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Involvement of Supplier is a Vaccine to Enhance New Product Development Performance

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Abstract

Many recent studies highlight the need to rethink the way organizations manage product development. Traditional approach to achieve product development by a centralized and collocated R&D team is becoming outdated. The involvement of supplier for the new product development projects gives a scope to improve the efficiency of the projects by reducing the development costs and the development time, and to improve the effectiveness of the project by reducing the cost of product and improve the quality of the product. In collaborative product development the unique skill, capability, and expertise of the supplier is utilized. This article deals with the strategies and practices used by firms to achieve greater success in their collaborative product development. The key areas where the advantages of these benefits could be achieved are Inventory, Labor, Material, Product development, Warranty, Synergized/ shared equipment, Innovation/ new technology implementation, Risk management Product improvement, Lead time. This paper attempts to reveal the key findings of data collected from component suppliers to original equipment manufacturers (OEM) related to ten selected Indian automobile industries. The results indicate that collaborative product development holds the key to achieve the competitive advantage in selected Indian automobile industries.

Keywords

New Product Development, Supplier Involvement, Collaborative product development

I. Introduction

In today's business world, competition is high, prices are near competitive, product differentiation is narrow and market share is diminishing so in such a scenario getting cost and time advantages in product development and hence increasing profits is the most important way of achieving competitive advantage. In order to achieve the best optimized product development cost and time, collaboration is emerging as an important concept. The involvement of suppliers in collaborative product development has benefits in terms of reducing cost at product development, risk management product improvement and reduction of time during product development (Handfield et al., 1999). Supplier integration in new product development combines the internal resources of the buying firm with the skill, capabilities and expertise of selected suppliers, through the alignment of their product development processes (Wagner, 2003). The supplier integration effectiveness achieved through the reduction of product costs and the increase of product value (Wynstra, van Weele and Weggemann, 2001). Creating and capturing superior value in the marketplace achieved by business relationship creation and sharing among exchange partners (Wagner et al., 2010).

In this paper a detailed study has been undertaken to measure the tangible benefits achieved due to collaborative product development in automotive industry. The report further deals with the analysis of interviews and also the proposal for a framework or model required for successful collaborative product development.

The structure of the paper is as follows: Section 2 summarizes, in a tabular form, from the past works on supplier involvement in new product development (NPD). Section 3 presents the methodology adopted. Section 4 gives data analysis and key findings. Section 5 presents the recommendation on degree of collaboration required. Section 6 presents key requirements for the success of initiatives. Section 7 discusses the conclusions drawn based on the analysis and future discussion.

II. Literature Review

Considerable amount of research in the area of supplier involvement in new product development (NPD) has been reported. The past works included in Table 1 mainly focused on importance of supplier relationship in NPD based on collaborative product development, early involvement of supplier, relationship between the supplier & buyer, and risk management in product development.

Table: 1 Role of Supplier Involvement in New Product Development

Role of supplier in NPD	Researchers
Collaborative Product Development	Chang & Chu (2004), Chu, Chang, and Cheng (2006), Bruce et al. (1995), Del Rosario et al. (2003), Leek et al. (2003),Wagner et al.(2003)
Early Involvement of supplier	Chang (2002), Mikkola (2003), Eisto et al. (2010), Dowlatshahi (1997), Liker, et. al., (1998), Abu Bakar and Rohaizat (2002)
Relation between the Supplier and Buyer	Calvi & Le Dain, (2003), Chu, Chang, & Cheng, (2006), Chu & Cheng, (2007),Hoegl and Wagner(2005)
Risk Management in product Development	Kayis et al.(2007), Lu and Cai (2000), Lutters et al., (2001)

III. Methodology

A. Research Setting

The hypothesis was assessed with data collected from component suppliers to original equipment manufacturers (OEM), because

OEM-supplier relationship has a significant role in the improvement of Indian economy. To understand the partnership between buyers and suppliers in the automotive sector, questionnaire was send to the executives of 10 organizations. All the organizations have manufacturing setups in different parts of India. Out of those 10 organizations few of them were OEMs. OEMs and Supplier organizations were varying in sizes from small to medium sized enterprises to large multinational organization. The supplier organizations used to supply products of varying degrees of complexity and having varying degree of relationship within partnership with OEMs. The interviewees were mostly AGM of OEMs and Plant head, marketing/ sales head, project manager of suppliers.

B. Data Collection

The participants have given the required information as per their experience and facts. The data was collected from 10 organizations using telephonic interview, Email service and face to face interviews. The method of interview was selected based on their location and availability. Participants in the study are strictly voluntary and all the respondents were assured of complete anonymity. The data was collected in both quantitative and qualitative form.

C. Measures

For measuring the tangible benefits of collaborative product development, the metrics are divided in terms of cost, quality and time. The cost is measured in terms of percentages varying from 0 to 5% and a box is provided for any other value, similarly time is measured in terms of weeks varying from 1 to 3 weeks and a box is provided for any other value. This would make it easier for the supplier to judge the benefits.

IV. Data Analysis and Key Findings

Data analysis is done using statistics and other models to judge the scope of cost and time reduction in a collaborative model. The data is summarized in the form of graphs for easy understanding and judgment. Based on this data a model is recommended to achieve the required tangible benefits.

A. How OEM and Supplier Encourage Each Other in Collaboration?

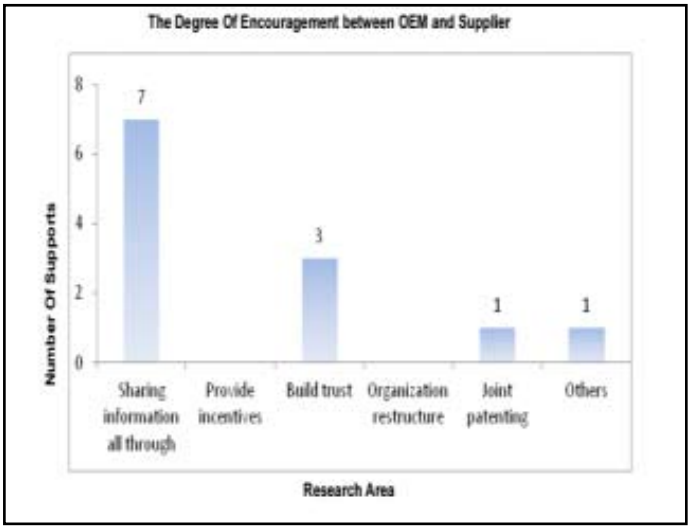

Fig. 1:

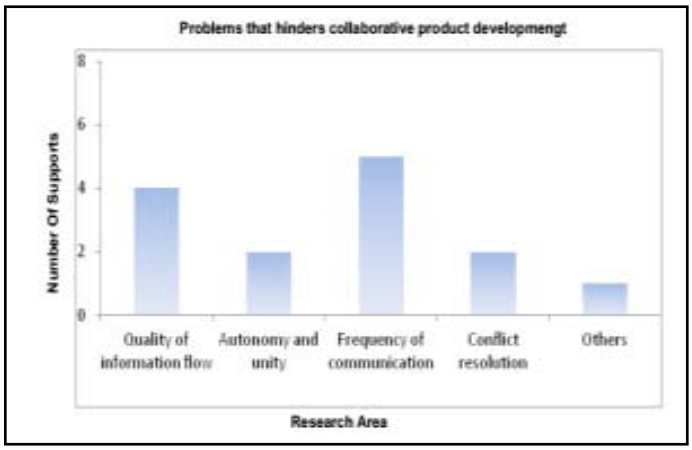

Fig. 2:

Insights: Fig. 1 show that sharing information at various stages of product development is found to be the most important factor in establishing collaborative product development followed by building trust and joint patenting.

B. What are the problems faced that hinders the collaborative product development?

Insights: Fig. 2 shows that frequency of communication and quality of information flow are found to be the most important factors in establishing collaborative product development followed by conflict resolution and autonomy & unity.

C. Areas critical for collaboration in various product development stages?

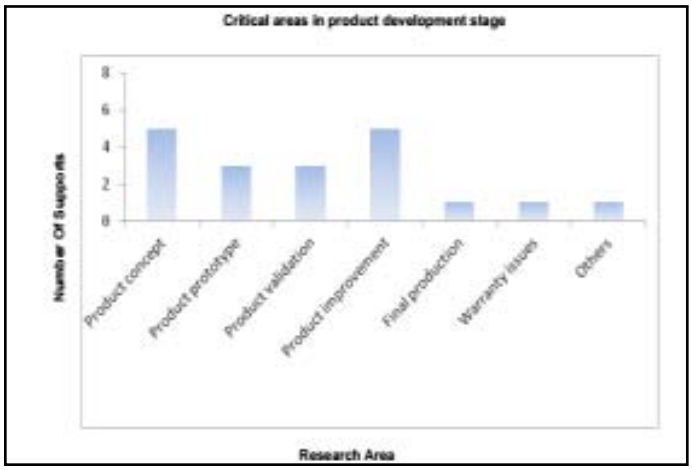

Fig. 3:

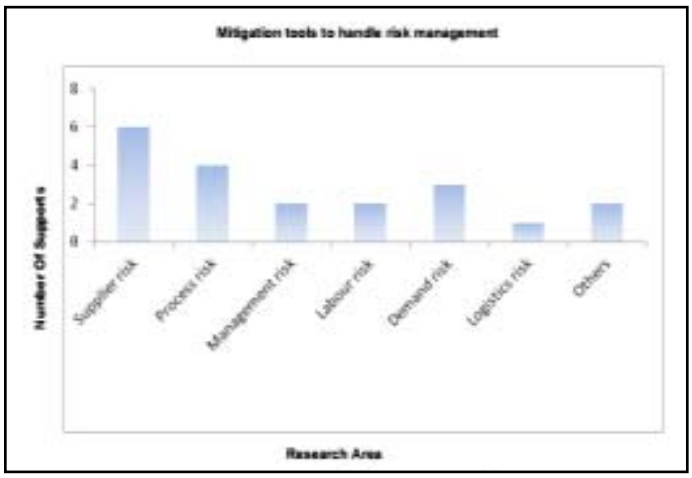

Fig. 4:

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Insights: Fig. 3 shows Product concept and improvement are found to be the most important factors in establishing collaborative product development followed by prototype and validation.

D. Mitigations tools available to handle collaborative risk management?

Insights: Figure-4 shows Supplier, process and demand risk are found to be the most important factors in establishing collaborative product development followed by management, logistics and labor risk.

E. What proportion of cost reduction due to collaboration in R&D cost, Inventory handling cost, equipment sharing cost and product improvement cost is reduced?

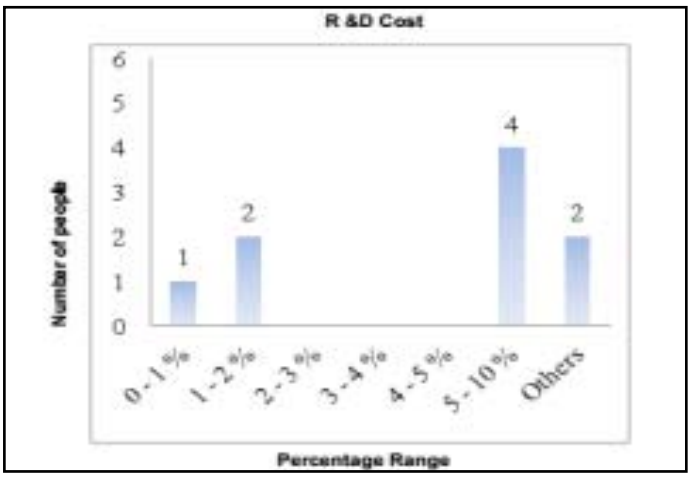

Fig. 5: R & D Cost

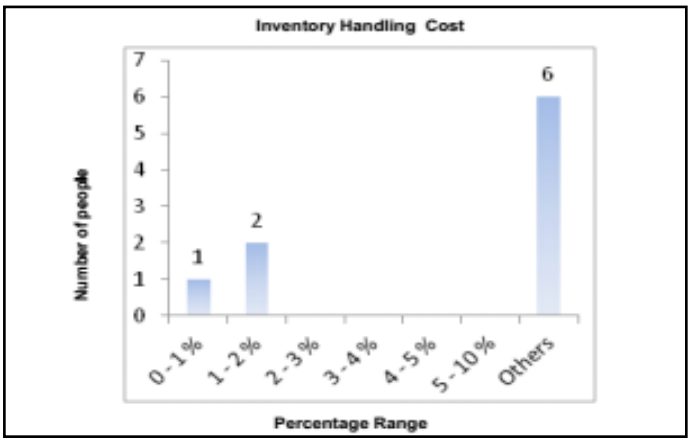

Fig. 6: Inventory Handling Cost

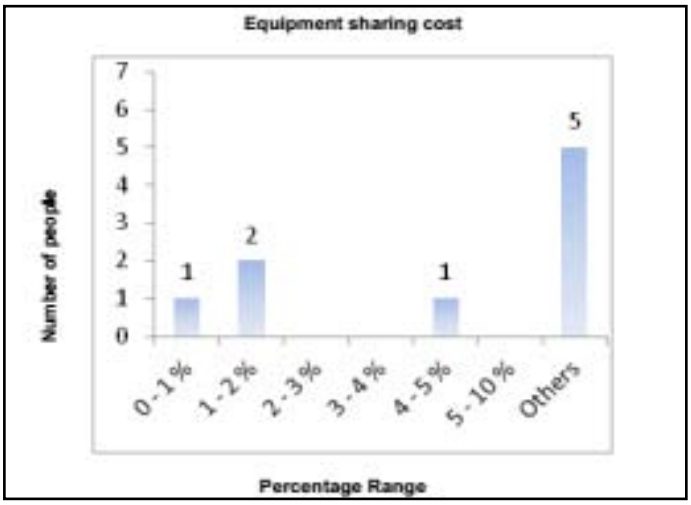

Fig. 7: Equipment Sharing Cost

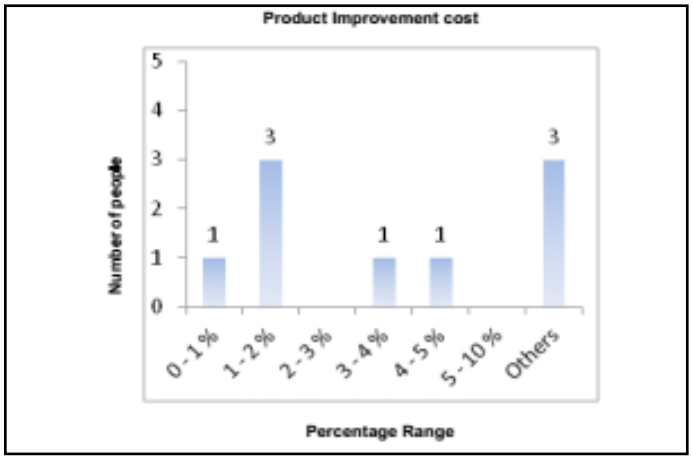

Fig. 8: Product Improvement Cost

Insights: Fig. 5,6,7, and8 shows most of the organizations have achieved 1) 5-10 % reduction in R&D cost 2) 1-2% reduction in inventory handling cost, 3) 1-2% reduction in equipment sharing cost and 4)1-2% reduction in product improvement cost.

F. What proportion of time reduction occurred due to collaboration in lead time, shared equipment usage, product improvement and risk management?

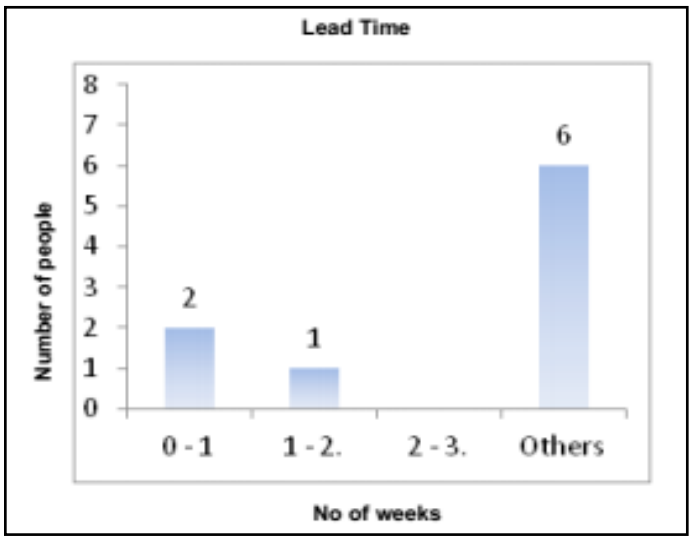

Fig. 9: Lead Time

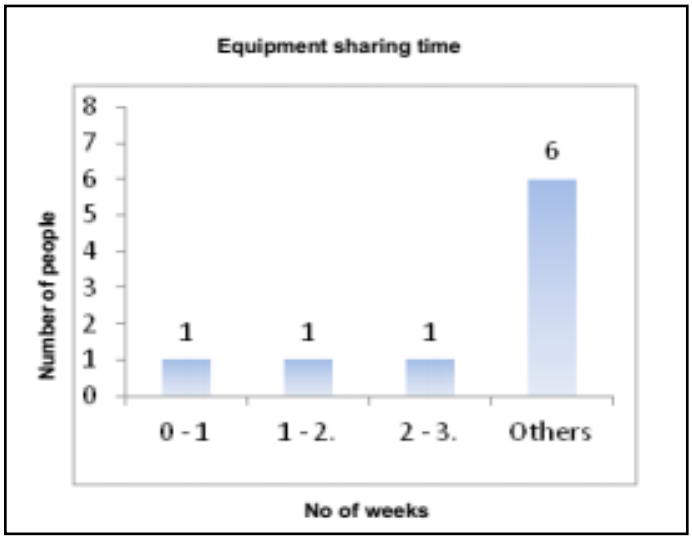

Fig. 10: Equipment Sharing Time

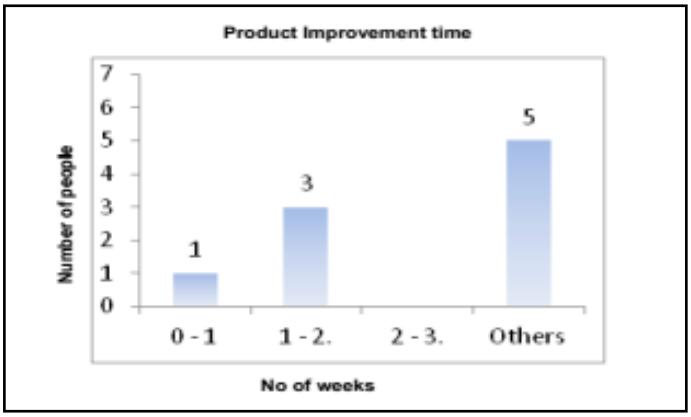

Fig. 11: Product Improvement Time

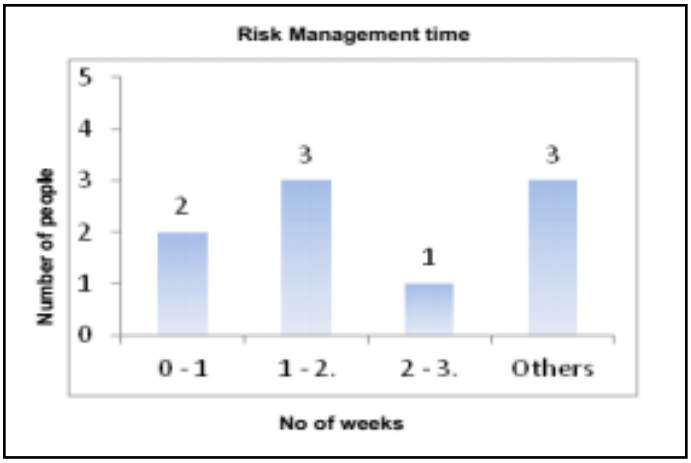

Fig. 12: Risk Managment Time

Insights: Fig. 9,10,11,12 shows most of the organizations have saved 1) 0 - 1 week in lead time, 2) 1 week due to equipment sharing time, 3) 1 - 2 weeks in product improvement time and 4) 1 - 2 weeks in risk management time.

V. Recommendations on Degree of Collaboration Required

Based on the insights received from the suppliers and the OEMs, the critical areas are identified within many domain of collaborative product development. After brainstorming on the degree of collaboration required in those critical areas the following recommendations are arrived at

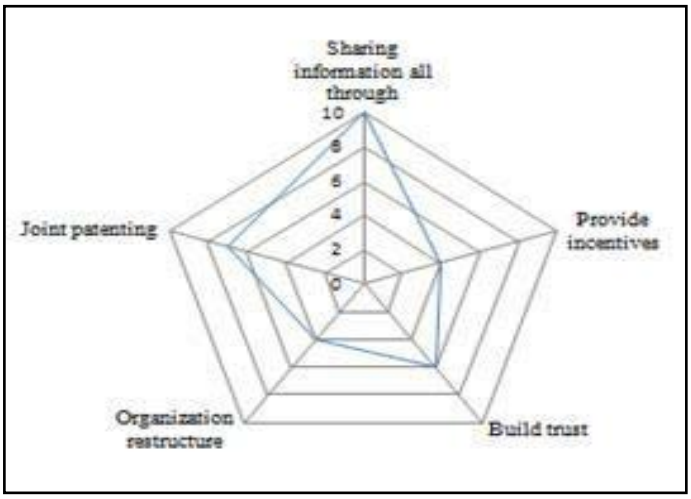

Fig. 13: The Degree of Encouragement Between OEM and Supplier

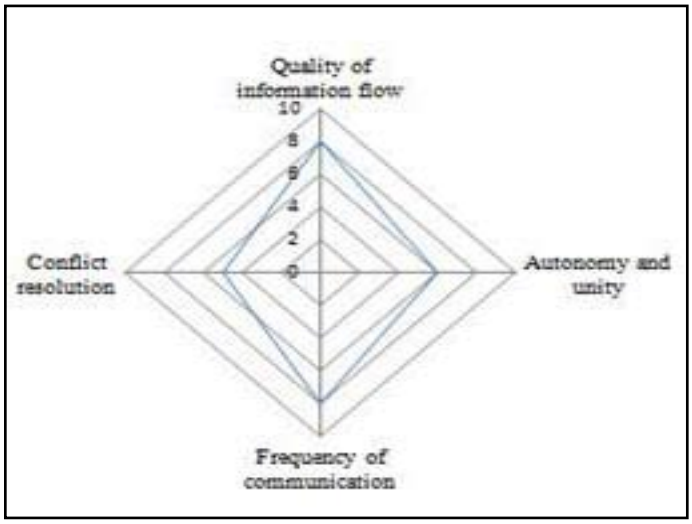

Fig. 14: Problems That Hinders Collaborative Product Development

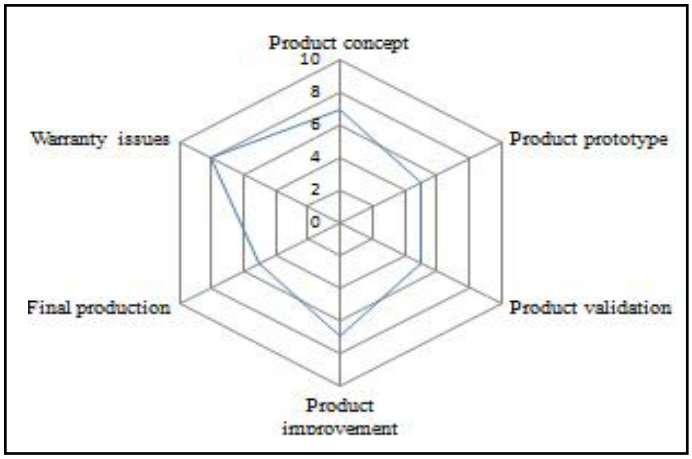

Fig. 15: Critical Areas in Product Development Stage

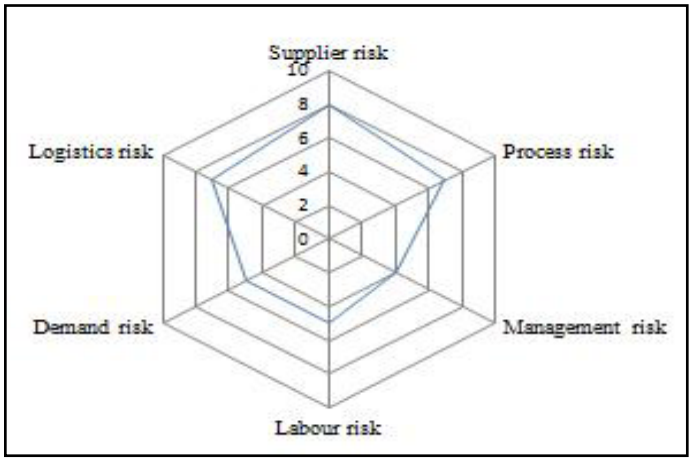

Fig. 16: Mitigation Tools to Handle Risk Management

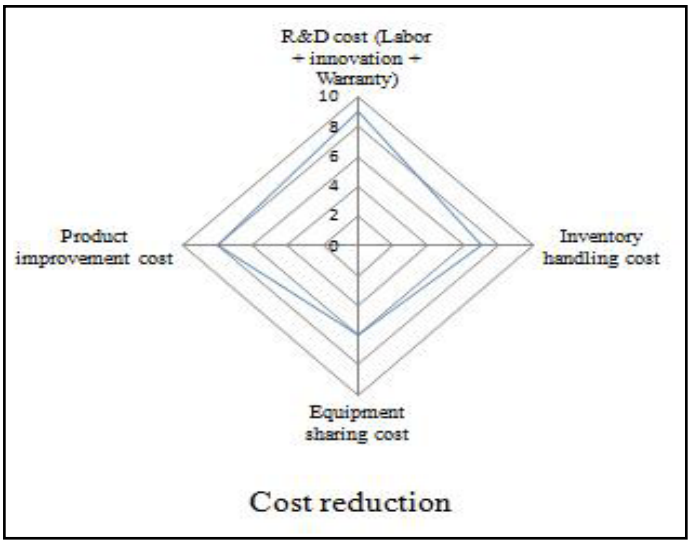

Fig. 17:

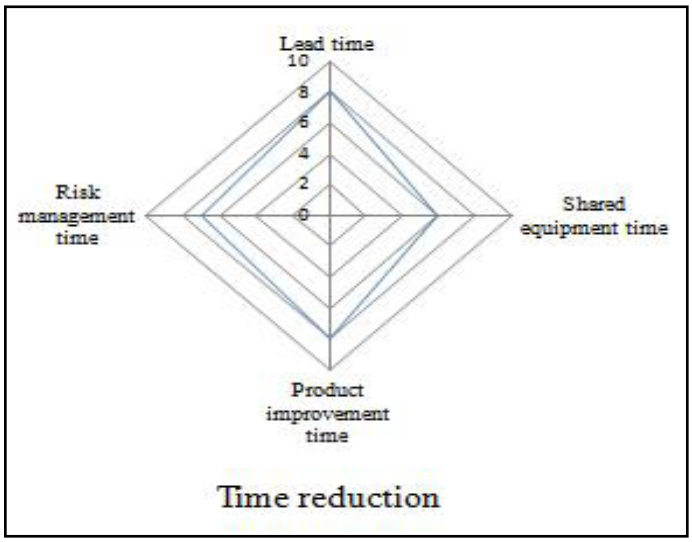

Fig. 18:

VI. Key Requirements For Success of Initiatives

Establishing high collaboration in design and development	Supporting points
Increase the frequency of communication during all stage of product development between OEM and suppliers	Engineers from OEM and suppliers should be appointed for frequent communication about the product development stages for optimizing the cost, time, quality and delivery of product
Sharing useful and timely information about product development by both OEM and suppliers	Sharing timely information will increase the visibility of project and reduces the overall risk
Develop strategies to increase collaboration between OEM and suppliers	OEM should use of incentives, joint patents, build trust and other top commonly used strategies to increase supplier participation
Analyze risk all along the OEM's product development including Supplier's component development	Access the risk and brainstorm for its mitigation so that the cost and time is reduced, product quality is enhanced and delivery of products is improved
Prioritize warranty and quality issues received at both supplier and OEM end	Warranty and quality issues should be communicated and resolved to ensure better and improved product and increase customer satisfaction.
Timely communications between OEM and Suppliers to optimize manufacturing process	Optimizing manufacturing process yields to high quality, low lead time and better products. This also helps in identifying bottlenecks at various stages and utilizing best possible capacity from the resources.
Provide timely information on production volume of final goods by OEMs to all the concerned suppliers	Timely information of production volume yield to reduction in bottlenecks, better planning and low lead time
Provide collaborative solution to in-house logistics of OEM and Suppliers	Resolving in-house logistics yields to decrease in lead Time and cost. It also leads to better utilization of resources
Provide collaborative solution to out-bound logistics at both supplier and OEM end	A strategy to balance the number of trucks, number of trips, and capacity per truck can reduce the cost, inventory and save plant space. There is also a scope of reducing or relocation the work force.

VII. Conclusion and Future Discussion

This paper presented the results of a survey conducted on OEMs and component manufacturers, which had the prime purpose of investigating the benefits and challenges of collaborative product development. From the results presented and discussed, the benefit of collaborative product development has been outlined. This report has also indicated and identified crucial factors for organization to consider for collaborative product development. According to our research collaborative product development can provide advantages such as time saving, cost saving and quality improvement. Moreover based on our result it can be suggested that the factors such as sharing of information, frequency of communication, quality of information, product concept and supplier risk were found to be the most important factors in

establishing collaborative product development.

For the manufacturing firms the advantages result in lead time reduction, time reduction in product improvement, time reduction in risk management, R & D cost reduction, Inventory handling cost reduction and product improvement cost reduction. The further scope of study could me to go into details of the above factors as well as include more factors for proper validation.

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