

Importance of dual sourcing and supply chain impact in new product design and current product development

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Abstract

The initial dual sourcing in automotive industries may have less expertise during initial RFQ (Request for quotation) and hard tooling (production tooling). Many industries have made it clear in single sourcing for their new product development. This article aims to develop guidance on dual-sourcing and its importance and explain why we need to use dual-sourcing during the introduction of new products. However, none of the case studies carried out thus consider Dual sourcing before the pandemic and other countries' bands. This study sets a path to establish dual-sourcing in new and current products, which helps the continuous supply chain in production and aftermarket. In another way, the proposed process study significantly impacts the achievement of a constant supply chain to manufacturing and service facilities without any parts deal. Also, this study helps minimize the part's cost when it dual sourcing. It makes obtaining impactable results in product budget and supplier risk possible. Furthermore, this process control will impact the further parts delay and additional cost savings.

Keywords: New Product Design; Dual Sourcing; Cost saving; Supply chain; Sourcing matrix; Manufacturing; Quality

1. Introduction

In the current global situation, OEM companies face various downsides when getting parts from suppliers. A single source plays a significant role between OEM and supplier and directly affects the supply chain, causing delays in getting parts to the manufacturing and service departments. In the 2020 pandemic, some country bans made the supply chain even worse. Companies like OEMs that work in global manufacturing facilities can work with the purchasing team to dual source the parts and localize them to increase the supply chain's width. This article explores the critical role of dual-sourcing in new product development, slowly adopting the same process in current product design, and proves how strongly dual-sourcing can influence a constant supply chain and release the product on time.

2. Literature Review

2.1. Introduction

The exhaustive dual-sourcing strategy:

- Identify parts to dual-source: Identify the parts that need to be dual-sourced and reflect a constant supply chain.
- Cost Savings: Identify similar parts and move them to a dual-sourcing supplier. If necessary, update the design to keep a single part number with dual-sourcing suppliers.
- Localization: Identify the parts that can be sourced locally to avoid supply chain risk
- Purchasing team: Develop the sourcing matrix supplier list to identify the strategic supplier for each part family.

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An Effective dual-sourcing part can benefit the organization, such as continuous production and less supply chain risk. The following key benefits are presented in below Fig 1.0:

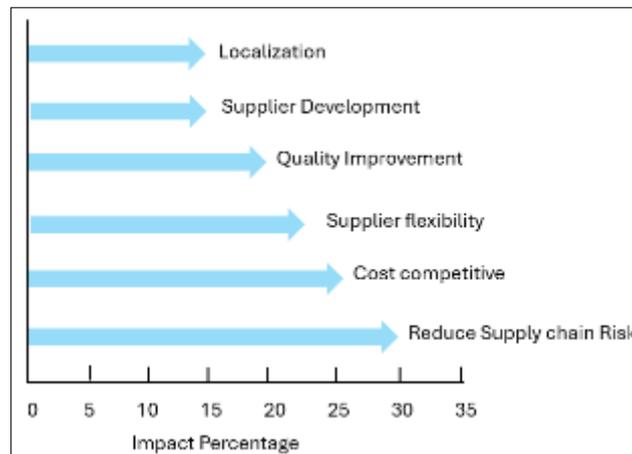


Figure 1 Benefits of Dual sourcing

2.2. Types of Sourcing

There are two types of sourcing – single and dual sourcing (multiple sourcing). The purchasing team and engineering will decide the time of production parts whether the parts need to be single-source or dual-sourced

- *Single Source*: The component, product, or material is sourced from a single supplier even if other suppliers are making similar parts for different customers.
- *Dual or Multiple sources*: A company can purchase a component, product, or material from two or more suppliers in the same region or different regions to minimize the supply chain risk for continuous production.

2.2.1. Risks in Single Sourcing

- Supplier quality issues which will affect the continuous production
- Material delay from tier 2 supplier or other factors will affect the delivery of the component
- Cannot do cost negotiation
- If the supplier has financial stability, it will directly impact the parts distribution, and it will be hard to find an alternate source in a short time.
- Ramping up production on short notice will be not possible. So, the demand will be impacted.
- Sometimes aftermarket revenue will be reduced if the branding agreement is not properly called out.

2.2.2. Benefits of Dual sourcing:

- Risk reduction and continuous parts supply – getting parts from multiple suppliers keeps the supply chain stable and fulfills the market demands.
- Improved negotiation – we can get better prices when compared to single-source suppliers.
- Quality Improvement – by dual sourcing, the quality of the product will increase and minimize the warranty claim
- Geographical Diversification – based on the manufacturing location, the parts can be localized for cost reduction and minimize the delivery time of the part
- Increase production – Dual source suppliers can be able to meet the sudden market demand without any issues.

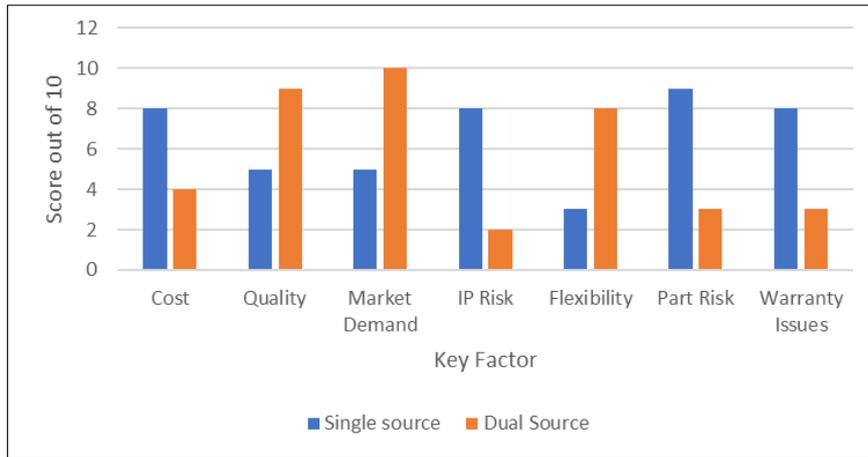


Figure 2 Single Vs Dual source

2.3. Parts identification and impact study

To analyze the impact of the single source parts, the Supplier quality team and purchasing team need to identify the single source parts and categorize each part's risk level.

- Identify single source parts by auditing inventory and procurement data
- Evaluate supplier performance – by conducting RCCP, supplier quality performances, delivery time, and response time for quality investigation.
- Analyze market demand and parts inventory (aftermarket or service parts)
- Quality and warranty complaints against each part number
- Analyze the supply chain impact parts vs production demand
- Cost increase from original Purchase order (PO)

Identify the list of parts that needs to mandatory dual sourcing based on above process.

- Investigate high risk parts with various fact checks to immediate dual sourcing or alternate sourcing.

Bearing				
Description	Single sourced	Dual Sourced		
		Supplier 1	Supplier 2	Supplier 3
Cost	\$120	\$90	\$75	\$85
Supply Risk	High	Low	Low	Low
Quality	Risk	No Risk	No Risk	No Risk
Demand	Not Meet	Meet	Meet	Meet
Flexibility	No	Yes	Yes	Yes
Sudden Cost Increase	Yes	No	No	No
Product Improvement	Less Chance	Yes	Yes	Yes
Part Localization	No	Yes	Yes	Yes
Negotiation	Limited	Better	Better	Better

Figure 3 Single vs Dual Source Impact Study

2.3.1. Key Points

- Detailed Single source impact parts study refer Fig 3.0. Compare the risk assessment study for single and Dual source
- Supplier Feasibility:
 - Complete detailed CPPD with supplier on drawing and its criticality
 - Compare the quote

- Analyze the RCCP and Risk assessment scorecard
 - Similar part for other customers
 - Sample parts order – quality check, measurement check, part validation
 - Quality Improvements:
 - Quality risk is very less
-

3. Implementation

3.1. Dual Source Implementation

The right time to implement dual sourcing is during new product design and development (NPD). During NPD, the engineer has enough time to develop the product design and try to get parts from multiple sources for soft tooling. All these soft tooling parts undergo various testing cycles during various design phases to prove their durability. It allows the team to choose the best supplier for their production parts.

Upon finalizing the supplier in the Alpha design stage, the drawings undergo a detailed CPPD and Pre-PPAP study. This pivotal stage is crucial in our process as it allows us to comprehensively understand the hard tooling production line, underscoring the significance of each quality role in the NPD process.

3.2. AI in Dual sourcing

- **Predictive Supplier Performance Screening:** AI plays a significant role in dual sourcing. The AI tool continuously monitors supplier performance, alerting us to any supply chain risk, quality risk, or other risk that another supplier may be facing. It then recommends a volume increase notification, ensuring our volume demand is protected and our production line runs smoothly.
 - **Risk Management Study and Volume Distribution:** Proactive AI Tool The AI tool takes a proactive approach to managing risks. It performs various external market studies to understand the supply-demand relationship and plays accordingly. For example, if there is a political or weather issue, the tool will recalculate the current demand for the parts and ramp up the other supplier volume.
 - **Cost Study with another supplier:** AI can Help the manufacturing team identify the cost study comparison of material, transportation cost, and regional MFG price increase, compare the study with another supplier, and allocate the volume accordingly.
 - **Supplier Quality Monitor:** Efficient AI System the AI system efficiently monitors supplier quality in parts delivery. It compares the data with another supplier to understand the quality risk and allocate the volume accordingly to another supplier.
 - **Supply Chain Demand:** AI monitors the demand for real-time parts for each product, such as future demand, past parts orders, market trends, customer orders, and after-market demand. The system will help allocate the parts quantity to each supplier.
 - **Inventory Balance:** The AI tool can optimize the inventory part level by balancing supplier parts orders. The tool can also analyze production and service demand and maintain the parts inventory accordingly.
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4. Discussion

4.1. Dual Sourcing Strategy planning

To effectively plan for dual sourcing strategy in current product and new product, follow these steps

- *Parts need to Dual source:* Identify the global level single sourced parts family which are at high risk due to supplier dependency, geographical risk due to country ban or long route, supplier capacity constrain, and supplier quality. Category the part family and complete a detailed cost study, production impact, and service parts impact
- *Develop sourcing matrix:* Develop a sourcing matrix for each part family based on the manufacturing technical requirements. Identify the preferred categorized supplier for each region. Refer Fig 4.3.
- *Request for Quote (RFQ) and select supplier:* Send engineering print to preferred supplier and Request For Quote and select the preferred supplier based on cost, quality, supply chain and Rough-cut capacity planning (RCCP). Select the supplier in different region to avoid supply chain risk.
- *Technical Feasibility:* conduct detailed technical discussion with Selected preferred suppliers for any engineering drawing updates.

- *Plan for quantity split*: based on the supply chain, parts risk and cost, plan the quality splits (e.g., 60/40, 50/50, 70/30) for both suppliers for each part.
- *Supplier capability*: Order the sample parts from both suppliers and complete the detailed validation of the parts to understand the supplier capability.
- *Dual sourcing Implementation*: Set a new PO to the suppliers for parts implementations.
- *Quality Control*: Set the quality measurement for both suppliers to ensure to meet quality requirements. Like., PPAP, and continuous auditing of parts.
- *Monitoring the performances*: The corporate quality and purchasing team will conduct periodic RCCP discussions to ensure any potential capability risk from suppliers and supplier supply chain performance quality measurements.
- *Risk Management and contingency planning*: Review and prepare where one supplier is facing issues and ensure that production from another supplier is kept increasing for a continuous supply chain.
- *Continuous Improvements from supplier*: After implementation of dual sourcing continuous monitoring of the supplier quality, periodic reviews, RCCP investigation, and service parts monitoring.

4.2. Process implementation

Periodic review with supplier, Supply chain team, quality team and for cost increase and quality of the part

Continues monitoring the suppliers

4.3. Sourcing Matrix:

Develop a sourcing matrix for each region based on the part, supplier capability and capacity.

- Conduct periodic review with each supplier and update the table based on the risk assessment of each supplier.
- Develop a new supplier during NPD and include them in sourcing matrix.
- Sourcing matrix helps to identify each supplier based on the part category in each region.

Strategic Partner	Sourcing Matrix				
	Supplier Type	North america	Europe	China	India
	Collaborative Supplier				
	Preferred / Strategic Supplier				
	Transactional supplier				

Figure 4 Sourcing Matrix

5. Conclusion

Dual sourcing is best strategic procurement approach which balance the supplier risk, best service in industry, reduce single source dependency.

While dual sourcing helps to reduce the lead time, cost effective, reduce supply chain risk, higher part quality, local source parts which lead to reduce the transportation, Ontime product launch. It helps for better negotiation with suppliers, adopt fast changes in design, maintain supply chain, Increase supplier relationship. Geographical diversification adds another layer of protection in supply chain which allows to flexibility in timing and meets demands in the market.

The key advantages on Dual sourcing.

- Risk Mitigation
- Flexibility
- Cost efficiency
- Supplier performance management
- Product quality
- Meeting demand
- Continuous production and demand
- On-time new product launch

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