

Boeing's Billion-Dollar Outsourcing Problem

MGMT 3306

Section number

University of Houston – Victoria

Name

Date

Abstract

This paper considers an offshore outsourcing problem and how outsourcing may not be a pleasant experience without proper research done in vendor selection. The Boeing Company lost billions of dollars and was years behind schedule because of its outsourcing and vendor decisions. Specifically, this paper delves into the problem itself, and provides suggestions on what the company could have done differently from an operations management perspective. Two methods are suggested: the Strategic Importance and Criticality Matrix to identify the candidate components for outsourcing, and the Factor Rating method in vendor selection. Both methods are explained and applied to Boeings specific issue. Furthermore, an analysis of the application of these methods is made demonstrating how it would benefit the company.

Background Information

Outsourcing is one of the most debatable issues that many multinational corporations need to consider. There are many pros and cons when it comes to procuring from an external source. The decision to outsource requires careful consideration of risks versus advantages. Not only is outsourcing an ethical issue concerning the parent country, it is also an important operations factor concerning the organization.

A business article titled *787 Dreamliner teaches Boeing costly lesson on outsourcing* by Michael Hiltzik, published in the LA Times, clearly illustrates what can happen when a company does not invest enough time and research before executing the decision to outsource. Even the most prominent of businesses can make mistakes resulting in devastating repercussions and losses.

Boeing is the world's largest leading manufacturer of commercial jetliners and defense, space and security systems. The aerospace company is divided into two business units: Boeing Commercial Airplanes and Boeing Defense, Space & Security. It has been a premier commercial jet manufacturer for over 40 years. Boeing also produces military aircraft, satellites, weapons, electronic and defense systems, launch systems, advanced information and communication systems, and performance-based logistics and training. Boeing is a top US exporter and support U.S. and allied government customers in 150 countries (Boeing in Brief, 2012). Their corporate offices are located in Chicago and they employ more than 170,000 people in the United States and 70 other countries worldwide.

Problem Description

This paper considers an offshore outsourcing problem at Boeing. The cause of the outsourcing failure in the Dreamliner project was the lack of planning and consideration before

outsourcing. Because of this, they were billions of dollars over budget and about three years behind schedule. Their new plane model, the Dreamliner, boasted its low fuel consumption, reduced maintenance costs, and greater passenger comfort. It was one of the fastest selling jets ever. Unfortunately, they could not deliver to their customers on time.

Boeing wanted to maximize profit by saving money through outsourcing. For their Dreamliner 787 model, they outsourced their components from various countries like Italy, Sweden, China, and South Korea. Even though it may have seemed cheaper to outsource at first, other factors came in to play and proved that outsourcing was more expensive. As stated in the Hiltzik's article, Boeing's experience shows that it's a folly to think that every dollar spent on outsourcing means a savings on the finished product. Thirty percent of their 787 models were composed of foreign made content as opposed to a mere five percent for their other models (Hiltzik, 2011)

Due to the increasing number of imported parts, their domestic aircraft factory in Seattle, Washington seemed more like an assembly plant rather than a factory. One issue among many that led the operations astray was the fact that Boeing did not provide its blueprints to its contractors and expected them to develop their own. Not only that, these very same contractors in turn hired subcontractors meaning an even further stretch for Boeing to oversee and control what was going on. This made it more difficult to manage and supervise the design and manufacture of its parts.

Some of their contractors did not have an engineering department, nor did they have the expertise or experience. This would be a good indicator as to why a lot of the parts did not fit together, and why a lot of the contractors did not meet their quotas. This in turn hindered the

entire production schedule. Boeings aviation chief admitted that in hindsight, they spent a lot more money trying to recover from the outsourcing than if they had done everything in-house.

One of Boeings contractors, Vought Aircraft Industries was bought out by Boeing eventually because they were in charge of producing parts for the 787 and would be involved in the manufacturing of spare parts for the life of the airliner even though they contributed to many delays for the company. The time and trade secrets provided by Boeing to Vought was the main reason Boeing had to buy out the company. Boeing thought that by outsourcing, they would save money by asking their partners/contractors to make the investments that Boeing should have made. “The company now recognizes that they needed to know how to do every major system on their airplanes more than their suppliers do” (Hiltzik, 2011).

Proposed IOM Concepts/Tools

There are a few strategies that Boeing could incorporate when considering outsourcing in order to lessen its losses and maximize its profit. As the author of the article stated in regards to outsourcing, “If you don’t think it through, it can wreck your business and cost you a bundle” (Hiltzik, 2011). The analysis of what should be outsourced should be carefully considered utilizing the Strategic Importance and Criticality Matrix as shown below as tool to determine what should be produced in-house or by an outside vendor.

Strategic value of the part in isolation	High	NOVELTY (Outsource/In-house) Technology; Quality; Service	PROPRIETARY (In-house) Technology; Quality
	Low	COMMODITY (Outsource) Price	UTILITY (Outsource) Cooperation; Service
		Low	High

Criticality of the part to final assembly

Strategic Importance and Criticality Matrix (SIC Matrix)

There are two dimensions to this matrix that include the strategic value of the part itself, and the criticality of the part to the final product (Dornier, Phillip-Pierre, & Ernst, 1998). The strategic value is the value of the part based on the stand-alone criticality of that part in the market. For example, the wing of the Boeing 787 Dreamliner would be considered to have low value in the market place on its own since it is specific to the jetliner model and serves no purpose by itself. “Some of the broad indicators of strategic value include technological complexity of the part, proprietary nature of the relevant technology, and where the part fits into the products’ life cycle” (Dornier et al., 1998). The criticality of the part to the final product is the second dimension to consider and includes factors such as the percentage value of the part to the final product, and the extent to which the quality and reliability level of the final product depends on the part. In this case, the wing of the 787 Dreamliner model has a high level of criticality to the final product- the airplane.

Components are divided into four categories based on the SIC matrix: novelty, proprietary, commodity, and utility. The novelty category includes products that require sophisticated technology but that are not essential to the functioning of the final product. The proprietary category includes products that are the core of the company. According to Doriner et al, commodities include products that have low technology and minimal contribution to the principal functional aspects of the end product. Lastly, utilities are very critical to the final product but are based on low or readily available technology. Because some of the outsourced parts did not fit together, Boeing should have realized the criticality of these parts and decided on a different method for manufacturing. Or in the very least, they should have realized that more supervision would be necessary rather than having subcontractors come up with their own blue prints to this specific product.

Once Boeing figures out which parts to outsource and which parts to manufacture in house based on the SIC Matrix, careful consideration should also be taken when evaluating vendors. Factor rating is one of the methods we can use in vendor selection.

The first step to take in factor rating is to list the criteria that are critical to the particular outsourcing activity. Next, an importance weight must be assigned to each of the factors. Weights are assigned to the criteria based on importance to the firm. Rate each vendor based on the criteria on a scale. A simple scale from 1-5 with 5 being the most satisfactory can be used. For example, if vendor A has the best price, then they would receive a rating of 5 for price. If they are also trustworthy, they can receive a 5. If their logistics system is poor, they could get a 1 for logistics and so forth. Once all vendors have been rated for each criterion, multiply those ratings by the criteria weight. Then sum those numbers for each vendor. The vendor with the highest score is the best choice.

If Boeing had effectively applied the SIC matrix to its outsourcing decision, it would have been clear that outsourcing its major, crucial components to various inexperienced vendors in multiple countries would have been a poor choice. Secondly, after deciding to outsource anyway, they should have used the factor rating method to help find more qualified vendors. Unfortunately, due to poor outsourcing decisions, Boeing ran into many issues with their vendors. Pieces manufactured did not fit together, some could not meet their output quotas, and some didn't even have an engineering department.

Application of IOM Concepts /Tools

The Boeing 787 Dreamliner model is no ordinary airplane. With the use of new materials, the Dreamliner 787 uses less fuel, and has lower maintenance than other planes. Kesmodal & Michaels state that it is the first big passenger jet built largely from plastics reinforced by carbon

fiber instead of aluminum. With this information, we know that the plane certainly includes unique and specialized parts. Considering the parts that Boeing outsourced during the time of the article, we will apply the SIC matrix to see if it should have been outsourced or manufactured in-house instead.

One of the parts the Boeing outsourced was front section portions of the airplane which required their vendors to subcontract from other vendors. Ultimately, the parts did not fit together and quotas were not met. Did Boeing make the correct decision to outsource? When applying the SIC matrix, the front end parts of the 787 Dreamliner are considered to be low in strategic value and high in criticality. The front end parts can be considered under the utilities category since they are critical to the final product, but are based on low or readily available technology. In this case, the choice to outsource is ideal. However, Boeing should have done more research on their selected vendor. The same method and outcome applies to other outsourced parts such as brakes and engine pods that Boeing outsourced from Goodrich.

Based on the above analysis utilizing the SIC matrix to decide whether or not to outsource the components that Boeing outsourced, the option to outsource was correct. However, once the decision to outsource has been made, further research on vendor options should also be made. Utilizing the factor rating method helps compare vendors based on the specific attributes that are important to the company and helps decide which vendor is best suited to work with in each specific situation.

In Boeings case, it is the manufacturing of airplane parts. The criterion to consider in Boeings case would be as follows: 1) Labor 2) Logistics System 3) Price 4) Trustworthiness 5) Management. First, we rate Vought Aircraft Industries, Boeings long time existing vendor. We rate them on a scale of 1-5 as follows:

<u>Criterion</u>	<u>Weight</u>	<u>Rating</u>
Labor	0.2	2
Logistics System	0.1	2
Price	0.3	1
Trustworthiness	0.2	3
Management	0.2	2

Because the labor was subpar considering the fact that they were behind schedule, we give them a low labor rating of 2. Their logistics system was flawed and caused production delays, earning them another low score of 2. For the price criterion we give them a low rating of 1. This is because Boeing had to purchase the Vought plant for 580 million dollars due to repeated delays in manufacturing. They decided that it was better to take control and buy out the plant since it had invested in the company too much already. This ended up being much more expensive for Boeing. They earn a rating of 3 for trustworthiness because they produce the desired products, just not on time. Finally, their management rating also scores low with a 2 since management was more difficult given the lack of communication and clarity. Next, we calculate their overall rating by multiplying each rating by its respective weight and sum up the total:

$$.2*2+.1*2+.3*1+.2*3+.2*2 = 1.9$$

After rating Vought, we consider a newer, more recent vendor to compare. Finmeccanica SpA is another aerospace component vendor headquartered in Rome, Italy. We rate Finmeccanica SpA with the following weights:

<u>Criterion</u>	<u>Weight</u>	<u>Rating</u>
Labor	0.2	4
Logistics System	0.1	4
Price	0.3	3
Trustworthiness	0.2	4
Management	0.2	4

We give Finmeccanica SpA a labor rating of 4, since they have a track record of quality products and are recognized as one of the top ten global players in their sector. Their logistics system also earns a high rating of 4 because of this. As for price, they rate 3 because they are less expensive than Vought. They also earn a high rating in trustworthiness and management because they have been reliable and have an excellent reputation.

We calculate their overall rating by multiplying each rating by its respective weight and sum up the total:

$$0.2*4+0.1*4+0.3*3+0.2*4+0.2*4 = 3.7$$

Finally, we compare the total rating scores of 1.9 for Vought versus 3.7 for Finmeccanica SpA and select the vendor that rates the highest, which in this case, was Finmeccanica SpA.

After analyzing whether or not front end parts among other parts of Boeings Dreamliner should be outsourced using the SIC matrix, we can see most of the components considered were low in strategic value and high in criticality of the part to the final product. This makes the decision to outsource favorable because the SIC matrix suggests utility products be outsourced. Outsourcing would be beneficial since it would cost less (if done correctly). The utilities class are very critical to the final product, but are based on readily available technology. Parts such as brakes, engine pads, and front end parts of the jetliner are crucial to the final product, and are based on readily available technologies.

The use of the factor rating vendor selection methodology helps better assess which vendors are better suited to work with based on a scoring system. The rating scale involves how each vendor rates on each criteria considered by the company. This method requires careful research and consideration in order to rate each applicable vendor considered.

The rating that Vought Aircraft Industries ranked was a 1.9 out of a 5 while their competitor ranked higher with a 3.7. Based on the weights specific to Boeings list of priorities, the better vendor choice would be Finmeccanica SpA. Even though Boeings weights emphasized more priority on price, with the factor rating system, it is easier to get a holistic view on each option. This way, the selection is not skewed completely on one factor, but considers multiple factors. The company appeared to prize short-term profits over the development of its engineering expertise, and began to view outsourcing too myopically as a cost-saving process (Hiltzik, 2011). Ideally, more vendors should be researched and rated using this method in order to choose the best candidate as a partner. Vought Aircraft industries ended up being one of the many underperforming vendors. Because Boeing had invested a lot in this particular vendor, they ended up being bought out by the company. By using factor rating, the choice of vendors would be better considered saving the company time and money.

Conclusion

The Boeing Company is one of the largest leading aerospace manufacturers worldwide. They have operations all over the world and have made their mark with their many impressive commercial airplanes, defense and security systems. As successful and pronounced as the company is, they are not immune to errors in judgment when making business decisions. One of the many major decisions that a multinational company must face involves outsourcing. Due to a number of bad outsourcing decisions, Boeing ended up losing money and time in regards to their newest airplane model, the 787 Dreamliner. The issue stemmed from poor selection of vendors and investment decision on Boeings part as well. Parts were outsourced from various parts of the world without any supervision or blueprints provided. Many vendors had to subcontract because they lacked the facilities to manufacture the parts. Other vendors provided parts that did not fit

together causing a hold up in the entire process. The aerospace giant was caught up in the idea of outsourcing to save money and did not anticipate other factors that might jeopardize their manufacturing process.

More extensive research and methods should have been used before executing any decisions to outsource. One tool to assist in this decision is the Strategic Importance and Criticality Matrix. This method helps decipher the importance of the component based on its stand alone value and its criticality to the end product. Based off of how the component is valued will help decide whether or not it is beneficial to outsource or produce in-house. If the product is suitable for outsourcing, then the next step is to decide which vendors are most appropriate for collaboration based on the company's goals. Factor rating is a vendor selection method that helps makes the vendor selection process easier by putting weights on the company's criteria based on importance, and then by rating each vendor based on how they rank for each factor. The vendor with the highest rating is the most ideal option.

Based on the parts specified in the article, the SIC matrix indicates that outsourcing would be beneficial. The front end parts, brakes, and engine pads have low strategic value and high criticality to the end product. However, the issues that have arisen with their current vendors lead to the conclusion that their vendor selection process may have been flawed. It seems as though time and research was not done thoroughly since their vendors had multiple issues with timing, integrity, and quality. Using the factor rating method Boeing is able to compare vendor options to find the best vendor to use. Concerns such as price, trustworthiness, and labor are high in priority and should have vendors that can perform up to standards. One example of a subpar vendor that Boeing used was Vought Aircraft Industries. Using the factor rating method could have assisted in the selection of a better vendor like Finmeccanica SpA.

Instead, Boeing was forced to spend billions in buying out the company since it invested too much time, information and money on the vendor to pull out. Once competent vendors are selected, Boeing should also consider a different method in how it invests its time in supervision of its outsourcers. One thing they should do differently is assign blueprints. This allows the vendor to follow specific guidelines for their parts ensuring a better fit avoiding parts that aren't compatible and hindrances in the production schedule. With further research and a better method of selecting vendors, problems such as quota delays and subcontracting can be avoided. This in turn helps the company achieve its original goals of saving money when outsourcing instead of losing money and time.

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