

4 Early Supplier Integration in the Design of the Skid-Steer Loader¹

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?

Teaching Objectives

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

1. Reprinted with permission from the publisher, the Institute for Supply Management™ “Early Supplier Involvement in the Design of the Skid-Steer Loader” by Manus Rungtusanatham, PhD and Fabrizio Salvador, PhD, Arizona State University, 2001 Case Writing Workshop.

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 early supplier integration in the Deere skid-steer loader development process.

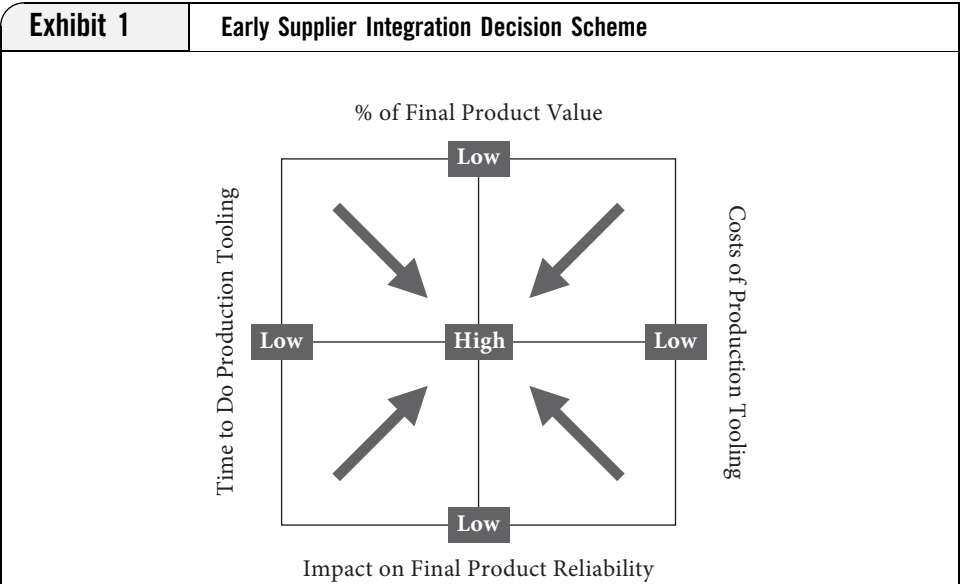
Answer, Part (a)

Screening Suppliers for Integration

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]).

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.

Answer Part (b)

Early Supplier Integration

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 give some insights into how Deere & Company tries to integrate suppliers.

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

Exhibit 2	Supplier Integration into the Product Delivery Process—Evaluation Categories
Evaluation Category	Justification for Inclusion
Metrics	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.
Resources	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.
Responsiveness	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.
Attitude	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.
Communication	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.

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 U.S. \$40,000 to U.S. \$120,000.

Additional Points to Raise

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.

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

This case is best used with students who have been introduced to new product development and supplier management. The suggested assignment requirements are best assigned to a team of 4-5 students for preparation, before actual class discussion. 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.

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” section. This task should take about 30 minutes.

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 above. To stimulate comments, the instructor can use the questions from the “Discussion Questions” section. This task should take about 30 minutes.

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” section. Depending on student comments, this should take between 30–40 minutes.

Additional Reading & Data Gathering

www.johndeere.com: Product information, corporate culture and history, current financial situation, etc.

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