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# **An Analysis of the Relationship between Supply-Chain Management Practices and New Product Development Time: A Case of the North American Confectionery Manufacturers**

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This paper describes the relationship between supply-chain management practices and new product development time in the North American confectionery manufacturing industry. Using data from a survey of new product development managers, results indicate that buyer involvement and supplier involvement do not have a statistically significant impact on development time. Outsourcing of activities, however, does significantly impact new product development time. Findings of this study have important implications for supply-chain management practices of the food-manufacturing industry.

Balsmeier and Voisin (1996) define supply-chain management as “a strategy that integrates the various organizations’ objectives in order to increase the efficiency of the entire supply chain” (p.24). By using supply-chain management as a strategic variable, firms can have the freedom of not trying to balance the relationship between profitable growth and customer satisfaction. Coordination of efforts through supply-chain management allows firms to meet customer wants cheaper and faster, thereby meeting the desired financial performance. When each functional area—i.e. research and development, marketing, plant operations, and finance—works together, companies can increase revenues, control costs, and achieve customer satisfaction.

Today’s manufacturers realize there is a role for channel partnerships to exploit the synergies. Strategic partnerships let companies work more effectively with a few important suppliers and with customers who are willing to share the responsibility and success of the product.

To achieve efficiency and reduce uncertainties related to suppliers, companies undertake several production activities by themselves. However, involvement of buyers and suppliers during the development process can potentially allow early detection of mistakes that affect the compatibility of the product to the logistics of the supply chain and the true needs of the customer.

The Integrated Supply-Chain Performance Benchmarking Study of 225 manufacturers, con-

ducted by the consulting firm of Pittiglio, Rabin, Todd, & McGrath (as cited in Allnoch 1997), found that “companies that improve their supply chain can generate savings equal to seven percent of their annual revenues, but most companies instead spend nearly twice that amount on inefficient processes” (p. 8).

This paper examines supply-chain management practices of the North American confectionery manufacturers, particularly as they undertake various strategies for new product development. Information on the frequency of buyer and supplier involvement within the new product development process, the type of development activities in which buyers and suppliers are involved, and trends in buyer-supplier involvement is provided. The impacts of buyer and supplier involvement on new product development time are also analyzed. The following section discusses the literature on supply-chain management. Data collection method, survey findings, and statistical data analyses are documented in the third section. The final section presents findings and conclusions.

## **Buyer-Supplier Involvement**

Early customer involvement is one of the most commonly cited factors affecting product success according to new-product-development literature. Terms like “incorporating the voice of the customer,” “developing a strong market orientation,” and “doing the up-front homework” are all used to describe customer involvement in the development process. Although involving customers requires time, it minimizes the possibility of rework and ultimately reduces development time.

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Gupta and Souder (1998) found that short-cycle-time companies were extensively involving their buyers in the development process. Buyer involvement resulted in an early definition and clarification of user needs. This also helped companies identify problems during the development process so that necessary changes were made before the product launch.

Dimancescu and Dwenger (1996) reflected on a study undertaken by Edith Wilson, a manager for the Hewlett-Packard company, who analyzed factors related to the success or failure of a sample of Hewlett-Packard projects. Seven out of ten failure cases showed that consumers' needs were not well understood by the product-development team. Since no one took responsibility for the errors caused by others, errors were not corrected in the early stages of development and caused big problems at the end of the development process.

Manufacturers often decide which products to produce based on their own strengths, experience, and resources and then push the product to the consumer. The supply chain, however, can be very complex, involving many firms with their own culture of working with new products. Manufacturers sometimes overlook supplier-buyer involvement in the chain and thereby limit the success of their products. In instances where a pull strategy is appropriate, it is logical to look at consumer needs and work with them to meet these needs. This is nothing new, because the consumer has been the focus of all manufacturing activities. The problem is that consumers are sometimes neglected when it comes to the development process. Instead of involving them with the process from the beginning, some manufacturers prefer to "push" the product. This may work for other industries, but for the confectionery industry it can be a problematic strategy. With the flood of new product introductions, the manufacturer needs to be more careful. Involving both suppliers and buyers in the development process may not only increase the efficiency of the process but may also help establish a strong supply-demand chain relationship.

Involving both buyers and suppliers in the process is found to have advantages, such as faster product development and greater promotional support downstream. Every company involved with the new product development process heavily depends on the process and the people who make it possible to develop a new product. If the reason

for introducing new products is to satisfy buyers, what is more logical than involving buyers in the development process?

If a company is heavily involved with new product introductions, it may continue including buyers in the development process as much as possible. But there are some cases when the competition is intense and the timing of the introduction is critical, as it is in the confectionery industry, and the firm may want to skip some of the development-process stages. Buyer involvement is often the first stage eliminated, because it is "time-consuming," even though "speed to market" is faster in companies where the buyer and supplier are included in the development stages of the new product.

Handfield et al. (1999) stated that "across all world-wide manufacturers, purchased materials account for 50 percent of the cost of goods sold" (p. 59). If this is the reality, it is expected that suppliers will have an impact on the new product development process in several ways. In fact, suppliers have been found to be helpful in lowering costs, decreasing process and product-development times, and offering alternative solutions, according to a 1997 Food Processing Survey (Kevin 1997). Supplier involvement in the development process brings advantages such as better and more consistent quality, timely delivery, and reduced cost. Gupta and Souder (1998) found that short-cycle companies involve their suppliers in the development process more than do long-cycle companies.

Ittner and Larcker (1997) stated that supplier involvement provides "early availability of prototypes, increased standardization of parts, enhanced consistency between designs and suppliers' process capabilities, and reduced engineering changing" (p.14). These contributions of supplier involvement may help reduce development time.

Handfield et al. (1999) survey results showed that the responding companies achieved improvements in new product projects when the supplier was involved with the product-development process. These respondents with active supplier integration achieved a 20-percent improvement in development time, a 15-percent improvement in development cost, and a 10-percent improvement in product manufacturing cost compared to similar projects with no supplier integration. Early involvement of buyers and suppliers will likely lead to a more successful product.

## Outsourcing

Many companies look for outside help when they lack the necessary skills to perform some of the activities within the development process, such as packaging, legal assistance, or advertising. When the company cannot provide these services internally they look for outside sources.

Outsourcing is sometimes seen as dependency on outside resources. However, outsourcing has been the solution to counteract a downsized budget for R&D staffing. The *Food Engineering* 1998 Manufacturing Survey revealed that the percentage of food companies with less than 100 employees that outsourced engineering activities has been increasing. In 1994, only 25 percent of the respondents were outsourcing, while in 1999 this increased to 32 percent. In the survey in 2000, 31.2 percent of the respondents said that they are outsourcing engineering projects, a slight decrease from 1999. In 2001, nine percent of respondents said they outsourced more activities, while 13 percent in 2002 and 17 percent in 2003 reported more outsourcing (Higgins 2004).

*Food Processing* magazine conducts an annual survey of the top 100 food processors. The survey in 1997 revealed that 70 percent of R&D departments were outsourcing projects, while 52 percent of the respondents were relying on ingredient suppliers. Approximately 58 percent of the survey respondents in 1998 and 62 percent in 1999 claimed that they were asking ingredient suppliers for more assistance than they have in past years. In 1998, 19 percent of the respondents said they were doing more outsourcing compared to 1997. In 2003, nearly two-thirds of R&D survey respondents said that suppliers were playing a greater role in developing new products, where multiple suppliers were included in project teams to control cost, improve product quality, develop product prototype, and assist in package design (*Food Processing Magazine* 2003). All of the 2004 Research & Development survey respondents indicated that they depended on suppliers to get help in product development (Katz 2004). It is clear that the trend of including suppliers in product-development activities has strengthened over the years and has become a norm in the food industry.

It is evident that some companies outsource parts of certain projects and others outsource an entire project. The four top outsourced activities according to *Food Engineering Magazine's* State of

Food Manufacturing Study in 2004 are engineering, copacking, sanitation, and maintenance. The choice of what and when to outsource is a difficult one in the new product development process, and firms need to examine its benefits and costs.

Outsourcing activities make the development process more efficient when the firm lacks expertise. Costs can be lower when experts take charge. However, there are drawbacks to outsourcing, such as the risk of exposing the new product idea to outsiders. If the outsourcing is not managed well, due to lack of communication and information flow, activity may be completed more slowly than planned, which can cause a late market entry.

Outsourcing new product development to independent firms has been seen as an alternative to traditional methods such as in-house product development. Since the development process requires confidentiality, bringing outsiders into the process means that the trust between the company and the supplier must be established and maintained throughout all the stages of the development. In addition to confidentiality and security, another common concern of outsourcing is loss of control.

Despite these concerns, Berne (1995) suggested that many producers no longer support the long-held belief of conducting product development inside company walls by carefully screened company employees "under a shroud of secrecy with no outside assistance." He suggested that the need for speedy development has superseded the fear of exposure from using outside assistance.

## Data Collection

A mail survey was used to collect data to analyze the supply-chain management practices of the North American confectionery manufacturing industry. The North American confectionery manufacturing industry was the focus of this research project in part because there is a strong focus on new product introductions. Confectionery manufacturers introduced 1,924 new products in 2000 (National Confectioners Association 2004). The U.S. confectionery industry was valued at \$25.1 billion, while the global confectionery market was valued at \$79 billion, and it was estimated to be growing at a compound annual growth rate of 0.6 percent (*Candy Industry* 2001). The candy industry is driven by new product introductions. It is the third largest selling, growing, and expandable consumption category in

the United States (IdeaBeat 2001).

The *Thomas Food Industry Register* list of 567 confectionery manufacturers was used in the survey. Each was initially contacted by telephone to identify the name of the person in charge of new product development as well as to confirm addresses. New product managers of each manufacturer received a copy of the survey via mail. New product development managers were asked to focus on the most two recent new products released into the marketplace. A questionnaire with questions on new product development practices by manufacturers, including their outsourcing and buyer-supplier involvement, was created. At the end of the questionnaire, respondents were asked to provide contact information if they wanted to receive a copy of the survey results of the study. This offer was made in an attempt to increase the response rate. After two mailings, a total of 110 questionnaires were returned with detailed development profiles on 208 new confectionery products. Fifty-two of 110 respondents attached their business cards and requested a copy of the survey results.

The sample for this research represented a broad array of confectionery manufacturers. Survey respondents stated that their companies focused mainly on manufacturing chocolate candy products, followed by non-chocolate candy and snacks (Figure 1). The most commonly reported type of product was a new item in an existing product line, followed by modifications; new to market, new to company; new line; and innovative (Figure 2).

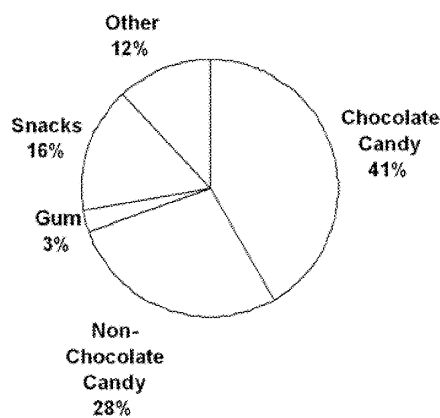


Figure 1. Product Category.

## Data Analysis

It is reasonable to expect that larger firms may structure their new product development process differently from smaller firms. These differences were examined as a part of this analysis. Company size in the sample varied from very small, with one or two employees, to more than 10,000 employees. Annual sales levels also varied among respondents. Responses were split evenly between companies with less than \$20 million in sales and companies with \$20 million or more in sales. There were 50 small and 49 large manufacturers, while the size of 11 manufacturers could not be determined. Table 1 reports the number of manufacturers by six annual-sales categories.

Manufacturers introduced on average ten new products in 1999, and the majority of these products were modifications of existing company products. Large manufacturers introduced 15 new products on average, while small manufacturers introduced only four new products in 1999. The response bias, focusing particularly on business' size (gross annual sales and number of employees) was examined using t- and chi-square tests. No significant bias in size was detected.

## Buyer-Supplier Involvement Strategy

Including suppliers in the new product development process allows manufacturers to gain information about and experience with new ideas and technolo-

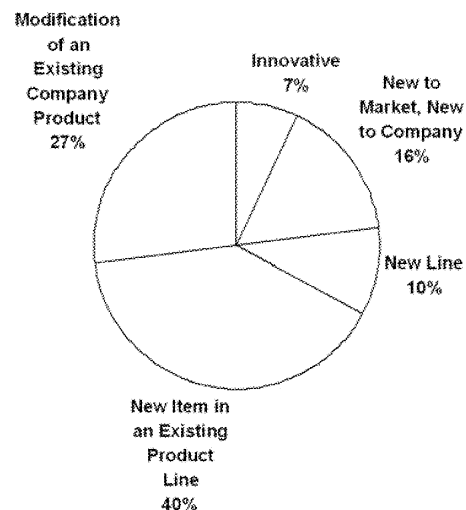


Figure 2. Product Type.

**Table 1. Number of Manufacturers by Annual Sales.<sup>a</sup>**

Annual Sales in \$ million	Number of manufacturers
less than 5	36
5 ≤ 10	8
10 ≤ 20	6
20 ≤ 50	13
50 ≤ 100	17
more than 100	19

<sup>a</sup> Eleven new product managers did not report their company's annual sales.

gies available outside the company. It was suggested by Kessler and Chakrabarti (1996) that suppliers help to identify potential problems, they provide extra personnel to shorten the development time, and they provide information on availability of necessary parts so that rework is reduced. Imai et al. (as cited in Brown and Eisenhardt 1995) associated faster development processes with an early and extensive supplier involvement.

Less than half of the confectionery manufacturers appear to regularly involve their buyers and suppliers. Table 2 shows that 31 percent of the confectionery manufacturers indicated that suppliers were often or always involved with the new product development process, while 47 percent of them involved buyers in the development efforts. Buyers appeared to be more frequently involved than suppliers. The relationship between frequency of buyer and supplier involvement was statistically significant at  $\alpha = 0.05$ . Manufacturers, when they look to channels for new product development help, tend to look downstream toward the buyers.

The new product development process includes a series of activities which may take place concurrently. In this study, new product development managers were asked to report on the following seven main activities: concept search; concept screening; concept testing; business analysis; product development; product use, field, and test marketing; and commercialization. The survey included brief explanation of each activity.

Manufacturers consulted with buyers on a wider range of activities than with suppliers. Prototype development; product use, field, and market testing; and product concept search were the top three activities in which buyers were most often involved

(Table 3). There was no association between frequency of buyer involvement and type of development activities they were involved with, except for commercialization activity (Table 4).

Those who involved suppliers in the process indicated they were highly involved during prototype-development activity (69 percent). This represents the sole development where suppliers are relatively more involved than buyers. It is not surprising that this activity falls much closer to the actual production process, where manufacturers evaluate technical feasibility. Suppliers, however, seem largely absent from the other stages of the development. There was no significant association between the frequency of supplier involvement and type of activities they were involved with, except for the product development and product use, field, and test marketing activities (Table 4).

Development partnerships with suppliers can bring a fresh perspective to the search for new ideas, aid in analyzing cost, and contribute to concept testing. In any case, manufacturers in the confectionery industry have been inclined to increase their involvement with both buyers and suppliers over the last five years. The trend seems to be toward more open channel involvement (Table 5). The association between frequency of supplier involvement and a trend for supplier involvement was found significant at  $\alpha = 0.05$ , whereas no significant association was found between frequency of buyer involvement and a trend for buyer involvement.

New product development managers were asked to report both the number of months spent on each activity and the total number of months it took to introduce the new product because there may be overlapping-concurrent activities. If the supplier

**Table 2. Degree of Buyer and Supplier Involvement.**

Degree of involvement	Buyer involvement		Supplier involvement	
	Frequency	Percent	Frequency	Percent
Always	23	20.9	8	7.3
Often	29	26.4	26	23.6
Sometimes	39	35.4	43	39.1
Rarely	8	7.3	19	17.3
Never	7	6.4	11	10
Not answered	4	3.6	3	2.7

**Table 3. Activities in Which Buyers and Suppliers Were At Least “Sometimes Involved.”**

Development activity	Buyer involvement		Supplier involvement	
	Frequency	Percent	Frequency	Percent
Concept search	38	34.5	23	20.9
Concept screening	31	28.2	9	8.2
Concept testing	33	30.0	17	15.4
Business analysis	25	22.7	11	10.0
Product (prototype) development	49	44.5	76	69.1
Product use, field, and test marketing	48	43.6	23	20.9
Commercialization	33	30.0	21	19.1

**Table 4. Results of the Chi-Square Test on Buyer and Supplier Involvement in Activities At the Level Described as “Sometimes Involved.”**

Development activity	Buyer involvement		Supplier involvement	
	Chi-square	Probability	Chi-square	Probability
Concept search	0.17	0.68	0.01	0.94
Concept screening	1.07	0.30	3.01	0.08
Concept testing	0.00	1.00	0.02	0.88
Business analysis	0.81	0.37	2.84	0.09
Product (prototype) development	0.00	0.96	7.64	0.01
Product use, field, and test marketing	0.46	0.50	4.55	0.03
Commercialization	7.38	0.01	0.03	0.85

**Table 5. Trend in Buyer and Supplier Involvement Over the Last Five Years.<sup>a</sup>**

Trend	Buyer involvement	Supplier involvement
	Percent	Percent
Declined	6	4.7
Stayed the same	57	60.4
Increased	37	34.9

<sup>a</sup> Ten and four managers did not answer this question on buyer and supplier involvement trends, respectively.

was involved in the concept search stage, the average time spent on a concept search was 3.5 months, whereas manufacturers with no supplier involvement spent 1.7 months on the concept search (Table 6). On the other hand, manufacturers spent less than half of a month when the buyer was involved during the concept-search stage. Supplier involvement increased the amount of time spent on the product-use testing stage and the commercialization stage. Significance of supplier involvement's impact on these two stages was confirmed by the statistical test at  $\alpha = 0.05$ .

Products introduced by companies that involved buyers in the development process took seven months (Table 6). Products with buyer involvement were developed in 15 percent less time than those that were developed by companies that did not include buyers in the development process. However, the difference in development time with and without buyer involvement was found statistically insignificant at  $\alpha = 0.05$ . Buyer involvement reduced the time spent on the concept-search stage by 20 percent, the business-analysis stage by 52 percent, and the product-development stage by 12.5 percent. It should be noted that all of these differences in time spent on each activity with and without buyer involvement were statistically insignificant  $\alpha = 0.05$ .

Table 6 also shows that products that were introduced by companies that did not involve suppliers in the development process took on average almost seven months, whereas products that were

introduced by companies that involved suppliers took almost nine months, a 31-percent difference. However, the t-test showed that this difference is statistically insignificant. Average time spent on the product use, field, and market testing and commercialization stages was statistically different between companies with and without supplier involvement, at  $\alpha = 0.05$ .

Speed-to-market is only one performance variable. Obviously it is most important to develop a new product that achieves market success. The nature of the survey—gathering data on the two most recently developed products—precluded gathering any data on product market performance.

### Outsourcing Strategy

Outsourcing various aspects of the development process—specifically, hiring experts outside of the firm for a certain project—was also examined in the survey. More than half of the new products (128 of 208) reported in the sample were introduced without outside assistance. The top three activities outsourced by the confectionery manufacturers were packaging, advertising, and prototype development. Among the 110 confectionery manufacturers, 49 looked for outside assistance during the new product development process, while 61 did not.

Outside assistance for packaging was used for 26 new products introduced by large companies and for 20 new products introduced by small companies (Table 7). The small manufacturers looked for out-

**Table 6. Comparison of Buyer and Supplier Involvement on Development Time (Months).**

Product development stages	Buyer		Supplier	
	Involved	Not involved	Involved	Not involved
Concept search	2.0	2.5	3.5	1.7
Concept screening	0.9	0.8	1.5	0.5
Concept testing	1.1	0.8	1.0	0.9
Business analysis	1.2	2.5	3.8	0.8
Product development	2.8	3.2	4.4	2.4
Product use, field, and market testing	1.1	0.9	1.5*	0.7*
Commercialization	2.4	2.0	2.8*	1.8*
Total development time	7.0	8.2	8.9	6.8
Number of products	101	89	61	133

\* Implies the difference in average time spent on activity is statistically significant.



**Table 7. Activities with Outside Assistance, by Company Size<sup>a</sup>.**

Outsourced Activity	Small companies	Large companies
Idea generation	4	3
Market analysis	8	9
Business analysis	1	1
Technical analysis	6	10
Financial analysis	3	1
Legal analysis	4	6
Prototype development	9	13
Market tests	1	16
Packaging	20	26
Distribution	2	6
Advertising	11	17
Other	1	3
Did not hire outside help	55	53

<sup>a</sup> Outside help was not hired by 20 manufacturers who did not declare their size, while only two outsourced technical analysis.

side assistance for advertising activities for 11 new products, while advertising was outsourced for 17 new products introduced by large companies. The sample size is too small to say much about differences between specific activities. The difference in market tests is notable. Aside from this, larger firms seem only slightly more inclined to outsource some aspect of their development. Smaller firms have fewer resources to invest in extensive outsourcing, but also have fewer resources to invest in intensive internal development systems.

More than 50 percent of innovative products were developed with outsourcing of some of the activities, whereas 70 percent of the modification products were introduced without any outside help (Table 8). In other words, the more the innovative the product was, the more outsourcing was needed.

Firms must balance the need to move quickly with limited internal resources and still maintain the quality of the product, but they also may risk exposing a proprietary process. Outsourcing technical assistance slows down the product development time in this sample (Table 9). New products developed by companies who hired outside assistance took almost 10 months to develop, while those without outsourcing took six months on average to develop. This difference was statistically significant at the 5-percent level.

## Conclusions

This study analyzed the findings of a new-product-development-practices survey of candy and snack manufacturers. Survey results revealed that there is increasing buyer and supplier involvement within new product development processes; however, buyer and supplier involvement may have different, but not significant, impacts on new product development time.

Involvement of a buyer reduced development time by 15 percent, whereas supplier involvement increased development time by 31 percent. However, these differences in development time due to buyer-supplier involvement were not statistically significant.

The “customer is king” attitude and customer focus have been a driving force for new product introductions for many years (Cooper and Kleinschmidt 1987, 1995; Griffin and Hauser 1993). The downstream orientation of manufacturers is evident here, as well. The study does document a trend toward increasing channel involvement in new product development in the confectionery industry. Ekström and Karlsson suggested that the degree to which user requirements are considered is one of the most critical factors for commercial success (2001). With the introduction of supply-chain management practices, the direction of this relationship has

**Table 8. Activities with Outside Assistance, by Product Type.**

Activity Outsourced	Innovative (n=16)	New to market, new to company (n=35)	New line (n=35)	New item in an existing product line (n=76)	Modification of an existing com- pany product (n=46)
Idea generation	1	2	0	1	3
Market analysis	0	4	3	7	2
Business analysis	0	1	0	1	0
Technical analysis	5	3	5	2	3
Financial analysis	1	1	0	2	0
Legal analysis	2	3	1	1	2
Prototype development	2	8	1	3	8
Market tests	3	2	3	5	3
Packaging	1	13	5	17	9
Distribution	1	5	0	2	0
Advertising	5	6	6	7	3
Other	1	0	0	3	0
Did not hire outside help	7	17	22	49	32

Note: Respondents could select multiple outsourced activities.

**Table 9. Outside Assistance and Development Time (Months).**

Outside Assistance	N	Average development time	Standard deviation
Obtained	75	9.6	9.6
Not obtained	119	6.2	4.6

started to change. More emphasis has been given to the relationship with suppliers and, ultimately, a business-to-business concept has emerged. The results on supplier involvement were unexpected in that, based on the literature, supplier involvement was supposed to reduce the development time, not increase it. Supplier involvement, however, can be justified with certain types of projects even if it lengthens development time. Supplier input on certain aspects of product design can provide key insights leading to a much more successful product. While development time is critical in many cases, getting the product right is also essential. The data gathered do not permit an evaluation of product success, and many firms that took additional time to involve their suppliers may have discovered that the benefits of better design outweighed the costs of additional development time.

As stated earlier, suppliers were involved mostly during the latter stages of the development process. This may imply that supplier involvement later in the process may have a positive impact on reducing development time. However, confectionery manufacturers not only reduced development time but they significantly increased time spent on product development and product use, field, and test marketing activities.

Supplier involvement can be explained by a number of different variables not examined in this study. Previous business history, trust, and the nature of suppliers' business relationships to competitors can determine a manufacturer's attitude toward pursuing development partnerships. If the manufacturer has a minor share in the supplier's total sales, the supplier may show a lack of commitment.

The Supplier Integration Project of Handfield

et al. (1999) pointed out two negative impacts of supplier involvement on technology risk and uncertainty. The first negative impact is due to the fact that involvement with a supplier may have a tendency to lock the buying company into the supplier and its technologies. The second negative impact was due to the missing incentive to innovate when the supplier has an inside track, which slows the pace of technological advancement. The same study also revealed that 45 percent of the study participants were not satisfied with the results of supplier integration efforts, but 70 percent of them had high expectations for this integration in the future. Their results indicated that many companies realized the importance of supplier integration but had not yet discovered the means to successfully implement it. This seemed to be the case for confectionery manufacturers in that they also agreed that supplier involvement had been increasing but it did not save any time on new product development efforts. This result may also be due to the fact that supplier involvement is a relatively new concept for manufacturers, and the means for efficient supplier involvement has not yet been discovered and adapted.

The time to develop new products may also be related to the complexity of a new product. Suppliers may only be involved with certain kinds of products where the logistics of introduction is more complex. Less-complex line extensions may be developed with only minimal involvement.

Survey data revealed that almost 47 percent of confectionery manufacturers did not outsource development-related activities. Those manufacturers who outsource take longer to develop a new product, since the impact of outsourcing on development time is statistically significant. An increase in development time may be attributed to another common concern of outsourcing: going outside the company means loss of control as well as loss of internal coordination and decision making. Therefore, candy and snack manufacturers need to pay attention to better management of outsourcing so that development time does not increase due to outsourcing.

There is a need for more research on both buyer and supplier involvement since, contrary to the literature's suggestions, they did not bring any significant reductions in new product development time. Development managers need to look at outsourcing to reduce development time if the speed to market is an important issue for the company's new product

development goals. A follow-up survey with the manufacturers may help explain the direction and magnitude of both buyer and supplier involvement's impact on development time, as well as changes, if any, in managing outsourcing activities. Questions on channel trust, vertical integration, and competitive environment should also be included in the follow-up survey to further explore relationships and their impact on development time.

## References

- Allnoch, A. 1997. "Efficient Supply Chain Practices Mean Big Savings to Leading Manufacturers." *IIE Solutions* (July):8-9.
- Balsmeier, P. W. and W. J. Voisin. 1996. "Supply Chain Management: A Time-Based Strategy." *Industrial Management* (September/October): 24-27.
- Berne, Steve. 1995. "Outsourcing New Product Development." *Prepared Foods* (mid-April): 31-33.
- Brown, S. L. and K. M. Eisenhardt. 1995. "Product Development: Past Research, Present Findings, and Future Directions." *Academy of Management Review* 20(2):343-378.
- Candy Industry. 2001. Retrieved September 24, 2001 from <http://www.candyindustry.com/media.asp>.
- Cooper, R. G. and E. J. Kleinschmidt. 1995. "Benchmarking the Firm's Critical Success Factors in New Product Development." *Journal of Product Innovation Management* 12:374-391.
- Cooper, R. G. and E. J. Kleinschmidt. 1987. "What Makes a New Product a Winner? Success Factors at the Project Level." *R&D Management* 17(3):175-189.
- Dimanceanu, D. and K. Dwenger. 1996. *World-Class New Product Development: Benchmarking Best Practices of Agile Manufacturing*. New York: AMACOM American Management Association.
- Ekström, K. M. and M. A. Karlsson. 2001. "Customer Oriented Product Development? An Exploratory Study of Four Swedish SME's." FE-rapport 2001-380. Göteborg University. <http://www.handels.gu.se/epc/archive/00001404/01/gunwba380.pdf>. Retrieved November 1, 2004.
- Food Engineering Magazine. 2004. "State of Food Manufacturing Study." <http://www.foodeengineeringmag.com/CDA/ArticleInformation/>

- coverstory/BNPCoverStoryItem/0,6326,132486,00.html. February 4, 2005.
- Food Processing Magazine*. 2003. "32<sup>nd</sup> Annual R&D Survey." Retrieved February 14, 2005 from <http://www.foodprocessing.com/ME2/dirmod.asp?sid=&nm=&type=Publishing&mod=Publications%3A%3AArticle&mid=8F3A7027421841978F18BE895F87F791&tier=4&id=6516C74708424EB18AD3807E2E625CB6>
- Griffin, A. and J. R. Hauser. 1993. "The Voice of the Customer." *Marketing Science* 12(1):1–27.
- Gupta, A. K. and W. E. Souder. 1998. "Key Drivers of Reduced Cycle Time." *Research Technology Management* 41(4):38–43.
- Handfield, R. B., G. L. Ragatz, K. J. Petersen, and R. M. Monczka. 1999. "Involving Suppliers in New Product Development." *California Management Review* 42(1):59–82.
- Higgins, K. T. 2004. "The State of Food Manufacturing: Processors Bring Out the Checkbooks and Focus on Productivity and People." *Food Engineering*. Retrieved February 14, 2005 from <http://www.foodengineeringmag.com/CDA/ArticleInformation/coverstory/BNPCoverStoryItem/0,6326,132486,00.html>.
- IdeaBeat. 2001. Retrieved October 8, 2001 from <http://www.idealbeat.com/candy/SOTC/>.
- Ittner, C. D. and D. F. Larcker. 1997. "Product Development Cycle Time and Organizational Performance." *Journal of Marketing Research* 34 (February):13–23.
- Katz, F. 2004. "33rd Annual R&D Survey: More Home Runs, Fewer Bunts on Tap for Next Year." Retrieved from <http://www.foodprocessing.com/ME2/dirmod.asp?sid=&nm=&type=Publishing&mod=Publications%3A%3AArticle&mid=8F3A7027421841978F18BE895F87F791&tier=4&id=E2D227A735894C1196AA55F11DB00E82>
- Kessler, E. H. and A. K. Chakrabarti. 1996. "Speeding Up the Pace of New Product Development." *Journal of Product Innovation Management* 16: 231–247.
- Kevin, K. 1997. "The 1997 Top 100 R&D Survey." *Food Processing* (June):65–70.
- National Confectioners Association. 2004. Retrieved June 30, 2004 from <http://www.ecandy.com/content.aspx?SectionID=2&ParentID=6&ContentID=4329>.
- Thomas Food Industry Register*. 1998–99 Edition.