

# **Early Supplier Integration in the Design of the Skid-Steer Loader**

## **Teaching Note**

Scott has been offered a new position as supply management manager for a new Deere & Company manufacturing facility of a yet-to-be-designed product (i.e., skid-steer loader). As part of his new job, he must make a proposal to identify specific suppliers to integrate into skid-steer loader development process and specific ways to effectively integrate these suppliers in order to meet aggressive target costs.

### **Immediate Issues**

- To identify and define criteria for integrating suppliers into the early phases of the skid-steer loader development process.
- To identify and specify critical principles, practices, and techniques for integrating suppliers effectively into the early phases of the skid-steer loader development process.

### **Basic Issues**

- Why is supplier involvement important?
- Why should certain suppliers be integrated into the product development process, particularly in the early phases?
- How should suppliers be integrated into the product development process?
- What structural and infrastructure support should be provided to ensure effective integration of suppliers into the product development process?

---

*Copyright©, 2001 National Association of Purchasing Managers (NAPM).*

*This case was written by Dr. Manus Rungtusanatham and Dr. Fabrizio Salvador from Arizona State University at the 2001 Case Writing Workshop co-sponsored by Deere & Company under the supervision of Professors Michiel R. Leenders and Dr. Robert A. Kemp. It was prepared solely to provide materials for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.*

## Teaching Objectives

1. To understand the meaning and significance of supplier integration.
2. To learn the criteria and potential tradeoffs for integrating suppliers into the product development process.
3. To recognize contextual factors that would increase or decrease the effectiveness of early supplier integration in the product design process.
4. To specify critical principles, practices, and techniques for successful early supplier integration into the product design process.

## Suggested Student Assignment

Imagine you are in the position of Scott Nolan. Write a two-page memorandum that (a) identifies, defines and justifies the criteria (limit 4) for screening suppliers to integrate into the early phases of the Deere skid-steer loader development process and (b) recommends guiding principles, practices and/or specific techniques to provide for effective integration of early supplier integration in the Deere skid-steer loader development process.

## Suggested Additional Reading & Data Gathering

1. [www.johndeere.com](http://www.johndeere.com): Product information, corporate culture and history, current financial situation, etc.
2. Birou, L. M. and S. Fawcett. 1994. "Supplier Involvement in Integrated Product Development: A Comparison of U.S. and European Practices." International Journal of Physical Distribution and Logistics Management. 24(5): 4-14.
3. O'Neal, C. 1993. "Concurrent Engineering with Early Supplier Involvement: A Cross-Functional Challenge." International Journal of Purchasing & Materials Management. 29(2): 2-9.
4. Smith, G. B. 1990. "Co-makership: The Japanese Success Story in a British Environment." International Journal of Quality & Reliability Management. 7(2): 7-14.
5. Wheelwright, S. C. and K. B. Clark. 1992. Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency, and Quality. New York, NY: The Free Press.

## Discussion Questions for Use in Class

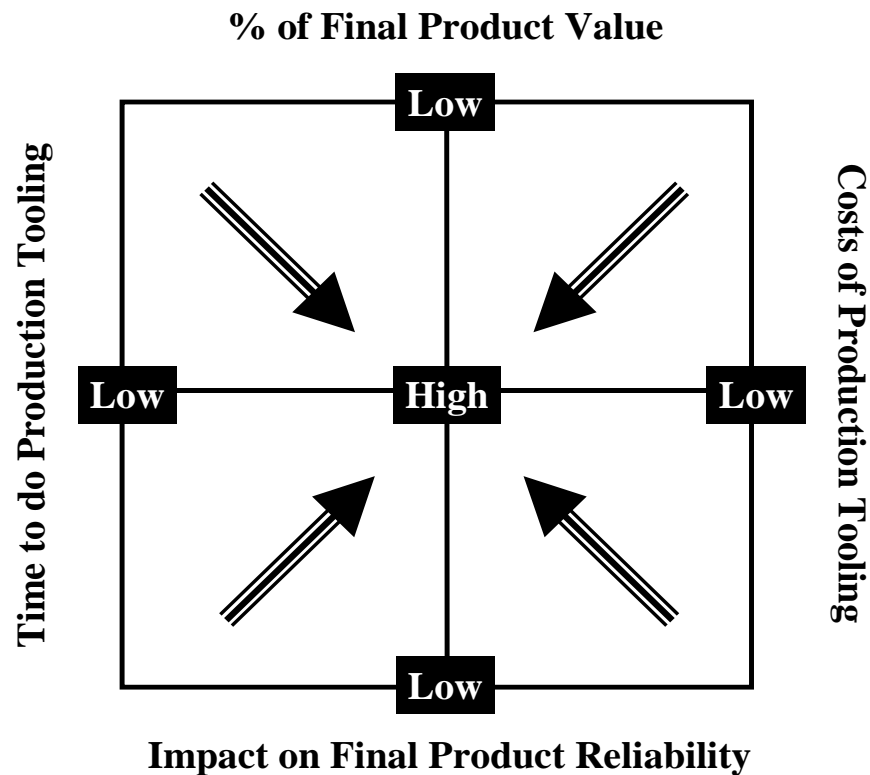
1. Suppose there are 100 potential suppliers, how many suppliers do you think should ideally be integrated in the early skid-steer development process? Why that many or that few?

2. Are there tradeoffs in terms of the number of suppliers to integrate? If so, what are the tradeoffs?
3. Are there tradeoffs among the identified criteria? Can you tell? What do you need to know to better answer this question?
4. Would you mandate weekly meetings as an inter-organizational policy to structure the interactions? If not, how can you facilitate communication?
5. What role can IT play or should play in structuring these interactions? What concerns do you have with the suggested IT role?
6. Suppose the criteria you developed suggest that you integrate supplier X into the product development process for the skid-steer loader, what reasons might lead you to choose to not do so or to reduce the convenience of doing so?
7. What do you think might be hurdles to overcome at Deere to integrate suppliers into the early phases of the product development process?

### **Case Analysis**

Early Supplier Integration Selection. The product development process is responsible for the generation, specification, prototyping and finalizing of a product that can be manufactured according to operational, marketing and financial objectives. Research has consistently shown that involving suppliers in the product development process can yield such benefits as improved product costing, faster product development time and more effective and efficient operations. This case asks students to first develop a set of criteria that can be applied to identify a subset of “critical” suppliers from all suppliers who should be integrated early in the product development process. While there are potentially a large number of different criteria, for this particular product, there are, at least, four generic critical factors that should be considered in deciding whether or not a supplier should be integrated [see Exhibit 1 for the Early Supplier Integration Decision Scheme (ESIDS)].

### **Exhibit 1** **Early Supplier Integration Decision Scheme**



The first factor, Percent of final product value, refers to the relative value of a supplied item – part, component, subassembly, etc. – to the value of the final product. When the value of the supplied item relative to the final product value is high, the supplier should be integrated early in the product development process.

The second factor, Impact on final product reliability, refers to the extent to which a failure in the supplied item compromises the primary functionality of the final product. When a supplied item failing can significantly compromise the primary functionality of the final product, the supplier should be integrated early in the product development process.

The third factor, Costs of production tooling, refers to the monetary investment to design and to implement the production tools necessary for making a supplied item. The higher the total costs of production tooling, the earlier the supplier should be integrated in the product development process.

The last factor, Time to do production tooling, refers to the length of time it would take to design and to implement the production tools necessary for making a supplied part. This factor is related to the third factor. Again, when it takes a supplier a long time to design and implement the production tools

necessary for making a supplied item, the supplier should be integrated early in the product development process.

### **Integration Principles, Practices, & Techniques**

Again, a number of principles, practices and techniques can be elicited. Clearly, there must be resources available to support the activities needed for effective integration. But generally, one critical guiding principle should be the development of mutual trust and open communication. To this extent, such practices as sharing of confidential information, providing common meeting spaces, providing access to organizational and supply chain-wide resources can support the development of mutual trust and open communication. Finally, with technological advances, the creation and protection of an electronic repository for design related information that can be accessed by both parties would go a long way towards generating trust and facilitating communication. In Exhibit 2, a summary of Deere's evaluation categories for supplier integration into the product delivery process should shed some insights into how Deere & Company tries to integrate suppliers.

## Early Supplier Integration in the Design of the Skid-Steer Loader

### Exhibit 2

#### Supplier Integration into the Product Delivery Process – Evaluation Categories

Evaluation Category	Justification for Inclusion
<b>Metrics</b>	To successfully implement new products, Deere and the supplier need to agree on the objectives of the program. This includes performance objectives, quality, schedule, cost and investment. If results are not supporting objectives, Deere and the supplier need to have regular communication on metrics and change direction.
<b>Resources</b>	In order to meet project objectives, a sharing of Deere and supplier resources is necessary. Suppliers and Deere need to have access to the resources of all the companies in our supply chain (people, tools, alliances with other suppliers, alliances with customers, etc.) and use these resources to meet mutually agreed objectives that enhance the value of both Deere and the supplier's business. Sharing of these resources includes, but is not limited to these activities: establishing product performance, establishing cost targets, quality planning, detailed design and verification.
<b>Responsiveness</b>	Deere demonstrates a commitment in our responsiveness to your needs. This includes timeliness and accountability of information, availability of personnel to help resolve issues and the degree of assistance required to achieve closure on business issues.
<b>Attitude</b>	A high degree of commitment is required from Deere and its suppliers to have a successful business relationship. Deere's commitment is measured in the degree of teamwork, professionalism, and acceptance of change and new ideas.
<b>Communication</b>	Deere's acceptance of responsibility to communicate is critical in the Deere/supplier relationship and is measured by the quality, accuracy, conciseness and professionalism of Deere's communications. The issue of confidentiality of information and the degree of follow-up and clarification required of supplier personnel to reach closure is also addressed. Deere needs to communicate long-term plans and objectives with the supplier to help them plan their future needs.

## Two Examples

Two examples, the Fuel Tank and the Headliner, can be used to illustrate how the successful application of the ESIDS helped Deere and its supplier.

### The Fuel Tank Example

The fuel tank on the skid-steer loader is a component that can be mapped onto the early supplier integration decision scheme as follows:

- Percent of final product value: low = 2 percent
- Costs of production tooling: high
- Impact on final product reliability: low
- Time to do production Tooling: high (typically 12-14 weeks)

Two out of the four criteria on the Early Supplier Integration Decision Scheme, suggest that the supplier should be integrated in the early phases of the skid-steer loader development process. Once the supplier was selected, Deere engaged in a close collaboration with the supplier to establish a climate of trust. This was a prerequisite for the supplier to openly share sensitive cost data with Deere.

The collaboration with the supplier was key to the meeting of the project goals. For example, in order to assess product quality, Deere required that tank prototypes be manufactured with the same process they would have gone through in volume production. This required metal dies to be cut. Unfortunately, after six months of work, the fuel tank was still 30-40 percent above target cost, so that many engineering design changes would likely be required to comply with target cost requirements. Given the 12-14 weeks lead-time for the fuel tank die cutting, this situation was seriously threatening Deere's capability to meet the 24-month deadline. By collaborating with the fuel tank supplier it was possible to reduce the die cutting lead-time from the typical 12-14 weeks to just 7 weeks. This successful collaboration ensured on-time and on-cost fuel tank design release.

This supplier was integrated by multiple methods. For example, the suppliers' design personnel regularly visited the design team at the Knoxville facility every two weeks to discuss advances in design, as well as engineering changes needed to meet cost targets. Moreover, Deere and the supplier shared CAD drawings and files through a shared database to ensure timely exchange and alignment of product design information.

### **The Headliner Example**

The skid-steer headliner is a component that can be mapped onto the Early Supplier Integration Decision Scheme as follows:

- Percent of Final Product Value: low = 1%
- Costs of production tooling: high
- Impact on final product reliability: low
- Time to do production tooling: relatively high

The headliner, located just below the cabin roof of the skid-steer loader, houses instrumentation, provides sound insulation and contributes to interior cabin aesthetics. The decision not to integrate the headliner supplier early in the beginning of the product development process led to a number of problems. In fact, when the supplier was contacted at an advanced stage of final product design, Deere discovered that the design of the skid-steer loader up to that time made it impossible for the headliner supplier to meet cost targets. At the same time, component design changes became problematic because the design of interfacing components had already been frozen. For this reason, the supplier had to make a set of tentative die changes, increasing the cost of production tooling from \$40,000 to \$120,000.

### **Additional Points to Raise**

1. These four criteria are based on the experiences of Deere & Company, and, hence, might be biased by Deere's corporate culture and the types of products that exist in its portfolio.
2. The four criteria probably have different weights depending on the type of item that is being supplied. This may explain why the Headliner supplier was not selected for integration early in the product development process.

### **Teaching Suggestions and Suggested Time Plan**

1. This case can ideally be assigned to students before assigning the Deere Commercial Worksite Products case by Dr. Peppi Kenny, © 2001 NAPM.
2. This case is best used with students who have been introduced to new product development and supplier management. The suggested student assignment requirements are best assigned to a team of 4-5 students for preparation, before actual class discussion.
3. Depending on student profiles previous exposure to the new product development process, etc., the instructor might want to quickly sketch the typical new product development process, as well as to hint at



- possible criteria for early supplier involvement. If necessary, spend 10-15 minutes on this issue.
4. Otherwise, the instructor might want to begin by dividing the board into two equal halves. On one half, the instructor should solicit a broad list of supplier integration screening criteria. The instructor should discourage the students from making evaluative comments about the listing. Discussion of listings should take place only after the listings have been exhausted for possible groupings and higher-level abstractions of the various listing entries. A vote can be taken to select the top 4-5 listings. To stimulate comments, the instructor can use the questions from the “Discussion Questions for Use in Class” section. This task should take about 30 minutes.
  5. On the other half of the board, the instructor should solicit principles/practices/techniques that enable effective integration of suppliers into the early phases of the product development process. Repeat the steps in [3]. To stimulate comments, the instructor can use the questions from the “Discussion Questions for Use in Class” section. This task should take about 30 minutes.
  6. When discussion on the two listings has been concluded, the instructor might want to show Exhibits 1 and 2 and ask students to comment on both before providing them with the two examples about the fuel tank and the headliner and ending with insights from the additional points to raise” section. To stimulate comments, the instructor can use the questions from the discussion questions for use in class” section. Depending on student comments, this should take between 30-40 minutes.