A Conceptual Model for Development of New Product in SMEs by E-collaboration and Project Management

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Abstract - Being excessive time for new product development is one of the problems in most of the industries. Usually the time for production is longer than the first estimation. Then the companies lose their customers. Therefore, they can’t be competitive in the global market; also the cost for production will be increased. Specially small and medium size enterprises (SMEs) can’t successfully enter the market, unless they do the customer needs. In this study, we have proposed electronic collaboration between different sections in the company via project management is necessary for improving time and cost of new product. Other researchers already identified several factors are important for lead times in new product development projects like design, planning, product and procurement. We develop the model incorporation all these four factors, to estimate the time and cost.

Keywords: Project Management, E-Collaboration, New Product, SMEs, Reduce Time, Reduce Cost.

1. INTRODUCTION

Prior studies have illustrated small and medium sized enterprises (SMEs) have some problems inside their firms’, one of them is the excessive time for new product development. “As the global competitive pressure increases and product life cycle grows shorter, SMEs have to shorten their product development cycles (Mohammadjafari, Ahmed et al. 2010)”. Usually the time for a new production is longer than initially estimated. Then the companies cannot catch-up to their customers. Therefore, SMEs cannot remain competitive in the global market.

In this context, the authors propose that integration of different departments in one company is important for reducing time and cost in new product development. One way to integrate information is working under a web. The use of electronic collaboration (E-collaboration) technologies is essential for supporting projects (Qureshi, Min et al. 2005). In addition, project management has been considered in many sciences (Kollveit, Karlte et al. 2007).

The objective of this study is to reduce new product time and cost by establishing a relationship between a project manager and different departments of the company via E-collaboration. The main factors to be considered are department of design, department of planning, department of procurement and department of production. Previous researchers have discussed these items separately. In this study, these factors are combined to create and evaluate a new model.

2. E-COLLABORATION

Collaborative in different industries is essential for supporting projects. “E-collaboration and collaborative tools bring geographically dispersed teams together for virtual meetings across great distances. These results in
tremendous time and cost saving, greatly decreased travel requirements, faster and better decision-making and improved communications flow throughout the organization (Bafoutsou and Mentzas 2002).” “The field of collaborative computing encompasses the use of computers to support coordination and cooperation of two or more people who attempt to perform a task or solve a problem together (Borenstein 1992).” Then in this research we consider to E-collaboration between different departments in one factory and project manager.

3. PROJECT MANAGEMENT

“Project management is a methodology for managing a project.”(Ramaprasad and Prakash 2003) “Project management, including the tools, techniques, and knowledge-based practices applied to manage the creation of products and services, is becoming an increasingly accepted and applied discipline across industry sectors.”(Jugdev, Mathur et al. 2007) “Project management can be defined as the process of controlling the achievement of the project objectives”.(Munns and Bjeirni 1996) “Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from the projects. Meeting or exceeding stakeholder needs and expectations invariably involves balancing competing demands among:

- Scope, time, cost and quality.
- Stakeholder with differing needs and expectations.
- Identified requirements (needs) and unidentified requirements (expectations).

Also project management is used to describe an organizational approach to the management of ongoing operations. This approach called management by projects, treats many aspects of ongoing operations as projects in order to apply project management to them” (Guide 2004). “Project management is the manner of implementation, of expertise, paraphernalia, knowledge and modus operandi to an extensive range of activities for the fulfillment of prerequisite of the specific project(Qureshi, Warraich et al. 2009).”

4. THE MAJOR CHARACTERISTICS OF SMALL AND MEDIUM ENTERPRISES (SMEs)

For better understanding of SMEs actions, summary information of the SMEs characteristics is listed in Table 1. “SMEs are in a more advantageous position in terms of structure because it facilitates faster communication line, quick decision-making process, faster implementation, short decision-making chain, higher contribution as a source of ideas in their operations and innovation, unified culture and very few interest groups (Kraiportsak 2002).” “A majority of SMEs have simple systems and procedures, which allows flexibility, immediate feedback, better understanding and quicker response to customer needs than larger organizations(Deros, Yusof et al. 2006).” “SMEs employees are given the authority and responsibility in their own work areas that can create cohesion and enhance common purposes amongst the workforce to ensure that a job is well done.”

Table 1: Strengths of SMEs.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>References</th>
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<tbody>
<tr>
<td>Easily adaptive to new market conditions, flexible to change, developing</td>
<td>(Mezgár, Kovács et al. 2000; Aragón-Sánchez and Sánchez-Marín 2005; Davis and Sun 2006;</td>
</tr>
<tr>
<td>customized solutions for partners and customers, dynamic in activities</td>
<td>Ale Ebrahim, Ahmed et al. 2009)</td>
</tr>
<tr>
<td>Knowledge creating</td>
<td>(Egbu, Hari et al. 2005; Ale Ebrahim, Ahmed et al. 2009)</td>
</tr>
<tr>
<td>Excellent at multi-tasking</td>
<td>(Schätz 2006; Ale Ebrahim, Ahmed et al. 2009)</td>
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<tr>
<td>Powerfully correlated and inter-related with respect to innovation</td>
<td>(Huang, Soutar et al. 2001; Jutla, Bodorik et al. 2002; Bhagwat 2006; Gray 2006)</td>
</tr>
<tr>
<td>Capable to answer quickly to customer requests and market changes,</td>
<td>(Abdul-Nour, Drolet et al. 1999; Kim, Knotts et al. 2008; Ale Ebrahim, Ahmed et al. 2009)</td>
</tr>
<tr>
<td>customers focused</td>
<td>(Lawson, Longhurst et al. 2006; Schätz 2006)</td>
</tr>
<tr>
<td>Quick decision making process</td>
<td>(Lawson, Longhurst et al. 2006; Schätz 2006)</td>
</tr>
<tr>
<td>Weakness</td>
<td>References</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
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<tr>
<td>Lagging in the export, absence the resources necessary to enter overseas markets</td>
<td>(Mahajar, Abdullah et al. 2006; Jansson and Sandberg 2008)</td>
</tr>
<tr>
<td>Fragile at converting research and development into effective innovation</td>
<td>(O’Regan, Ghobadian et al. 2006; Ale Ebrahim, Ahmed et al. 2009)</td>
</tr>
<tr>
<td>Limited manpower and resource</td>
<td>(Abdul-Nour, Drolet et al. 1999; Chou 2008; Kim, Knotts et al. 2008; Westerlund and Rajala 2008)</td>
</tr>
<tr>
<td>Policy formulation biased on what available, not have a long run perspective</td>
<td>(Yusuff, Chek et al. 2005; Ojeda-Gomez, Simpson et al. 2007)</td>
</tr>
<tr>
<td>Imperfect degree of information technology achievement</td>
<td>(Sarosa and Zowgh 2003; Igbe, Hari et al. 2005; Eikebrok and Olsen 2007; Chou 2008)</td>
</tr>
<tr>
<td>Lack of industrial engineers or right kind of manpower to apply various statistical and managerial methods or tools</td>
<td>(Ahmed and Hassan 2003; Ale Ebrahim, Ahmed et al. 2009)</td>
</tr>
<tr>
<td>SMEs shy away from formal projects and long-term initiatives and instead only participate in small-scale, once-off initiatives</td>
<td>(Burke and Gaughran 2006)</td>
</tr>
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</table>

Table 2: Weakness of SMEs.

5. NEW PRODUCT AND SMEs

“New product development is of high importance for both large and small and medium sized organizations (Pullen, de Weerd-Nederhof et al. 2008).” “Small- and medium sized organizations (SMEs) have a number of typical problems with regard to their innovation process, especially in the shift from the development stages to the commercialization stages (Hanna and Walsh 2002).” “They are more confronted with financial constraints, they have more manpower bottlenecks in terms of too few or unqualified personnel, and they often don’t have the possibility to substitute for the lack of sales and profits through other products (cash cows) which makes it necessary for these companies to cooperate with other organizations” (dt ling 2002).” “On the other hand, SMEs also have some advantages with regard to new product development, which makes them very suitable as network partner. SMEs are usually less bureaucratic, and generally have greater incentives to be successful than large firms (Michael and Palandjian 2004).”

In these situations, “companies offer their customers the right products in terms of features and quality, at the right time and at the right price can expect market success (Kusar, Duhovnik et al. 2004).” “A multidisciplinary approach is needed to be successful in launching new products and managing daily operations (Meyer 2006).” “In the NPD context, teams developing new products in turbulent environments encounter quick depreciation of technology and market knowledge due to rapidly changing customer needs, wants, and desires, and technological “know-hows” (Akgün, Byrne et al. 2007). There are a few investigators done to evaluate NPD performance. For example, (Cooper et al., 2004) discover different measures of NPD performance at the project levels and various plans (Cooper, Edgett et al. 2004). “Measures of the performance of the entire NPD program include the percentage of business profits from new products and the
success rate of launched/developed products. All of these measures show that NPD brings positive growths. With some exceptions, there is general agreement that the new product development (NPD) process is not adequately studied in small and medium enterprises (SMEs) and models and tools specifically focused for these units are lacking. This deficiency is particularly evident where SMEs located in industrial districts are concerned (De Toni and Nassimbeni 2003)."

6. METHODOLOGY

By investigation in the literature review, we found that the long time required for new product is a problem in firms especially in SMEs. Four departments are influential in reducing new product time. This paper adopts a theoretical-conceptual research, and proposed that if these departments (design, procurement, planning and production) work together through project management, the time for a new product will decrease.

The development of this model was based on empirical experience and interviews with 20 project managers in SMEs in Iran. The interview was done by voice chat and PC calls. Information on the respondent organizations is presented in Table 3.

7. CONCEPTUAL MODEL AND THEORETICAL FOUNDATION

As indicated by the review of the literature, it is cleared that the long time that is needed for new product is a serious problem for SMEs (Roemer and Ahmadi 2010). However, an examination of the interdisciplinary literature (Xie, Huang et al. 2002; Lifang, De Matta et al. 2009; Xia-Bao and Li-Xi 2009) identifies four departments that affect the completion of projects in terms on time and within the budget: design, planning, production and procurement. The effects of these four departments have been studied separately under several theoretical perspectives in recent years. No studies, however, used these four stages together.

To understand the importance of coordinating these sections with the project manager, we interviewed 20 project managers in Iran.

The majority of project managers we interviewed stated that the lack of coordination between the related departments in production is major problem in reducing time and cost. Our interviews led us to the conclusion that the long time for new products resulted from a lack of coordinating mechanisms.

Using the information from these case studies, we developed a conceptual model that characterized the major activities required for interdepartmental collaboration in new product development. However, the answers to the two major questions that emerged from our case studies remained elusive:

I. Are all four of these departments efficient?
II. What is the relationship between these four departments and project management for development time?

Table 3: Characteristics of the sample.

<table>
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<tr>
<th>Characteristics of the respondents (n=20)</th>
<th>Percentage of sample</th>
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<tbody>
<tr>
<td><strong>Function</strong></td>
<td></td>
</tr>
<tr>
<td>Project manager / director</td>
<td>30</td>
</tr>
<tr>
<td>Project manager / senior advisor</td>
<td>25</td>
</tr>
<tr>
<td>Project manager / general manager</td>
<td>45</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
</tr>
<tr>
<td>PhD’s degree</td>
<td>10</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>35</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>55</td>
</tr>
<tr>
<td><strong>Project management experience</strong></td>
<td></td>
</tr>
<tr>
<td>More than 20 years</td>
<td>5</td>
</tr>
<tr>
<td>15-20 years</td>
<td>20</td>
</tr>
<tr>
<td>10-15 years</td>
<td>15</td>
</tr>
<tr>
<td>5-10 years</td>
<td>60</td>
</tr>
<tr>
<td><strong>Specification domain</strong></td>
<td></td>
</tr>
<tr>
<td>business</td>
<td>45</td>
</tr>
<tr>
<td>engineering</td>
<td>55</td>
</tr>
</tbody>
</table>

Our case studies suggested that companies that had reduced time for new products, had better interdepartmental collaboration. Four critical elements of this process are captured in the explanatory model as shown in Fig. 1.

For this conceptual model, we consider five hypotheses:

**H1.** The communication between a designer in the department of design and project manager is essential before starting the production.

**H2.** Coordination between product manager and project manager is necessary for improving time of new production before the start of production.

**H3.** Procurement manager has to report to the project manager about preparing equipment before starting a project.
**H4.** The project manager has to know about the product plan and then the control project manager must report to a project manager before arriving at the project in the line of product.

**H5.** Time (H5a) and cost (H5b) for manufacturing of new product will be reduced with E-collaboration among different parts of companies.

**8. CONCLUSION**

We have presented some definitions of E-collaboration, project management and SMEs for reduce time and cost in new product. Some concluding points deserve attention. First, the literature has established that new product development takes a long time, especially in SME. Second, the conceptual model reflects the need for collaboration between departments of design, planning, procurement and production in a company through project management via net.

Consequently, incorporation of four factors are going to open a guideline for the future researchers towards effective improvement in terms of time and cost for a new product introduction.

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AUTHOR BIOGRAPHIES

Marjan Mohammadjafari is Industrial Engineering PhD candidate in the Department of Engineering Design and Manufacture, Faculty of Engineering, University of Malaya. She holds Master of Industrial Engineering from University of Zahedan in Iran and Bachelor of Electrical Engineering from university of Kerman, Iran and 7 years of experience in project manager in industrial companies in Iran. Her research interests focus on the role of E-collaboration in reduce time and cost by project management approach for new product development in SMEs.

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