

A Review of Literature on Reducing Time and Cost of New Product in SMEs through Project Management by E-Collaboration

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Abstract

Efficient project execution is an objective in many industries, and existing project management research gives direction about how project team factors influence two important capital project outcomes: time and cost. In addition, use of electronic collaboration (E-collaboration) technologies is essential for supporting projects. Combining a literature review with our empirical experience, we constructed a theoretically based, four-dimensional model of department of design, department of planning, department of production and department of procurement. One major practical implication of our findings is that relationship between project manager and four noted departments by E-collaboration is vital for reduce time and cost in small and medium size enterprises (SMEs). In this article, we describe project management, E-collaboration, SMEs and new product and review some article around this area.

Keywords

E-collaboration, project management, SMEs, new product, reduce time and cost

1. Introduction

Manufacturing industries play an essential role in many countries. SMEs are a part of manufacturing industries, but they have some limitation for attended and remain in the global market. SMEs can successfully enter the global market if they can fulfill the customer needs regarding features and quality of products. For this condition, they need to increase new product but almost the time for new product is more than first estimation. One of the ways for reduces time and cost in new product is collaborative between different departments of one factory. By investigation in the prior studies the author found four department have a key role in SMEs, this four departments are; department of design, department of production, department of planning and department of procurement. Collaborative has many ways and many tools; one of these tools is E-collaboration. As some authors illustrated that the use of E-collaboration technologies is essential for supporting projects.[1] one the other hand From many industries, project management has become a way to better working [2]. In this paper we review and introduce E-collaboration, project management, new product and SMEs and describe about some paper published about reduce time and cost.

2. Review Search Methodology

This review article is based on reliable publications. It covers aspects like SMEs characteristics, scope of reduce time and cost by E-collaboration through project management approach. The articles are collected from the famous journals and books related to the topic published since 1996.

There is a poor track record considering on the reduce time and cost by e-collaboration through project management. Just a few studies have been done around this subject. In order to prove this allegation, the distribution of published articles per year extracted from Web of Science database is demonstrated in Figure 1 and 2.

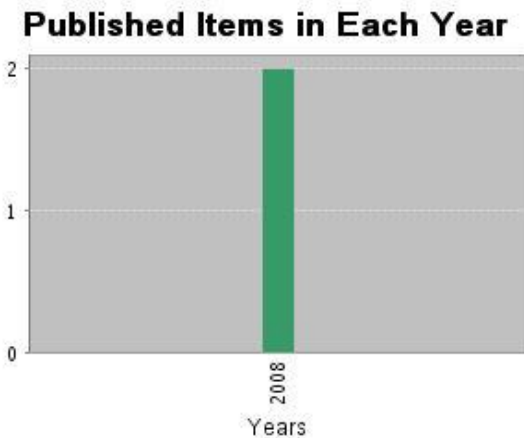


Figure 1: Trend of E-collaboration, Project management and New product (Source Web of Science 2010)

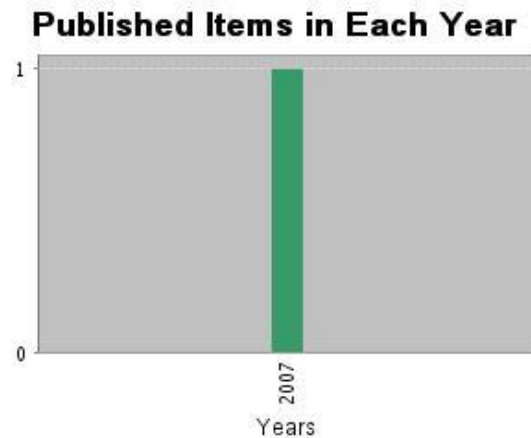


Figure 2: Trend of E-collaboration, Project management and SMEs (Source Web of Science 2010)

Therefore, in order to find out formations, actives and management involvement in the field, we consider to a broader scale of literature.

The used references contain approximately (28) articles out of 100 selected articles, which were took out from 545 pre-investigated items.

3. What is E-Collaboration?

For better understanding, the authors describe the meaning of E-collaboration. “E-Collaboration is collaboration among different individuals to accomplish a joint task using electronic technologies [3].” The categories and tools of E-collaboration are different, as below:

3.1 Categories of Collaborative Tools

There are four categories of electronic collaboration.

3.1.1 Computer Conferencing

“Space for asynchronous and threaded discussions as well for real-time text talk and real-time discussions is provided, and files and documents are shared. There is a possibility that users see and work on documents simultaneously, or on each other’s screen, or on a whiteboard and mailing capabilities are also provided. Audio and video conferencing are quite common [4].”

3.1.2 Electronic Meeting Systems (EMS)

“Meeting conduction is the basic functionality of the EMS category. Meetings can either be regular (same time, same place), synchronous (same time, different place), or asynchronous (different time, different place). Meeting participants are notified through email, and have the possibility to chat, conduct real-time discussions, use audio and video conferencing facilities, write or draw in real-time on a blank slide, participate in surveys-anonymously if preferred-and make group decisions, share documents and files, show and annotate PowerPoint slides, share live software applications and even work simultaneously on documents. Apart from the work-centered activities, the team also engages in team-centered activities including greeting, seeking additional participants, introduction and parting. Finally, meeting-centered activities support the meeting process including its set-up, maintenance of the agenda and minutes, and distribution of the minutes after the meeting [4-5]”.

3.1.3 Group File and Document Handling

“The core functionalities of this category involve working with documents and files. In the simplest form, users only have a shared view of files/documents, while advancing; there is also possibility for individual editing, document/file management and storing in a central database, as well as collective authoring and revision of documents. Synchronous work on documents can also be a part of a group document-handling tool. In addition, basic communication capabilities, such as e-mail notifications and e-mail, are provided[4].”

3.1.4 Electronic Workspace

“The primary idea is to provide teams with a common space to coordinate and organize their work. Groups can centrally store documents and files, work with them, solve problems through discussion, keep to-do lists and address books with information about group contacts, and even track project milestones and project interactions. There are workspaces for different groups, and users may be members of several workspaces with each workspace corresponding to each project a user is involved with [4, 6].” In this paper, the author used electronic workspace for the relationship between four departments and project management.

The tools for this category are “Forum, e Room, Group PORT, Info Workspace, Platform, Joint Planning, Groove, GroupWise, Hyper Office, Intraspect c-Business, Quick Place, team on and Team Wave. And for E-collaboration we have used Froum [4].” “Forum (SiteScape, USA)—Forum provides a way to communicate, share resources and collaborate with groups of people within a company or across organizations. Users can conduct threaded discussions and there is also a chat capability as well as support for creation of private work areas, where tools for team discussion and document sharing are included [4].”

4. Project Management

4.1 Why does project exist?

For better understanding the concept of project management first, we express why does the project exist? “First, a project exists because there is something important and complex to be solved. Second, a project organization exists because there is a need for a purposeful organization effort and a high need of coordination in order to execute a number of tasks/activities [7]. ”

4.2 What is project management?

“Project management is a methodology for managing a project [8].” “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 [9]. ”

“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 [10].”

5. What is Small and Medium Enterprises?

According to Ale Ebrahim et al “there are many accepted definitions of SMEs in addition the classifications vary from industry to industry and from country to a country, different countries accept dissimilar criteria such as employment, sales or investment for defining small and medium enterprises. In the absence of a definitive classification, a consensus has developed around the European Commission (EC) criteria for SME classification; this definition adopts a quantitative 4 approach emphasizing “tangible” criteria, employee numbers (Fewer than 250 employees), turnover (Less than 50 million) and balance sheet statistics (Less than 43 million)[11]. ”

6. What is New Product?

“New product development (NPD) is a business process for developing new products for a company, whether it is an upgrade of an existing product or a new concept (either for the company or for the customer). It includes all activities from the development of an idea or a concept for a product, to the realization of the product during the production stage and its introduction into a market place[12].”

7. Key Factors for Reduce Time and Cost

“In order to succeed, companies must deliver projects on time and within budget, and meet specifications while managing project risk [13].”The effective factors for reduce time and cost have been discussed by many researchers. In order to realize the objectives of the study, only four factors are used. These factors are design, planning, product, procurement, as shown in Table 1.

Table 1: The key factors for reduce time and cost based on literature review

Source information			Search Result	Subjects																				Performance Effects		Research Methodologies																															
Number	Author(s)	Year	E-collaboration	Project management	manufacturing	product	design	procurement	planning	quality control	organization	innovation	process	tool	product complexity	involvement of partners	concurrent product	team structure	project strategy	concurrent engineering	training & rewarding	simplification of structure	lead user	Supplier integration	virtual production	Time Compression Technologies	CAD technology	setting buffers	Identifying critical chain	development capacity	techniques	speed	Time	cost	Quality	variety	other	Simulation	Process Model	Theory-Building Framework	Case study (small n)	Empirical (large n)	Experiment	Math Modeling	www-based	Review	statistical	pattern matching	prototype	pilot study	creative software						
1	Thomas B. Clift	1996	✓												✓	✓																	✓																								
2	Abbie Griffin	1997	✓																															✓																							
3	Carter, J	1997																																																							
4	Hartley, J. L	1997	✓						✓																																																
5	Hebert, John E	2000	✓																																																						
6	Athakorn Kengpol	2001																																																							
7	Xie, S. Q.	2002	✓	✓											✓																																										
8	Janez Ku&sar	2004																																																							
9	Kenneth J.	2005	✓	✓																																																					
10	Fraunhofer ALB	2005																																																							
11	Tan, Chong Leng	2006																																																							
12	M Roberts	2006	✓																																																						
13	Zhou, Z. D	2008	✓	✓	✓	✓	✓								✓																																										
14	Hamdi A. Bashir	2008	✓	✓												✓																																									
15	Fred Langerak	2008																			✓		✓																																		
16	P. Selvaraj	2009					✓	✓																																																	
17	XIA-BAO	2009	✓	✓					✓																																																
18	Lifang Wu	2009																																																							
19	Vinodh, S	2009	✓																																																						
20	Thomas A. Roemer	2010	✓	✓																								✓																													

7.1 Design Factor

Zhou, Z. D in 2008 [14] has supposed a www-based collaborative between designer and engineers in the different department is effective to reduce the amount of reworks and shorten the product development cycle. The author has developed a WWW-based Collaborative Design and Manufacturing System (WCDMS) for integrated mould product development. However, in the injection molding enterprises, the product information, tool information and manufacturing information is the most important information to hold up the collaborative mould product development. Xie, S. Q. in 2002 [15] has presented a www-based information management system for rapid and integrated mould product development. The system was built in two parts, information management system and an integrated platform. The first part includes distributed relational databases, STEP databases and knowledge bases, WWW database tool (WDT), and user interfaces for the different departments of the company, to manage the product information. The second part includes a collaborative communication tool, an information access tool, an incremental process planning (IPP) user interface and a cost optimization model. This platform is developed by using current WWW development tools. The application tools are developed as agents that run in a distributed environment. Thomas A. Roemer in 2010 [16] presented two advances that harmonize production streams through the manufacturing system for reducing manufacturing lead times. P. Selvaraj has presented that one of the ways for reducing time and cost is design for manufacturing, the author sketch out the DFMA considerations to sheet metal parts considering things such as homogeneity of numerical profiles and integral part design through parts count reduction.[17] M Roberts has defined the (SAE) service assembly environment including the design phase of a product is important for Improving product times, and the author use the intelligent network's area.[18] Lifang Wu illustrated that modular component parts for designing product can develop time of new product, the author prove this idea with mathematic model [19]. Tan, Chong Leng has proved the use of CAD technology develop product development performance (development time, product quality, and design productivity) and to reduce product costs [20].

7.2 Planning Factor

XIA-BAO has illustrated that four steps involved defining a project, identifying a critical chain, setting buffers and constructing the project plan, is important to set lead-time. For proving an approach the author uses a simulation experiment.[21] Hebert, John E has proven by combining software project for planning like Microsoft project and traditional programming concurrently, the time and cost of construction projects decrease.[22]

7.3 Product Factor

Xie, S. Q. in 2002[15] has designed a Web-based information management system in the production line for rapid and integrated product development. Thomas A. Roemer in 2010[16] presented two advances that harmonize production streams through the manufacturing system for reducing manufacturing lead times. Abbie Griffin[23] has proved the cross-functional teams are important for development cycle time. Hamdi A. Bashir [24] has done a modeling of development time for hydroelectric generators. The model uses three factors, namely, product complexity, involvement of partners in the development process, and generator speed. Building of the model is based on the use of past data from earlier finished projects.

Thomas B. Clift[25] contrast the long and short cycle projects time, the short cycle complex projects run by leaders and use external sources of information also they were formal in their approach in NPD project management. However, in long cycle project leaders hold on to standardize and use less external sources of information. Finally it is evidenced short cycle complex projects require a different type of management process.

7.4 Procurement Factor

Fred Langerak in 2008 [26] has proven five factors is important for acceleration approaches on development speed, (i.e., supplier involvement, lead user involvement, speeding up activities and tasks, training and rewarding of employees, and simplification of organizational structure). Kenneth J .Petersen has illustrated that the supplier integration is important for reduce new product time, increase cost and also better quality.[27] Hartley, J. L at all in 1997 illustrated managing the buyer-supplier interface is important for on-time performance in product development.[28]

8. Conclusion

In this study, we expressed some definitions about conceptual of E-collaboration, project management, SMEs and new product. Our findings emphasis if the SMEs want to competition in the market, they have to develop their new product, and collaboration is one of the ways to success production in manufacturing. However, collaboration has some tools; one of these tools is electronic collaboration. This paper is just a review about the importance of departments of design, planning, procurement and production in SMEs for reducing time and cost. Future research can improve new product by this information in the manufacturing companies.

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