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## **Effectiveness of Control and Coordination of Global Software Development (GSD) Projects**

**Dr. Jeevan H.M.**

Guest Faculty, Yuvaraja College, Mysore, Karnataka, India

### ***Abstract:***

*Control and Coordination effectiveness in developing the software projects globally, plays a major role in achieving the good quality and meeting the goals and objectives of the project. In the global software projects, the teams will be located in different locations across the globe. However, geographical distance between team members creates difficulties for the effective control and coordination during the project execution. Control and coordination is having a set of orientation factors which constitute structural and contextual pillars that form the management of global software development projects. Such structural and contextual pillars enable the control and coordination to help organisations to keep pace with the changes in competitive business environment more easily, rapidly and dynamically. The structural and contextual pillars of sophisticated control and coordination of software projects, work together towards achieving greater effectiveness. In the light of the current tendency to securing for achieving the effectiveness of control and coordination is possible in competitive business milieus by using proper tools, techniques, policies, framework during the different stages of the project. In this article, we have briefed and summarizes the effectiveness and the factors influences the control and coordination of global software development projects.*

**Keywords:** *GSD – Global Software Development, IS – Information Science*

### **1. Introduction**

To gain the benefit of lower costs of software development and access to international talent, innovation and technology sharing, GSD is a good solution for many organizations. There are many reasons why an organisation should consider adopting distributed development of software systems and applications, including access to a larger labour pool and a broader skills base and round the clock working. Despite the benefits, GSD has introduced issues for stakeholders which are not present in software projects developed in the same location (collocated projects). Due to development teams being in different geographical locations, differences in cultures and time zones adversely impact control, coordination and communication processes. Due to development teams being in different geographical locations, differences in cultures and time zones adversely impact on control, coordination and communication processes. The presence of cultural, lingual, social, temporal and geographical differences not only impacts the communication process in GSD, but also introduces challenges for development teams in establishing and managing shared repositories for requirements.

### **2. Scope**

The study is limited to the selected software companies in Karnataka. The software companies in Karnataka were selected taking into consideration various parameters like the number of employees, organisation's age, investment outlay, global exposure and market share in the respective area of specialisation.

### **3. Research Methodology**

This article has been undertaken to assess the effectiveness of control and coordination of GSD projects in selected software companies in Karnataka. We explain the purpose, design of the study, participants, instruments, procedure and statistical techniques used. Research on control and coordination of GSD projects is of great relevance to modern industry as it provides a new dimension to the understanding of how to deal with organizational problems in software industries. Since the problem to be investigated is relatively new, we have chosen an explorative approach.

The empirical study was accomplished through data collection from Project Managers, Team Leaders and software Developers experienced in working with software development projects involving software industries. To obtain the data a well-designed and structured questionnaire has been used and the data for the present study was culled out from both primary and secondary sources. The

secondary data is collected by referring the books and searching the websites to present the conceptual foundation of the control and coordination of GSD projects.

The primary data relates to the perceptions of the software development professional groups are Developers, Team Leaders and Project Managers. At present there are more than 2,500 well established software development companies in Karnataka, out of those most of the companies are located in Bangalore alone. Among them, there are nearly 350 major software companies has a footprint across globe. For the purpose of the study, 10 percent of the major companies have been selected on random basis. From each selected software company 20 respondents were chosen for eliciting responses. When the structured questionnaires were served to all the respondents of the selected 35 companies, respondents from 3 companies did not respond to the request. Out of the responses received from 640 respondents, 140 respondents have failed to respond to the request in an orderly manner. Hence only 500 completed questionnaires in all respects were received and considered for the detailed study. The response towards management of GSD project was collected by serving a structured questionnaire on five-point Likert scale. For analysis and interpretation of data, weighted mean value, standard deviation, t-test was used.

The data processing was done through SPSS for windows (version 16.0).

### 3.1. Pre-Tested Questionnaire

Data from the literature and the pilot study was used to build the preliminary research framework suitable for software business environment of evaluation of effectiveness of control and coordination of GSD projects. The pilot study was conducted prior to the formal data collection process in accord with the recommendation that conducting a pilot study is the final preparation for data collection. The pilot study helped in determining the usefulness of assessing the reliability and validity of the instrument so that the researcher could refine the data collection plans with respect to both the content of the data and the procedures to be followed before final drafting of questionnaire is distributed.

### 3.2. Reliability of the Tool

Once the data was collected, it was entered into the computer software for analysis. The obtained Cronbach coefficient is .6856, where we can say that the tool obtained to measure the effectiveness of control and coordination of GSD project is reliable.

### 3.3. Validation of the Tool

The validation of the tool was established through face validity and content validity.

## 4. Review of Literature

Van De Ven et al., (1976) has suggested that team members coordinate the most routine aspects of their tasks through task programming mechanisms e.g. software tools, schedules, plans, manuals, specifications, etc. and less routine aspects through team communication. However, while these traditional coordination mechanisms are important, various types of team knowledge may influence the effectiveness of these mechanisms, and the extent to which they actually need to be used.

Henderson and Lee, (2002) have proved that high-performing teams exhibit high process control by managers and high-outcome control by team members, and also they have showed that both managerial control and team member control coexists. In co-located teams formal control methods are used extensively to enhance team effectiveness; both outcome and behavioural controls are viable methods and can be effectively used in co-located project and development teams.

Minghui Yuan; Xi Zhang; Zhenjiao Chen; Vogel, Douglas R.; Xuelin Chu.(2009, pp. 494-507), among the numerous reasons for software project failure, coordination problems are especially salient. Prior studies on coordination in software development are confined to team internal coordination and do not explicitly differentiate team internal and external coordination processes. This study presents a research model to explain the antecedents of coordination effectiveness of software developer from interacting teams.

IS project success is a multi-dimensional variable, so no single measure alone can tap into the various dimensions of IS project success. Measures of IS project successes are, on-time completion, within-budget completion, costs/effort, meeting system requirements, system quality, user satisfaction, system use, and net system benefits (DeLone et al. 2005). The major dimensions of assessing customer performance are process performance (e.g. on-time/ on-budget completion, communication effectiveness, user participation, etc.) and product performance (i.e. performance of final deliverable) (Coopriider and Henderson 1991, pp. 67-87).

## 5. Analysis and Interpretation

Mean obtained and expected score on "Effectiveness of Control and Coordination of GSD Projects" and results of one sample 't' test

Mean	S.D	Mean expected (min)	Difference	't' value	P value
3.65	.097	4.00	.349	76.68	.0

Table 1

Source: Primary Data

The mean score for the entire sample was 3.65 out of the maximum score of 5. A minimum test value of 4.00 was fixed to see the agreement by respondents on the component 'effectiveness of control and coordination of GSD projects'. One sample 't' test revealed

a significant difference having deficit from the test value of 4.00 ( $t=76.68$ ;  $P=.0$ ). On an average the sample did not reach the mean agreement on the statement.

## 6. Findings

Effectiveness of control and coordination of GSD projects is not upto the mark, and it mainly depends on some of the key areas that are nature of the project, developer characteristic, problem situation and technology, also it influences the control and coordination management framework and structure in the organization.

## 7. Conclusion

Control and coordination of software projects among team members is difficult when performed locally, and it is even more challenging for stakeholders when performed across different geographical locations and time zones. Some of the obstacles in control and coordination of GSD projects are technology variation, difference in culture, knowledge variation among teammembers and improper policy/ framework formulation for communication. Each team member would find difficulties during the different level of projects based on his/her knowledge, experience, level of global exposure and the complexities involved in the project execution. In an organization taking into consideration some of the factors, control and coordination management can also be influences by market/ product oriented, technology and customer oriented activities. Some of the reason for changing in the recent past for changes in control and coordination management are mainly due to advanced technology, product/ market line expansion, organizational growth and improvements in strategies, policies and frameworks.

## 8. Suggestion

In order to avoid to make the changes at control and coordination processes, activities and operations, people should take the consideration on some of the areas like vertical and horizontal channels, market and product oriented activities, globally operated GSD projects and activities relates to customer and technology. For changes in control and coordination management, change should happen in proper ways that on the key areas are advanced technology, product/ market line expansion, organizational growth and improvement strategies, policies and procedures. While allocating the resource, some of the key things to be considered are employee availability, educational background, employee knowledge etc.

## 9. References

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