

**ASSURING R & D QUALITY ACROSS  
ORGANIZATIONS IN INDUSTRY -  
TECHNOLOGY INSTITUTION  
JOINT R & D PROJECTS**

**BY**

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**Biographical Notes:** Ganesh N. Prabhu is faculty in the strategy area at the Indian Institute of Management at Bangalore since April 1996 where he teaches courses in strategic management and new product development. He has a doctorate in business policy from the Indian Institute of Management at Ahmedabad and a masters in rural management from the Institute of Rural Management, Anand. Ganesh has published four papers in refereed books, two papers in refereed journals and six papers in non-refereed journals. He has presented seven papers in national and international conferences, four of which were published in refereed conference proceedings. He has also written three articles for business newspapers and has developed research or teaching cases on eight organizations. Ganesh has two years of industrial experience in turnaround and consulting assignments and has been on deputations and projects with fifteen organizations.

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## **ABSTRACT**

*This paper documents the formal and informal project quality assurance modes adopted across organizations within joint R&D projects between firms and technology institutions. It draws data from a diverse set of in-depth case studies developed by the author during an earlier process study of such projects.*

## **I. INTRODUCTION**

Joint R&D between industrial firms and technology institutions (TIs) (not-for-profit organizations, including universities, involved in technological R&D) is a topic of considerable research interest [3], [4], [5], [9], [10]. However the focus of most of these studies has been on their antecedent conditions [e.g. 4] or their consequences [e.g. 2] rather than on their important implementation process [1]. Clinical studies of the important TI-firm joint R&D implementation process are generally lacking [1]. However this paper is an exception in that it draws from case data developed by the author for a clinical process study [8] of one of the modes of TI-firm joint R&D - formally implemented TI-firm joint R&D projects.

TI-firm joint R&D projects are initiated when a firm faces a technological problem for which the TI has no ready solution and both TI and firm have complementary capabilities to solve the problem. A joint R&D project involves either sequential or simultaneous TI and firm based R&D, each working independently or together. By collaborating, both firms and TIs can expand the scope and range of their activities without increasing their infrastructural investment [4].

Quality assurance issues across organizations [11] arise at every stage in a TI-firm joint R&D project and have been found to be a matter of great concern for project participants [4], [8]. The choice of a collaborating organization is primarily guided by its quality reputation [4]. However

there is a lack of studies in this interesting and important area. Parameters of quality in R&D projects, such as project duration, project cost, appropriate choice of R&D route and effectiveness of project organization [11], need to be controlled, not only within each participating organization, but also across organizations [8]. The same also applies to the quality of the end product or process of the joint R&D project on usual parameters such as market suitability, ruggedness of design, cost effectiveness and reliability [11].

This paper documents the formal and informal project quality assurance modes [11] adopted across organizations that were identified by the author while conducting several in-depth case studies of a diverse range of TI-firm joint R&D projects [8]. It also describes the quality mechanisms used for the effective choice of partner and for effective project structuring in these projects [8]. Compared to R&D projects conducted entirely within a firm, such quality issues were found to be more complicated in the multi-organizational context. Assuring quality across organizations in such projects required the use of an appropriate and judicious mix of both formal and informal mechanisms, documentation and relationship building, as administrative fiat across organizations was not possible [8].

This research has implications in developing effective quality assurance mechanisms [11] across organizations in TI-firm joint R&D projects in particular as well as multi-organizational R&D projects in general.

## II. METHODOLOGY

The data used in this paper emerges from the author's earlier research [8] involving several in-depth process case studies [12] of a diverse range of TI-firm joint R&D projects. In that research, twelve such projects, undertaken by six firms with seven TIs, were selected for developing cases. The selected projects reflected a range of investment quanta, project sizes, variety of technologies, variety of industrial sectors, differences in TI-firm technology levels, types of R&D, types of firms, and types of TIs [8]. A variety of cases were chosen in an effort to develop a richer theory while providing an opportunity for replication and comparison [6].

Primary data was collected through in-depth semi-structured open-ended interviews of forty key project participants in multiple hierarchical levels and departments in the thirteen organizations, who were involved in the joint R&D projects. The methodological procedures and approaches presented in [6], [7] and [12] were adopted. The process case studies were used to build a grounded

[7] empirical base for theory development [6]. Finally a process model of TI-firm joint R&D projects emerged inductively from this case data [8].

This paper does not use the process model, but only uses the raw case data collected as described above. The detailed TI-firm joint R&D project case write ups presented in [8] were re-examined and quality assurance mechanisms within and across organizations were identified from these cases for analysis and presentation in this paper.

### III. QUALITY IN THE CHOICE OF PARTNER

The first and most important step in ensuring quality in the implementation process of a TI-firm joint R&D project was found to be the appropriate choice of partner. Firms and TIs in the cases [8] were found to use varied criteria in choosing and accepting their partners respectively.

Given that the TI had the required facilities and expertise, the most important reference point in the firm's choice process was its earlier experience with the TI. Satisfaction with the personal rapport and amicable relations developed over previous formal and informal interactions with the TI, was found to strongly guide the choice of partner and later also facilitate high quality project implementation [8]. In the few cases where there was total absence of earlier interaction, recommendations from acquaintances who had such interaction were used. At a secondary level, the quality reputation of the TI and the concerned scientist, and the firm's judgment about the interest and enthusiasm level of the proposed project team also guided the choice of partner by the firm [8].

Acceptances of the partnership offers by the TIs were also guided by similar considerations. Satisfaction with the personal rapport and amicable relations developed over previous formal and informal interactions with the firm, was found to strongly guide the TIs acceptance decision of the firm as its partner. In the cases where there was total absence of earlier interaction, recommendations from colleagues who had such interaction, if any, were used. The quality reputation of the firm, and the TIs judgment about the interest and enthusiasm level of the firm's proposed project team also guided its choice [8].

### IV. QUALITY IN PROJECT STRUCTURING

Once the partner was chosen, appropriate organizational and work structuring of the project teams across organizations was required to assure better quality in the project implementation

process. Multi-disciplinary projects usually require project teams with diverse academic and professional experience [11]. In the cases studied [8] it was found that, apart from appropriate work distribution within and across the project teams, facilitating communication channels across organizations were established at both the work level and the top management level to preempt and solve inter-organizational problems. If required, personnel from one organization were placed in the other organization to facilitate inter-organizational interaction, project implementation and subsequent technology transfer [8].

Amicable relationships and understanding between the project leaders of the TI and the firm was found to be critical in ensuring high quality project implementation, and in rapid resolution of difficulties and disputes. Frequent formal and informal meetings across organizations were important in clarifying communications, establishing effective work norms and resolving expectations on quality parameters such as project duration, project cost, appropriate choice of R&D route as well as the end product or process quality [8].

## V. QUALITY THROUGH FORMAL MECHANISMS

In the cases [8] it was found that a judicious mix of formal and informal quality enhancing mechanisms [11] were adopted by participating organizations in effectively implementing their joint R&D projects.

Some of the formal quality enhancing mechanisms identified in the cases [8] are given in this section. The next section presents some of the informal mechanisms identified in the cases.

The *formal* quality enhancing mechanisms identified were:

- (a) Joint brainstorming sessions before the project commencement and before each stage of the project to jointly arrive at, and agree upon, project specifications, as well as to resolve difficulties concurrently.
- (b) Regular and scheduled inter-organizational meetings with a high level of internal pre-meeting preparations.
- (c) Use of an independent administrative front by the TI to free the TI scientists from the routine administration of the project.
- (d) Formal interactive presentations and demonstrations by each project team to the counterpart team during the project.

- (e) Clearly articulated formal project organization structure which also depicted the coordination relationships for each participant within each organization and across the two organizations.
- (f) Effective balancing between each participant's routine workload and project workload, through a formal agreement between the project leader and the functional head across organizations in a multi-organization matrix organization structure.
- (g) Project team recruitments being made primarily by the project team leaders.
- (h) Insistence on clear and comprehensive documentation both for internal use by the preparing organization as well as for technology transfer across organizations.
- (i) Formal involvement of relevant people such as customers, marketing and finance personnel who fall outside the core technical project team, during crucial project decision making discussions.
- (j) Formal quality control clearances by both organizations at the completion of every sub-stage in the project.

It was found that these formal mechanisms also helped project participants understand their individual role in the project more clearly, thus facilitating them in implementing their part of the project more effectively [8].

## VI. INFORMAL MECHANISMS FOR QUALITY

Apart from the above listed formal mechanisms for enhancing quality in the project implementation process, participating organizations were found in the cases [8] to develop several informal mechanisms that facilitated quality building [11] in the project implementation process.

Some of the *informal* facilitating mechanisms identified in this study were:

- (a) Project leaders made consistent efforts to kindle enthusiasm, interest and a sense of "ownership" among project participants within their own organizations and sometimes even across organizations.
- (b) Project leaders and top managements facilitated project participants to interact across organizations in informal settings as well as non-project related settings such as conferences.
- (c) There were informal joint celebrations of project milestone completions and similar achievements.
- (d) Project leaders or top managements helped in building an atmosphere where failures and mistakes by participants were not immediately penalized, but considered an essential part of the learning process for achieving eventual success.

- (e) Participants were encouraged to understand and "speak in the other sides language" - develop a "thick" understanding of the partner organization's reference system and diverse points of view.
- (f) Mechanisms were developed to encourage openness and flexibility in the flow of information across organizations.
- (g) Participants were found to exhibit a willingness to accommodate changes during the project.
- (h) Project leaders and participants gave precedence to the use of personal and friendly relationships over formal written contracts, for controlling the project implementation process across organizations.

These informal mechanisms acted as strong positive signals to participants both within and across organizations. They encouraged and supported them in developing and sustaining a collaborative culture during the project, thus ensuring high quality project implementation [8].

## VII. CONCLUSIONS

This paper has depicted the effective quality assurance and control mechanisms that were developed and used across organizations in TI-firm joint R&D projects, as identified in several in-depth case studies [8] of such projects. Both formal and informal mechanisms were found to be effective in countering the natural difficulties of ensuring quality control across organizations in the absence of administrative fiat.

This paper provides crucial insights and practical tips for building quality [11] during the implementation of TI-firm joint R&D projects in particular, as well as multi-organizational R&D projects in general. It can also aid understanding by policy makers for the development of facilitating policy for quality assurance within a progressive program of such projects.

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