Effects of team familiarity and project changes on

NPD project development times[1]

Abstract

In this paper we propose a simple model to explain how familiarity among team NPD project members and the extent to which project factors changed over the lifetime of the project can affect trade-offs in order to shorten development time for new products. We show that project changes mediate the relationship between team familiarity and project development time trade-offs. Those trade-offs are related to sacrifices in product quality and product cost characteristics. Then that the lack of familiarity of team members contributes to the extent of project changes and, indirectly, contributes to more sacrifices in shortening the project development time.

Track – Product and Process Design

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INTRODUCTION

The traditional approach for new product development (NPD) established trade-offs for achieving high quality, low cost and short project lead-time with faster product time-to-market. With the increase in global competition, a fast time-to-market objective becomes a competitive and strategic weapon for organizations. Especially in the last twenty years, faster product development has been a competitive weapon for organizations by surprising competitors with new products or modifications to existing products (Maskill 1991). Strategies and techniques were suggested to accelerate new product development. Gold (1987) suggested eight strategies for accelerating product and process development. Among those strategies is the category of reliance on internal research and development processes. Smith and Reinertsen (1998) suggested many tools and techniques for reducing product development time. However, there are organizational pitfalls in using accelerated product development techniques. Crawford (1992) discussed several hidden costs of accelerated product development, including that a firm's complex set of resources can be chewed up by pressure from players on speed-up teams. Also, organizations must be aware of barriers to accelerated product development. Mabert et al. (1992), studying six cases, found that frequently changing product specifications is a significant major problem for achieving fast product development times in at least two organizations.

THE ROLE OF PROJECT TEAMS IN NPD PROJECT DEVELOPMENT TIME

Accelerated product development demands that project teams overcome the barriers of traditional functional organizations. Also, it is recommended that project teams have an inter-functional composition to address and integrate different functional perspectives in the NPD project (Swink 1998). However, the use of inter-functional teams *per se* is not a guarantee of smooth project development. Sethi (2000) found no support for the hypothesis that team functional diversity affects product quality. Gupta and Souder (1998) discussed about the difficulty of giving up control and empowering team members and incurring higher costs in managing communication flows, frustration and ambiguity. These authors found, studying major differences between companies with short and long product development cycle times, that in short-cycle companies, people often assumed whatever roles were needed, independent of their rank or function, to get the job done. We argue that this "fluidity" among team members is more likely in an environment where team members are familiar to each other.

Despite the potential benefit of using inter-functional project teams, there is little research about how team factors can influence project decisions, and, especially how those factors influence trade-off decisions about product quality and product cost when reducing product development cycle times. Most of literature on this topic address barriers that must be removed to allow team effectiveness. Crawford (1992) reported that a team leader, in one of the successful short-cycle-time projects studied, asked for 30-day orientation period for members to get acquainted, socialize, and prepare to work together. Based on

Crawford's results, we can hypothesize that team members with a low level of familiarity may face problems. Successful team integration can require more than a 30-day orientation period; it can require the removal of communication barriers that prevent members from addressing dependencies in NPD (Souder 1998, Hauptman and Hirji 1996). Pinto and Pinto (1990) suggested that informal communication techniques increase cross-functional idea exchange, which enhances team performance. Since informal communication is more likely between members familiar with each other and their way of working, we propose that team familiarity increases cross-functional idea exchange. Swink (1999) suggested that better team integration results when development personnel have easy access to each other and when functional groups work well together. Those are basic conditions for team familiarity. Susman and Dean (1992) suggested a model in which group process, represented by goal consensus and problem-solving capability, directly affects project outcomes such as cost, performance, schedule and quality. Based on the arguments of Swink (1999) and Susman and Day (1992), we propose that under conditions of team familiarity, team integration, team consensus and problem-solving processes are facilitated. Consequently, fewer changes will be expected during the project lifetime. We are not assuming that the project solution is better under team familiarity, but under this condition fewer changes in personnel, product objectives and technology would be expected. Fewer changes in those factors represent fewer trade-offs (such as product quality and product costs) organizations must make to achieve fast product time-to-market.

MODEL AND HYPOTHESES

Based on the arguments above, we present a model in which the degree of change over the lifetime of the NPD project mediates the relationship between team familiarity and the trade-offs made to reduce project development time (see figure 1).

The importance of analyzing project trade-offs reflects the increase in customer sophistication. Customers are demanding more product variety, functionality and performance and shorter product time-to-market (Mabert et al. 1992).

Project changes are described as factors related to product and market objectives, technology, and personnel. Team familiarity indicates the extent team members know each other and their ways of working. In order to shorten development time, we measured trade-offs against reduction in product quality and product cost. We hypothesized that the higher the degree of familiarity between team members, the lower the extent of project changes. Also, the lower the extent of project changes, the lower the trade-offs between project lead-time and product quality/product cost. According to our model, team familiarity does not influence project development time trade-offs directly, but indirectly, through the number of changes during project lead-time.
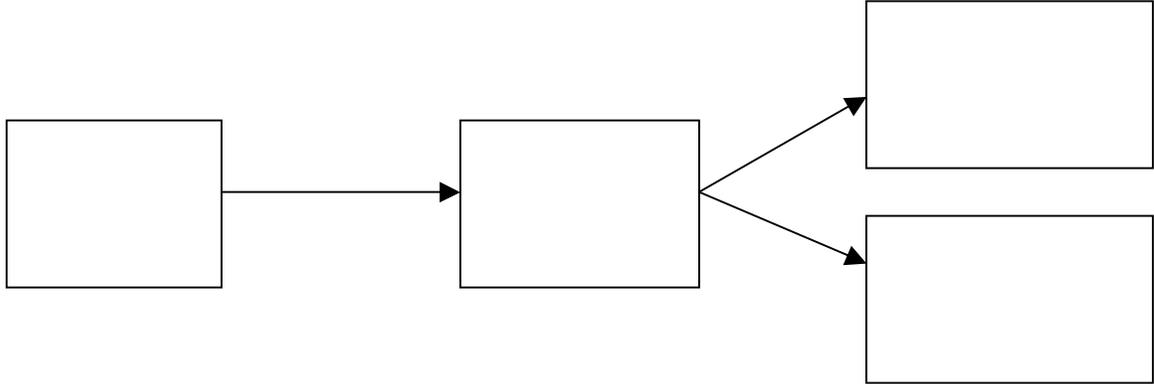
RESULTS

We tested our model using secondary survey data from an NSF-sponsored research project that examined the relationships between product development speed and quality (Flynn et al. 1999; Flynn et al. 2000). Data were collected regarding many different project characteristics for 38 NPD projects in five companies in the electronics industry. Multiple members of the NPD project team responded, including the team leader, up to five team members, the team sponsor, members of upper management, purchasing managers, and quality managers. For individual questions, the number of respondents ranged from 71 to 270. Having multiple respondents for each project increases the reliability of the data.

We analyzed bivariate correlations and scatter plots between our variables. We found that the Pearson correlation between our mediating variable (project changes) and team familiarity is -.519, indicating a high negative linear relationship (at .01 level) between these two variables. The Pearson correlation values between project changes and project development trade-offs are .448 for product quality trade-offs and .424 for product cost trade-offs, both significant at .01 level. Finally, the correlation between team familiarity and our two dependent variables are insignificant at .05 level (respectively, .029 for product quality trade-off and -.217 for product cost trade-off).

These results supported the position that project changes assume a mediating role between team familiarity and project development trade-offs. Despite the fact that team familiarity explained only 27.4% of the variance in project changes, it is an important

factor to call to the attention of project managers especially since it is a factor that can be influenced by management. Consequently, project mangers should monitor the lack of familiarity among project team members and use facilitators and tools for increasing the level of informal communication among team members to avoid negative effects on outcomes over the lifetime of the project. Less success at this task implies more sacrifices for shortening development project times.

Since we do not have a random sample and all companies are in the same industry (electronics industry), caution should be used in generalizing the results. Also, all of our measurements are perceptual. We reduced the opportunity for bias by choosing several respondents, including all team members in the questions related to team familiarity and project changes, and aggregating the results in a unique value for the project. Finally, the statistical analysis was performed with secondary data. While primary data are always better, the data collection process is arduous, and we believe that it is important for researchers to maximize the leverage from a given data collection effort by exploring as many valid research questions as possible.

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