

## A QUALITATIVE STUDY ON SUPPLIER RELATIONSHIP MANAGEMENT IN NEW PRODUCT DEVELOPMENT PROCESS

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### ABSTRACT

*Firms competing in the highly competitive global arena today can no longer rely only on their internal sources for innovation. This paper examines the relationship between supplier integration and innovation concepts from the perspective of the suppliers. Especially over the past decade in the literature the importance given to supplier relationship management (SRM), supplier integration (SI), knowledge management (KM), and new product development (NPD) have grown. The model proposed in the study suggests that as supplier relationships are more advanced supplier integration becomes richer, SI affects KM positively, and lastly KM is the prerequisite of NPD performance. The proposed model was analyzed with nine cases in Turkish automotive spare parts industry. Findings show that NPD performance is directly and significantly positively related with KM capabilities of a company. Furthermore, evidence supports the model and each relationship among the constructs studied reveals rich insights as to the nature of supplier integration.*

**Keywords:** *Supplier Relationship Management, Knowledge Management, New Product Development, Innovation.*

### 1. INTRODUCTION

Relying solely on internal resources is becoming ever increasingly inadequate in today's demanding and fast changing business environment. In order to enhance competitiveness, organizations are looking for more interaction in their external environments. Supplier relations play a significant role among such external environments. According to Chesbrough (2003) suppliers are becoming more of a source for innovation for firms. Therefore it can be said that open innovation will become more of a norm in the future in shaping competitiveness.

Fliess & Becker (2006) emphasize how critical an element new product development (NPD) is for the long term success of a firm. NPD is a broad term not only limited to product innovation, but also service and process innovation as well (Handfield & Ragatz, 1999). Thus it is easy to see why in the past few years the attention towards NPD and supplier relationship management (SRM) has risen considerably (Sjoerdsma & Weele, 2015).

Recently, literature on this area has focused more on collaboration and integration of suppliers and manufacturers (Casper, 1997; Harabi, 1998; Helper and Kiehl, 2004). Petersen et al. (2005) assert that it is becoming more frequent of a practice as suppliers become more internalized. Perols et al. (2013) emphasize the collaborative nature of such an NPD process. Since NPD performance is one of the most fundamental factors behind competitiveness, the increasing interest in this dynamic nature of relationships between suppliers and manufacturers seems to be getting even more significant.

NPD process relies heavily on knowledge management (KM). Due to the complicated and often risky nature of including suppliers in the NPD process, the supplier integration (SI) construct becomes a highly challenging one for both practitioners and researchers alike. The benefits of including suppliers is by far exceeding such challenges and thus there is an increasing urge to form successful and healthy relations between the suppliers and the manufacturers. Among such benefits, Koufterus et al. (2007) emphasize the

better product quality reached through such integration initiatives.

We assert that through better product quality firms can gain competitive edges in the highly challenging market conditions. Product development costs in terms of money, time, and effort can be greatly reduced according to Kessler (2000). Another benefit of such an integration is emphasized by the increases in both supplier and manufacturer revenues (Yeniyurt et al., 2014). Mishra and Shah (2009) assert improved market performance over the competitors. This can lead to long term firm performance because it will affect the customer perceptions positively as well. Faster development cycles are especially mentioned through the works of Perols et al. (2013). This will lead to a critical competitive advantage in today's ever so fast market conditions and changing customer expectations.

This study looks into the nature of SRM, SI, KM, and NPD and brings together a model for understanding the collaboration effects and dynamics of such relationships. Through the proposed model, we assert that better supplier relations lead to better supplier integration, which in effect will create more effective knowledge management practices. Such KM practices will help sustain more successful NPD results and these NPD results originating from such collaboration will be more inclined to enhance competitiveness.

This paper is organized as follows. First, we cover a wide span of the literature on the constructs. Then, the model is proposed. The methodology and the findings of the qualitative study are shared. Lastly, a discussion, managerial implications, and limitations and directions for future research are given.

## 2. SUPPLIER RELATIONSHIP MANAGEMENT

Rajendran et al. (2012) claim that creating an effective relationship between the supplier and the manufacturer is a major source of competitiveness. Hunt et al. (2002) link this relationship to resource based view in the sense that competitive advantage can be developed through the effective use of non-substitutable, inimitable, rare, and valuable resources. Sjoerdsma and Weele (2015) categorized the factors that effectively influenced the quality of the supplier relationship. They determined the list of factors in SRM and divided the list into two,

namely organizational factors and individual factors. Below is the list of dimensions within the SRM construct.

- *Organizational Dimensions of SRM: Relationship history* includes all past events, positive and negative, between the two parties. Handfield and Ragatz (1999) claim that the longer the relationship history the greater space for collaboration exists. *Loyalty* refers to the tendency to continue the relationship with the existing partner. *Reputation* refers to how the other party is perceived, whether it is honest, fair, etc. According to Rajendran et al. (2012) a good reputation will lower uncertainty and risk. In discussing *dependency* Sjoerdsma and Weele (2015) claim that in order to form more successful long term relationships interdependent parties are more preferred. In *relationship-specific investments*, if one party or both parties invest heavily in a process or technology, then as Sjoerdsma and Weele (2015) assert switching costs will increase and this will be a positive effect on the relationship. *Satisfaction* dimension refers to being happy with the results so far.
- *Individual Dimensions of SRM: Trust* refers to the expectation of one side on the other side that the results are going to be successful. *Communication* helps improve "coordination and alignment function between parties" (Sjoerdsma and Weele, 2015, p.194.) *Information sharing* is required for innovation and is critical for NPD. *Cooperation* refers to the alignment of expectations, targets, and goals. *Commitment* is reflected on actions of parties. Higher committed parties are expected to form more successful and long lasting relationships. *Flexibility* refers to the ability to adapt change in times of trouble.

Recent literature shows that effective supplier relationships improve NPD performance. As Zhao and Lavin (2012) indicate, transfer of knowledge between parties is critical for innovation. We assert that such innovation will be essential for creating and sustaining competitiveness in the market.

### 3. SUPPLIER INTEGRATION

SI construct refers to the integration level between the supplier and the manufacturer. Not all supplier relationships end up becoming highly effective. In fact, due to the nature of the relationships the success depends heavily on the quality of both organizational and individual dimensions mentioned above. The integration, or lack there of, and the degree of such an integration resulting from the collaboration of the parties involved will vary. Handfield & Ragatz (1999) classify different levels within integration. In white box integration, suppliers' involvement is almost

non-existing. Suppliers, in this category, only deliver what has been contracted to them. On the other hand, in black box integration, suppliers do almost everything based on the requirements and specifications they receive from the manufacturer. In this integration level, the quality of the collaboration is expected to be very high.

Even though this classification helps understand some supplier relationships, to put things into more deeper perspective a more recent approach can be helpful. Petersen et al. (2005) have developed the typology below which depicts a much richer content in the supplier-manufacturer relationship.

**Table 1:** Types of Supplier Integrations in New Product Development

None	White-Box	Gray-Box	Black-Box
No supplier involvement. Supplier "makes to print".	Informal supplier integration. Buyer "consults" with supplier on buyer's design.	Formalized supplier integration. Joint development activity between buyer and supplier.	Design is primarily supplier driven, based on buyer's performance specifications.

Increasing Supplier Responsibility

**Source:** Petersen, K., Handfield, R., & Ragatz, G. (2005). Supplier Integration into New Product Development: Coordinating Product, Process and Supply Chain Design. *Journal of Operations Management*. Vol. 23 (3), 371-388.

As shown in Table 1, design aspect still falls under the manufacturing party in white box integration. We interpret this as an informal relationship. However, in gray box integration a much richer and more formal relationship is created. Here, collaboration is much higher as well as closer. Furthermore, Koufteros et al. (2007) claim that design aspect of the new product as well as its parts is totally outsourced to the supplier in black box integration.

As the name suggests, gray box integration is the area in-between white and black box integration. Here, joint efforts play important roles as mutual gains are on the table. The level of integration naturally must come from the supplier relationship between the parties involved. The same manufacturing company may very well be inclined to work with a supplier under white box integration mode whereas it may prefer a more collaborative approach, gray or even black box integration, with another supplier.

Swink et al. (2007) claim that joint activities in new product development and information sharing systems enable better supplier integration. Shin et al. (2000) further assert that too much expectation of high returns need to be decreased in order for the relationship to be more productive and enable higher levels of collaboration. The quality of the relationship in SRM depends upon a lot of intertwined factors shaping the relationship. In this regard, we claim that it is also a dynamic process since the relationship between the parties have a history and this relationship history keeps building up in time.

Due to the delicateness of resource sharing and collaboration as well as the risks associated some researchers emphasize the fact that firms only engage in collaborative relationships where they don't possess the critical resources. Thus, it is easy to predict that in organizational cultures where collaboration is less favored, this necessity issue becomes even more critical and severe. Thus, in cases where there is a low level of trust prevalent in

the culture in general we presume SI to be more limited.

Another important view on SI is expressed through the Handfield and Nichols (2002) study where they assert that when NPD activities involve highly complex products (e.g. high technology products) and when the manufacturer prefers to concentrate on its major core competency areas, then integration with the supplier becomes easier.

**4. KNOWLEDGE MANAGEMENT**

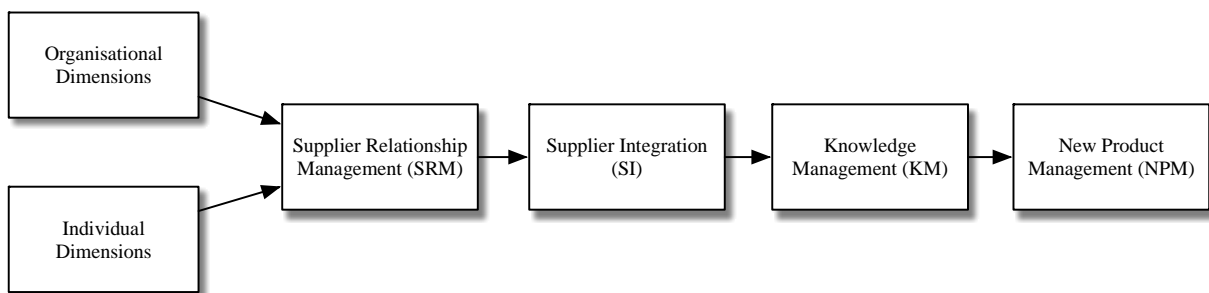
According to Delen et al. (2013) both financial and non-financial performance of firms can be influenced by knowledge utilization. KM includes knowledge usage, knowledge generation, and knowledge sharing. Knowledge can be applied not only in R&D activities, but also in relationships with suppliers. Knowledge sharing is both within the organization and between the organizations. Zaim (2005) found that firms increase their revenues through knowledge sharing.

In the literature there is consensus on the two major sources of knowledge, namely explicit and tacit knowledge. Nonaka (1995) emphasizes the technical and cognitive aspects of tacit knowledge. Mental models and perception of an individual are reflected in the tacit knowledge. Know-how and skills of the individual are reflected in the technical

aspect. Tacit knowledge is hidden in experiences. It is very difficult to express tacit knowledge. Furthermore, tacit knowledge does not accumulate in time if it's not transformed into explicit form. Explicit knowledge, on the other hand, can be accumulated, transferred, and easily codified (Alavi & Leidner, 2001). According to Alavi & Leidner (2001) KM has three major goals; (1) to make available knowledge clear so it can be put into use, (2) to create a knowledge nourishing culture that makes it easy to share information, and (3) to enable a technical and social structure for collaboration.

**5. PROPOSED MODEL**

Our proposed model integrates major approaches mentioned above and presents an understanding which depicts the nature of the relationships among the construct. We assert that better supplier relationships help create more effective supplier integration. Varying degrees of supplier integration result in different knowledge management practices. Through the model, KM is claimed to be the main and direct influencer of NPD performance. The model foresees that companies that are ineffective in their KM practices will not be successful in delivering new products that effectively satisfy their customers.



**Figure 1.** A Proposed Model of Supplier Relationship Management in New Product Development Process

**6. METHODOLOGY**

Based on the literature review, the constructs have been outlined and the final adaptation of the dimensions to automotive spare parts industry has been realized. Item reduction was mostly based on the work provided by Sjoerdsma and Weele's (2015) study. Through convenience sampling, a total of nine cases have been studied with in-depth

interview format. Interviews lasted between 55 minutes to 90 minutes and in each session correspondents from R&D departments have been contacted. These nine cases belong to spare part manufacturers that supply a wide variety of components and parts to big automotive companies, both in Turkey and in the global arena. The manufacturers were asked detailed questions on their relationships with their main suppliers. Their

responses reflected the suppliers' perspective on the relationship through the eyes of the manufacturer. The findings were presented in the summary table and the results were shown in the research model of supplier relationship management in new product development process.

## **7. FINDINGS**

As a first step, in the interviews, statements about all variables were discussed with the R&D experts of the companies so that they acknowledged themselves with the constructs studied. In this initial phase of each interview the participant was

clearly told about the content of each dimension within the depicted model. This phase was important in the sense that it assured that all parties understood the same thing from the according dimension.

During the analysis phase, relationships among constructs were considered. The existence of each variable's effect on the expected variable was checked according to the relationship as foreseen on the proposed model. Furthermore, through within-case checks the degree of the effect of each variable on the other one was also considered.

Table 2: Summary Table of the Findings of the Cases

Construct	Case1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
<b>Supplier Relationship Management (SRM)</b>	+	+	0+	0+	0	+	+	+	-
<b>Organizational Dimensions</b>									
1. Relationship history	+	+	0	+	-	+	+	0	0
2. Loyalty	+	+	+	-	-	+	0	+	0
3. Reputation	+	+	+	+	+	+	+	+	0
4. Dependency	0	0	0	+	+	+	+	+	-
5. Relationship-specific investments	+	+	-	-	-	+	0	-	-
6. Satisfaction	+	+	0	+	+	0	0	+	+
<b>Individual Dimensions</b>									
1. Trust	+	+	0	0	0	+	-	+	0
2. Communication	+	+	0	0	0	+	+	+	-
3. Information sharing	+	+	0	+	+	+	+	+	-
4. Cooperation	+	+	0	+	+	-	-	-	-
5. Commitment	0	0	0	0	0	+	-	+	0
6. Flexibility	+	+	+	0	0	+	+	+	+
<b>Supplier Integration (SI)</b>									
White Box Integration	-	-	+	0	0	0	+	0	+
Gray Box Integration	+	+	-	+	+	+	-	+	-
Black Box Integration	0	0+	-	-	-	-	-	-	-
<b>Knowledge Management</b>									
Knowledge Generation	+	+	0	0+	0+	+	+	+	0+
Knowledge Sharing	+	+	0	+	+	+	+	+	+
Knowledge Usage	+	+	+	+	+	0+	0+	0+	-
<b>NPD Performance</b>									
Cost	+	+	0+	+	+	+	+	+	-
Time to Market	+	0+	0+	0	0	+	+	+	0
Quality	+	+	+	+	+	+	+	+	0

The specific findings for each case are presented in Table 2. There are six different factors under the organizational dimension, these are relationship history, loyalty, reputation, dependency, relationship-specific investments, and satisfaction. Similarly, variables of individual dimension are trust, communication, information sharing, cooperation, commitment, and flexibility. As shown in the Table 2, there is a positive relationship between organizational dimension and SRM because if the factors under the organizational feature are generally positive, SRM is also positive and vice versa. Therefore, to provide a well-constructed connection with suppliers and customers, factors of organizational dimensions such as relationship history, loyalty and reputation are found to be important. Moreover, due to the results of each interview, as depicted on Table 2, findings of individual dimensions show a strong correlation with the findings of SRM. In addition, it was also observed that individual elements were positively associated with SRM.

When the relationship between SRM and SI was considered, a positive correlation between these variables was found to be evident. SRM is the prerequisite of the SI construct according to our conceptual framework and thus this finding highlights one of the most important outcomes of this research. SI contains three different factors white, gray, and black box integration. As mentioned above, in black box integration, suppliers are more responsible for new product

development projects and results show that these type of firms can organize their knowledge management processes better in the form of knowledge generation, knowledge sharing, and knowledge usage. Therefore it can be said that these findings show how SI triggers the KM processes and this supports the projected relationship in the proposed model.

Additionally, according to the consequences of analysis a very strong positive relationship between KM and NPD is found. In cases where KM activities are weaker, organizations were found to be lacking abilities of improving or developing their products. This result is also very consistent with what has been predicted because knowledge generation and usage are essential sub-dimensions to be considered for NPD. When compared with SRM-SI and SI-KM relationships, KM's effect on NPD is shown to be more vigorous.

Moreover, the direct effect SI has on NPD is positive but this correlation was found not to be very powerful. As an alternative to our existing model, a possible moderating effect of SI on KM-NPD relationship was also considered. In this situation, no significant moderating effect was found in favor of SI. Therefore, it can be said that SI is not a very crucial factor that helps improve new products and innovation projects. Nevertheless, SI provides better KM environments for companies and thus it has an indirect effect on NPD performance.

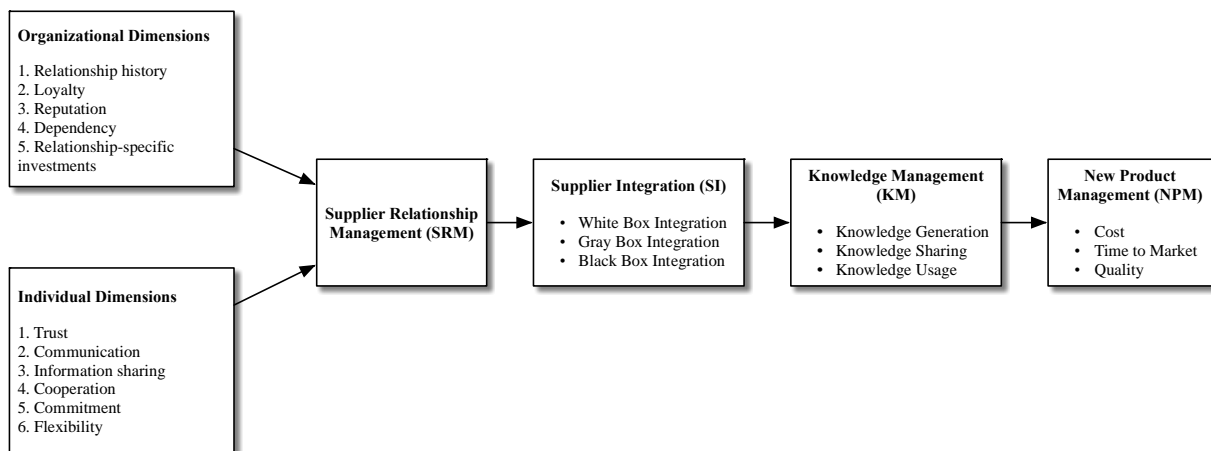


Figure 2. Research Model of Supplier Relationship Management in New Product Development Process

Furthermore, there are certain additional findings for each of the nine cases. For the first and

second case studies, in-depth interviews revealed that in this part of the market segment, there is too



much dependency on the foreign customers which impose very strict rules. Moreover, heavy requirements make it unnecessary to consult with the customers and make continuous iterations. In the third case study, an extra result of analysis is that original equipment manufacturers (OEM's), original equipment service providers (OES's), and independent after-market customers can be segmented in order to derive much richer information. Case study 4 and 5 show that dynamics of the automotive spare industry take away most of the manufacturers' flexibility. Additionally, for these two cases in specific, due to the mostly outsourced nature of these market segments certain restrictions and constraints dictate many of the tasks carried out.

Case study 6, 7, and 8 provide extra information about our research topics. Since 100% of all production is exported for these three cases, this fact affects supplier integration depending on which market/s are being served. More detailed findings can further be reached if customers are grouped and segmented according to their product lines. Findings in these cases show that country of origin of the specific customers demand varying degrees of integration between the manufacturers and the customers. Lastly, additional findings of case study 9 show a lack of research and development (R&D) support from the government and regulators which result in negative impacts on various aspects of new product development.

## 8. Discussion

Through this qualitative study looking into the automotive spare parts industry dynamics, it can be observed that KM is the most crucial factor for manufacturers in terms of NPD. The proposed model is supported by the nine cases and each relationship depicted through the conceptual framework has been examined. The positive relationships between each construct in the model, although with varying degrees, show that SI is not as significant as KM in determining NPD performance levels.

Additionally, interpretation of the results shown provide support for the precise nature of the automotive spare parts industry and its internal dynamics. The industry is highly specialized and fragmented. Direct competitors in the industry face the same or very similar situations whereas manufacturers of different components and parts face very different conditions. This reflects the

highly challenging nature within this very competitive industry.

Findings of our work suggest that managers and companies must heavily invest in knowledge management activities above all in their focused efforts in improving NPD. Customer relations play important roles in determining the manufacturing companies' level of SI, but in most of the nine cases studied in this work it was shown that specific requirements of the customers more often than not dictate a lot of activities which limit flexibility and innovativeness of the manufacturer. Therefore, limitations within the industry have a major effect on the degree of integration. Managers and companies in this industry face challenging KM practices and it is found that only through these challenging KM practices can they make a difference in terms of performance.

To sum up, companies of all sizes and all specialization areas can benefit from the proposed model. The study showed support for all areas of the model and depicted no need to be revised. The specific nature of the industry segment studied may be a factor in this regard. So, we suggest that further efforts be concentrated on elaborating the inner qualities of the model and hopefully accumulate based on these initial findings.

## 9. Conclusion

Firms competing in the highly competitive global arena today can no longer rely only on their internal sources for innovation. They should look for possible opportunities that may arise from interacting with their suppliers as well. This paper examines the supplier integration concept from the perspective of the manufacturer but delivers this by taking into account the view of the customers of those manufacturers as well. Especially over the past decade in the literature the importance given to supplier relationship management (SRM) and knowledge management (KM) has grown. With this study, we dig deep into the accumulated knowledge in the supplier integration (SI) and KM areas and explore nine cases in the Turkish automotive spare parts industry. All cases are related with highly competitive customers within the automotive industry. The model proposed in the study suggests that as supplier relationships are more advanced supplier integration becomes richer. Supplier relationship construct has both organizational and individual dimensions associated with it. Supplier integration (SI) can take three forms, namely white



box integration where suppliers merely act as contractors, gray box integration where the supplier is actively included in the new product development (NPD) process, and black box integration, where suppliers have full responsibility based on the specifications they receive from the manufacturer. Depending on the kind of supplier integration, knowledge management can, through generation, sharing, and usage of knowledge affect NPD performance. This study is original in the sense that it integrates SRM with SI, KM, and NPD and proposes a model based on the findings of relevant studies in the literature so far. Findings show that NPD performance is directly and significantly positively related with KM capabilities of a firm. Furthermore, evidence supports the proposed model and each relationship among the constructs studied reveals rich insights as to the nature of supplier integration.

Major limitation of this study is its focus on a relatively small number of cases, although the nine cases through the in-depth interviews revealed relatively high rich content. Therefore, naturally findings do not possess high generalizability. We claim that through this methodology, it was possible to look deeply into the dynamics of the nature of this industry. Further studies can benefit from repeating the methodology or the sampling and derive more generalizable results.

## References

1. Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 107-136.
2. Casper, S. (1997). Automobile supplier network organisation in East Germany: A challenge to the German model of industrial organisation. *Industry and Innovation*. 4 (1), 97-113.
3. Chesbrough, H. (2003). The logic of open innovation: managing intellectual property. *California Management Review*. 45 (3), 33-58.
4. Delen, D., Zaim, H., Kuzey, C., & Zaim, S. (2013). A comparative analysis of machine learning systems for measuring the impact of knowledge management practices. *Decision Support Systems*. 54 (2), 1150-1160.
5. Fliess, S., & Becker, U. (2006). Supplier integration—Controlling of co-development

processes. *Industrial Marketing Management*. 35 (1), 28-44.

6. Handfield, R., & Nichols, E. (2002). *Supply Chain Redesign: Transforming Supply Chains into Integrated Value Systems*. FT Press.
7. Handfield, R., & Ragatz, G. (1999). Involving Suppliers in New Product Development? *California Management Review*, 42, 59–82.
8. Harabi, N. (1998). Innovation through vertical relations between firms, suppliers and customers: a study of German firms. *Industry and innovation*, 5(2), 157-179.
9. Helper, S., & Kiehl, J. (2004). Developing supplier capabilities: Market and non-market approaches. *Industry and Innovation*, 11(1-2), 89-107.
10. Hunt, S., Lambe, C., Wittmann, C. (2002). A theory and model of business alliance success. *Journal of Relationship Management*. 1(1), pp. 17-36.
11. Kessler, E. H. (2000). Tightening the belt: methods for reducing development costs associated with new product innovation. *Journal of Engineering and Technology Management*, 17(1), 59-92.
12. Koufteros, X. A., Cheng, T. E., & Lai, K. H. (2007). “Black-box” and “gray-box” supplier integration in product development: Antecedents, consequences and the moderating role of firm size. *Journal of Operations Management*, 25(4), 847-870.
13. Mishra, A. A., & Shah, R. (2009). In union lies strength: Collaborative competence in new product development and its performance effects. *Journal of Operations Management*, 27(4), 324-338.
14. Nonaka, I., & Takeuchi, H., (1995). *The Knowledge- Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York.
15. Perols, J., Zimmermann, C., & Kortmann, S. (2013). On the relationship between supplier integration and time-to-market. *Journal of Operations Management*, 31(3), 153-167.
16. Petersen, K., Handfield, R., & Ragatz, G. (2005). Supplier Integration into New Product Development: Coordinating Product, Process and Supply Chain Design. *Journal of Operations Management*, 23(3), 371–388.
17. Rajendran, S. Kamarulzaman, N., Nawi, N., Mohamed, Z. (2012). Establishing buyer-supplier relationship in Malaysian pineapple industry supply chain: Suppliers’ perspective.

- Asia Pacific Journal of Operations Management. 1(1), 49-66.
- 18.** Shin, H., Collier, D., & Wilson, D. (2000). Supply Management Orientation and Supplier/Buyer Performance. *Journal of Operations Management*, 18(3), 317–333.
- 19.** Sjoerdsma, M. & Weele, A.J. (2015). Managing supplier relationships in a new product development context. *Journal of Purchasing & Supply Management*. Vol.21, pp.192-203.
- 20.** Swink, M., Narasimhan, R., & Wang, C. (2007). Managing Beyond the Factory Walls: Effects of Four types of Strategic integration on Manufacturing Plant Performance. *Journal of Operations Management*, 25(1), 148–164.
- 21.** Yenyurt, S., Henke Jr, J. W., & Yalcinkaya, G. (2014). A longitudinal analysis of supplier involvement in buyers' new product development: working relations, interdependence, co-innovation, and performance outcomes. *Journal of Academy of Marketing Science*, 42(3), 291-308.
- 22.** Zaim, H. (2005). Bilginin Artan Önemi ve Bilgi Yönetimi. İstanbul: İşaret Yayınları.
- 23.** Zhao, Y., Lavin, M. (2012). An empirical study of knowledge transfer in working relationships with suppliers in new product development. *International Journal of Innovation Management*. 16(2), 1-26.