

A Conceptual Model for Creating a Favorable Environment to Reduce the Production Time and Cost of Production by E_collaboration

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Abstract: The companies need to the implementation the projects on time within budget for achievement the success and competitive in the market. The prior researcher illustrated many method and model for development time in new product. For this purpose, in this research the author created a new model and allegation the electronic collaboration (E_collaboration) by a project manager can create a favorable environment to reduce the production time and cost of production of new product. This model is composed of four construct: design, planning, procurement and production. For initially evaluated the model the author has done interview with 20 project managers in electronic industry in Iran. Analysis of the questions of the interview confirms the use of E_collaboration by project management to successful projects in terms of time and cost.

Key words: E_collaboration; Project management; Development time; Reduce cost; New product.

INTRODUCTION

Previous researchers have shown many companies, especially small and medium sized enterprises (SMEs) have problems in terms of time and cost in new product. As the global competitive pressure increases, SMEs have to shorten their product development cycles (Mohammadjafari, Ahmed, *et al.*, 2010). Generally, the time for a new production is longer than, firstly, estimated (Mohammadjafari, Ahmed, *et al.*, 2011). Then the companies lose their customers and cannot remain competitive in the market. In this paper, the authors propose that share knowledge between different departments help the companies for reducing time and cost in new product t. One way to integrate information is functioning under a web. (Mohammadjafari, Dawal *et al.*, 2011) The use of electronic collaboration (E-collaboration) technologies is tendered by prior researchers for supporting projects (Qureshi, Min *et al.*, 2005). Also, project management has been considered by many researcher (Kolltveit, Karlsen, *et al.*, 2007). The objective of this study is reducing new product time and cost by share knowledge between different departments by E-collaboration through a project manager. The main categories to be considered are department of design, department of planning, department of procurement and department of production. Prior researchers have discussed these items separately. In this study, these factors are combined to create and evaluate a new model.

Literature Review:

Faster implementation projects have been a goal for many industries. Completing projects earlier may crate many benefits. Additionally, earlier completion of projects generates time and cost saving. Many approaches have been purposed to development time by many researchers in different years. For example, Callahan *et al.*, pointed out that sales and marketing involvement in defining product requirements, supplier involvement early and late in the development cycle, Frequent load builds and system tests are useful for reducing software product development times (Callahan and Moreton, 2001). Zirger *et al.*, elaborate that cross functional and overlapped development activities are effective at acceleration techniques on product development time (Zirger and Hartley, 1996). Bashir *et al.*, illustrated involvement of partners in the development process has a good accuracy for estimating development time (Bashir 2008). Ali *et al.*, proposes that product innovativeness moderate the link among development time and initial market (ALI, 2000). Marc H *et al.*, found the need to integrate multiple technologies necessary to extend development performance in product development (Meyer and Utterback, 1995). Kusar *et al.*, illustrated concurrent engineering lead the product to development time

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(Kusar, Duhovnik *et al.*, 2004). Selvaraj proved design for Manufacture, and Assembly (DFMA) is important in product development and it considerations to standardization and simplification of manufacturing processes also it facilitates integration of function (Selvaraj, Radhakrishnan, *et al.*, 2009). Swink proved marketing-manufacturing integration (MMI) is useful in new product development (Swink and Song, 2007). Gerwin found integrated product development (IPD) generates contact between activities and overlaps activities in the new product development process (Gerwin and Barrowma, 2002). According to Lifang, designing products by modular component parts help the producer to produce in shortening time and speed up new products in the marketplace (Lifang, De Matta, *et al.*, 2009).

Table 1: Prior research about reduce time.

Source information			Performance Effects		Description
No	Author (s)	Year	Development time	Cost saving	Description
1	Callahan	2001	✓		Sales and marketing involvement in defining product requirements, supplier involvement early and late in the development cycle, frequent load builds and system tests
2	Zirger	1996	✓		Cross functional, overlapped development activities
3	Bashir	2008	✓		Involvement of partners in the development process
4	Ali	2000	✓		Initial market
5	Marc H	1995	✓		Integrate multiple technologies
6	Ku&sar	2004	✓		Concurrent engineering
7	P. Selvaraj	2009	✓	✓	Design for Manufacture and Assembly (DFMA)
8	Swink	2007	✓		Marketing-manufacturing integration (MMI)
9	Gerwin	2002	✓		Overlap and interaction between activities
10	Lifang	2009	✓		Designing products with modular component parts

Our studies about reducing the production time and cost of production of new product indicated important gap. This gap is the lack of E_collaboration through a project manager between related factors for production. There are four categories for collaborative tools: Group file and document handling, computer conferencing, electronic meeting system and electronic workspace (Bafoutsou and Mentzas 2002).

Table 2: Category tools belongs E_collaboration (Bafoutsou and Mentzas 2002).

Tools	Categories			
	Computer conferencing	Electronic meeting systems	Group file and document handling	Electronic workspace
Intranets	✓			
Project place	✓			
Team Talk	✓			
Web Board	✓			
Meeting Place	✓			
Same time	✓			
Evoke Collaboration		✓		
Facilitate.com		✓		
Meeting Room		✓		
Place Ware		✓		
Team Now			✓	
Common Space			✓	
Document			✓	
Docu Touch			✓	
eRoom				✓
Forum				✓
Platform				✓
Joint Planning				✓
Teamon				✓
Team Wave				✓
Quick Place				✓

However, there is not existing a defined e-collaboration between a different department in a factory in order to reduce time and cost.

In this research, the author tries to create a model and supposed E_collaboration between four departments through a project manager in the factory helps to reduce time and cost in new product.

Proposed Conceptual Model:

Our research of E_collaboration, project management and development time and cost in new product formed the basis for this proposed model. Prior research has illustrated many methods for development time and cost (Meyer and Utterback 1995; Herrmann and Chincholkar 2001; Kusar, Duhovnik *et al.*, 2004). However, a few of research discuss about E_collaboration through project management for development time and cost.

From our particularity literature, we found 12 success factors (independent variables) can lead the projects to achieve the success according to time and cost (dependent variable). After that we developed a model that integrated this comprehensive.

Figure 1 demonstrates the conceptual model for development time and cost in new product by E_collaboration through project management. The 12 identify success factors arranged into four dimensions: design, planning, procurement and production.

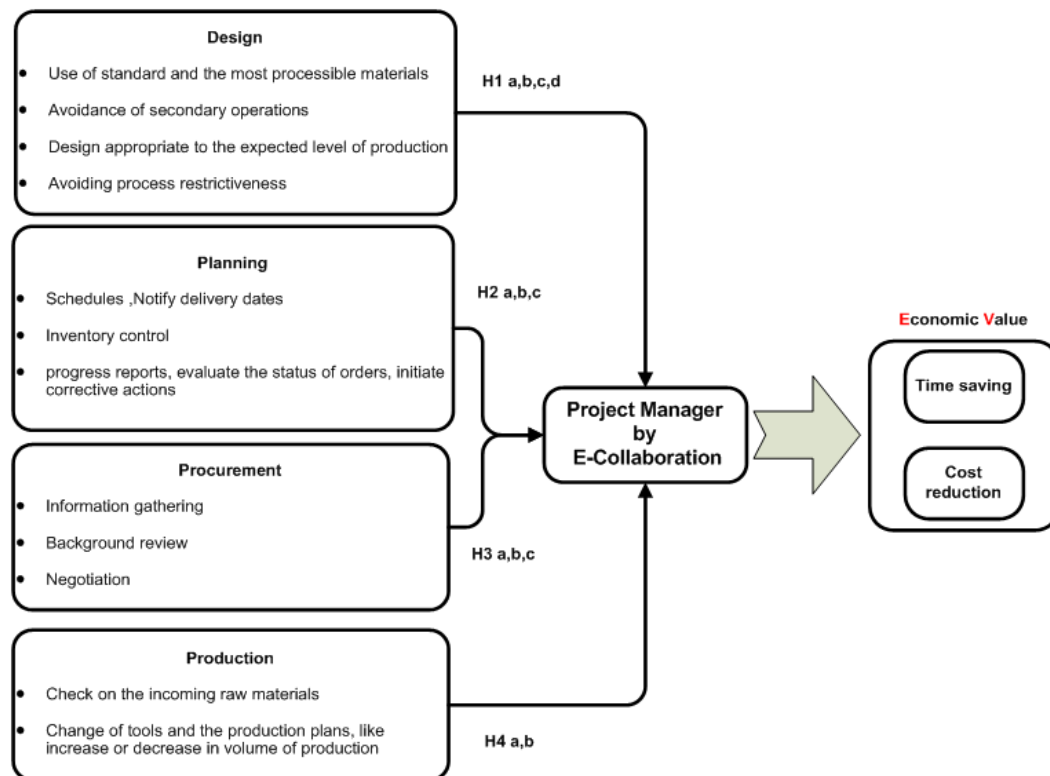


Fig. 1: The conceptual model.

Design:

Use of Standard and the Most Processible Materials:

Hypothesis 1a:

E_collaboration between the production design and materials procurement units used by a project manager can create a favorable environment to reduce the production time and cost of production in new product.

Teamwork with Manufacturing Personnel to Avoidance of Secondary Operations:

Hypothesis 1b:

E_collaboration between the design unit and production unit used by a project manager can create a favorable environment to avoidance of secondary operations to reduce the production time and cost of production in new product.

Design Appropriate to the Expected Level of Production:

Hypothesis 1c:

E_collaboration between the design unit for appropriate design to the expected level of the production and production unit used by a project manager can create a favorable environment to reduce the production time and cost of production in new product.

Avoiding Process Restrictiveness:

Hypothesis 1d:

E_collaboration between the design unit and production unit used by a project manager can create a favorable environment to avoiding process restrictiveness to reduce the production time and cost of production in new product.

Planning:

Schedules and Notify Delivery Dates and Cost Estimates:

Hypothesis 2a:

E_collaboration between the planning unit with design, procurement and production units used by a project manager to know about schedules and delivery dates can create a favorable environment to reduce the production time and cost of production in new product.

Inventory Control:

Hypothesis 2b:

E_collaboration between the planning unit with procurement and production units used by a project manager to inventory control can create a favorable environment to reduce the production time and cost of production in new product.

Receive Progress Reports, Evaluate the Status of Orders, and Initiate Corrective Actions:

Hypothesis 2c:

E_collaboration between the planning unit with design, procurement and production units used by a project manager to receive progress reports, evaluate the status of orders, and initiate corrective actions can create a favorable environment to reduce the production time and cost of production in new product.

Procurement:

Information Gathering:

Hypothesis 3a:

E_collaboration between the procurement unit with design, planning and production units used by a project manager to information gathering can create a favorable environment to reduce the production time and cost of production in new product.

Background Review:

Hypothesis 3b:

E_collaboration between the procurement unit with design, planning and production units used by a project manager to background review can create a favorable environment to reduce the production time and cost of production in new product.

Negotiation:

Hypothesis 3c:

E_collaboration between the procurement unit with design, planning and production units used by a project manager to negotiation can create a favorable environment to reduce the production time and cost of production in new product.

Production:

Check on the Incoming Raw Materials:

Hypothesis 4a:

E_collaboration between the production and procurement units used by a project manager to check on the incoming raw materials can create a favorable environment to reduce the production time and cost of production in new product.

Change of Tools and Change in the Production Plans, like Increase or Decrease in Volume of Production

Hypothesis 4b:

E_collaboration between the production unit with design, planning and procurement units used by a project manager to change of tools and in volume of production can create a favorable environment to reduce the production time and cost of production in new product.

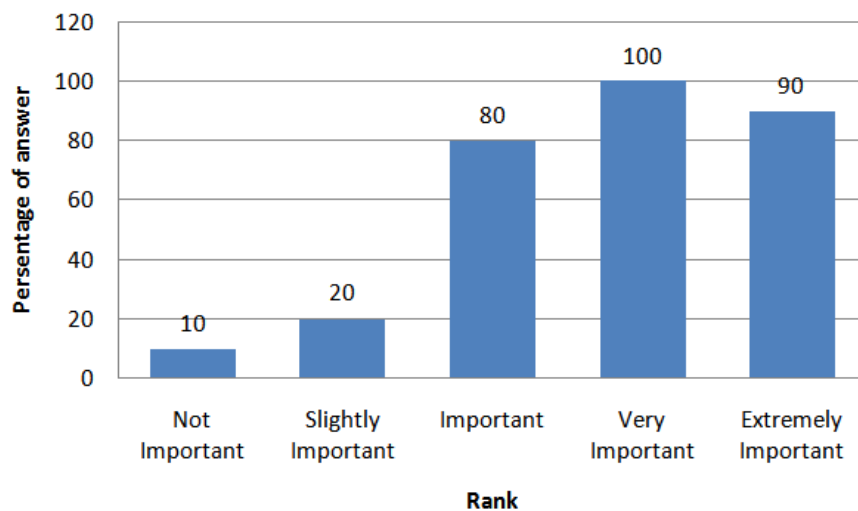
Research Methodology:

For primarily test the model an interview of 20 project managers was done, in the electronic industry in Iran in SMEs. Information on the respondent's demographics and respondent organization is presented in table 3.

The quality of questions for interviewing validated by previous questionnaire (Hughes, 1997). The author measured every question by five scales from 1 (Slightly important) to 5 (Extremely important). The basis of the interview was E_collaboration used by project management in order to create a favorable environment to reduce the production time and cost of production of new product. The results of this interview show in Figure 2.

Table 3: Demographics of responded.

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

**Fig. 2:** The graph of results of interview.**Conclusion:**

The research aim of this study is determining the relationship between E-collaboration and project management. One objective is determining the relationship between different departments by E_collaboration in one factory. Second objective is a development a model to reduce time in new product. Another objective is a development a model to reduce cost in new product. Following the conclusions of prior research there are many models for reducing time and cost. However, the purpose of this study is created a conceptual model to development time of new product and reduces cost of new product. Results produced through analysis of interviewed by 20 project managers in Iran in electronic industry showed the E-collaboration between four departments: design, planning, procurement and production through a project manager help the companies for new product in terms of development time and cost. And all four independent variables of a conceptual model have positive correlation with reducing time and cost.

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