

# Boeing 737 supply chain challenges essay examples

[Business](#), [Company](#)



## **Abstract**

Increasingly complex international business environment calls attention for sustainable practices not only within internal landscape of the companies, but across various elements of its supply chain. Shared value and integrated supply chain take more and more space in strategic planning and long-term investment portfolio of large multinational corporations. Aircraft manufacturing is in the heart of these challenges. With that in mind, the document focuses on the analysis and evaluation of general challenges of Supply Chain optimization by looking at six elements of Boeing BBJ division supply chain: supply chain management and sustainability, strategic capacity management, global sourcing and procurement, demand management and forecasting, service quality and six sigma, and sales and operation planning.

The objective of this study is to gain a comprehensive understanding of the core challenges that the company faces in all the above supply chain links rather than measure its performance against the industry. With that in mind, the research is based primarily on the analysis of academic and scientific literature that gives an interesting and specific insight into the integrated supply chain operation of the Boeing BBJ division.

## **Research Scope**

Increasing complexity of the international business environment put a lot of pressure on the companies in terms of cost and primary operation activities. It is no longer viable to achieve sustainable competitive advantage through downstream competencies, such as customer relationships and marketing

strategy. These elements in today's contemporary business landscape build on the construct of a robust strategy that the companies have to adopt in order to survive and grow organically. With that in mind, effectiveness and innovation within the end-to-end supply chain becomes prominent to address the issues of cost-efficiency and productivity rates. This question becomes even more relevant when it comes to large multinational corporations (MNCs) with complex geographical spread of sourcing, production and downstream activities.

The objective of this document is to look at the contemporary challenges of MNCs supply chain, taking an example of a specific company and product. With that, the research will focus on theoretical study of the Boeing BBJ division and the 'pains' of its supply chain operations. The study will look at six areas of supply chain operations that include: supply chain management and sustainability, strategic capacity management, global sourcing and procurement, demand management and forecasting, service quality and six sigma, and sales and operation planning.

## **Company Overview**

Boeing was founded in 1916 by William Boeing and Navy engineer Conrad Westervelt as Pacific Aero Products Company that headquartered in Seattle. The success came to the founder with the launching of the first seaplane B&W. In 1917 Westervelt left for the active military service and the company was renamed to Boeing Airline Company and continued working primarily with military aircrafts, supported by the market needs of World War I (Frederick, 2013).

Today, Boeing is the world's largest manufacturer of military and commercial aircrafts, accounting for almost 50% market share in aircraft manufacturing, employing over 174, 000 employees globally. Financial indicators talk in favor of strong strategic focus and fit into the industry environment with total income reported for the financial year 2011 of USD\$ 4 billion, 21, 2% up relative to the same period 2010 and USD\$ 5. 33 market price per share (Boeing, 2012). Current snapshot of the supply chain operations illustrates complex supply chain of over 5, 400 upstream suppliers and 500, 000 jobs created throughout the end-to-end supply chain. One of the newest Boeing divisions, created under the umbrella of long-term strategic planning and business diversification into high-end commercial aviation solutions is the Boeing BBJ division that works with seven aircraft lines, produced in partnership with over sixteen completion centers across in seven countries. Modern BBJ air jet line, including 737-700, -800 and 900ER and the newest MAX series that offers the best in the industry on-time performance and a full range of 110 to 220 seat market and significant improvement of fuel - saving technology. Additional competitive advantage comes from the utilization of the optimized CFM LEAP 18 engines that gives this jet series a benefit of 7% operational saving (Boeing, 2011). All the above provides evidence of increasingly complex supply chain operations of the Boeing BBJ and the approach that the company takes in managing this complexity sets the example in the industry and creates numerous challenges for its major competitor, Airbus.

## **Supply Chain Management and Sustainability**

Commercial segment is the second largest profit channel for the company and strategic focus on high-end private jet production put more pressure on sustainability of supply chain operations. To understand and evaluate the challenges that companies face in terms of supply chain sustainability, it is important to outline the core constructs of sustainable supply chain: 1) Integrated Corporate and social Responsibility (CSR) policies, 2) Aligned cost-reduction focus across internal and external elements of the supply chain and 3) Strategic Human Resource Management (HRM) enacting leadership and management practices that create internal capabilities (Senge and Prokesh, 2010). With that, what are the core supply chain sustainability challenges that Boeing BBJ faces today?

Suppliers are critical for the success of Boeing operations for three basic reasons: suppliers' costs are the costs of the Boeing BBJ final product; the company has a history of major delays in delivery and failures on upstream sourcing is the core cause of these challenges (Waugh, 2011); sustainability in environmental and community practices are critical for organizational relationships with NGOs and regulatory bodies. Back in 2007, Boeing adapted new strategic approach to the management of its sourcing operation by creating strategic affiliation relationships with its suppliers, who account for over 70% of 737 series final product cost. The strategy focuses on generating cost-reduction strategies across the upstream operations. This strategy was transferred further to the operations of Boeing BBJ specifically and can be summarized in the following pillars: investments in R&D on upstream sourcing, threefold strategy, including acquisition, technical

support and quality control and regulatory relationships on external CSR practices that include compliance on green-gas emissions, employment relationships and community (Boeing, 2012).

Some of the major initiatives in this area is lean workshops on reducing machined lead times, part supermarket to ensure fast availability of the parts on demand and Integrated Defense System (IDS). One of the specific for BBJ division initiatives is the 737 Kaizen Promotion Office that looks at cost-efficiency along the supply chain for the business jets. In spite of the efforts that have been made up-to-date to bring sustainability to the supply chain operations, Boeing BBJ still experiences significant challenges in terms of cost-pressure and effectiveness of communication along the supply chain. Creating of stronger links with the suppliers and developing aligned culture with core external partners are the key for addressing supply chain sustainability issues

## **Demand Management and Forecasting**

The complexity of capacity planning in airlines and aviation industry is determined by large number of stakeholders that influence the demand and supply in this sector (Appendix I). For the aircraft manufacturing company, which represents an upstream supplier within the airline industry, major influences come from the ways in which airlines manage their supply-demand curve within the industry itself. Mack et al (2013) argue that while an airline company orders a new aircraft, there can be other capacity gaps on the variety of route that leave their capacity idle or underutilized. This results in various options of capacity planning, such as brokerage, new builds

and idling of spare capacity. Such fluctuations of the global capacity of the airlines create strong pressure on the flexibility and preciseness of capacity prediction tools for the manufacturers. Boeing BBJ's core customer profile is the corporate market segment, where influences on the capacity optimization represent similar, but also more complex profile. First of all, the company has to measure capacity demand for an aircraft manufacturer is building up of two elements: internal capacity, including the size of the aircrafts and proportion of the supply based on the models. Secondly, it is critical to understand the external market demand for the total supply of the aircraft that it can absorb. With that in mind, the challenges that Boeing BBJ faces in view of capacity management are related to both, its ability to create robust tools to access external market environment in terms of demand fluctuation and development of integrated system for demand management on the upstream of the supply chain. The reality of the Boeing BBJ demonstrates that the failure to create strong demand forecasting tool between its core suppliers and the assembly operation results in delays and increased costs. These costs can come from the supplier's efficiency affected by wrong capacity forecast as well as from storage and waste created by excess supply.

## **Global Sourcing and Procurement**

Global sourcing is one of the most controversial elements of the supply chain. Twenty years ago the driver for global sourcing was clear - cost reduction. Today, global production and outsourcing map has changed under the influence of increasingly complex nature of the business themselves.

Moodley (2013) argues that MNC are turning back to insourcing, challenging the future of global sourcing in general. He provides an example of Airbus that shifted large part of its assembling operations back to the US as the total cost of sourcing in China became uninteresting, given the challenges and indirect costs associated with the lead times that take up to six months and delivery delays. Dutton (2013) shares the example of Boeing Business Jet challenges related to the ability to find essential capacity and required capabilities to supply systems and equipment, required for the Boeing 737 series. India, in this case, was able to provide both, cost-effective partnership and expertise to ensure that software is able to support physical characteristics of Boeing commercial aircrafts. This challenge is just an example that builds on the variety of factors that influence the decision of the company to source globally. At the same time, benefits always come at a price and in the case of Boeing such decentralized sourcing operation significantly reduces the control that the company has over its supply chain operations.

There are number of ways in which Boeing is trying to address the challenges. One of them is the decision taken by the management back in 2009 to open tender for the purchase of some of the supply operations from the partners to gain control over the critical supply chain link (Monczka, 2011). Another solution is direct investment of USD\$ 100 million approved by the Boeing management for building maintenance and overhaul facilities for Boeing planes in India (Dutton, 2013).

Another side of the supply chain challenges in the scope of global sourcing discussion is the Corporate and Social Responsibility of Boeing BBJ. This

element places a lot of pressure and adds complexity to the management and control system over the supply chain operations of the company. Just thinking about the size of the supplier network that today includes over 28,000 companies with total financial transaction over USD\$ 50 million, the cost of suppliers' errors in ethics and sustainable sourcing practices becomes tremendous. Boeing BBJ division is a part of the companywide Supplier Management Program that along with performance management places a lot of emphasis on the CSR responsibility and compliance of its suppliers across the world. The complexity of this relationships for Business Jet division is also determined by the cross-requirements of the corporate clients that expect Boeing BBJ to comply with high CSR standards. With that, inability to consistently deliver excellent performance within all the links of the supply chain results in significant loss on the final stages of product delivery.

### **Product/Service design and production processes**

Vision and Mission of the Boeing BBJ division is to deliver to their customers the best of commercial aviation with flexibility and good understanding of their 'pains' and needs (Boeing, 2012). The company considered personalization and customization for business, private and governmental needs as the key of their competitive market proposition. The above proposition creates several complications for the production process as it calls for adjustment of the entire operation for make-to-order that put pressure on the costs of parts supplied on demand and under strict and reasonably short lead times.

It should be taken into consideration that the volume of the BBJ purchases

within the standard product range falls lower than any other department and especially in comparison with military segment. The company does not work with safety stock for any parts that do not build on the standard package and, thus, scale and scope of their sourcing for personalized elements becomes a significant issue for planning and forecasting operations.

Upstream operation within Boeing supply chain, however, does not limit the problems and challenges that product and service design encounters on the way to its final supplier.

One of the examples that give an outlook of potential challenges is the production of Boeing jets in general. George (2001) argues that personalization and customization placed more pressure on already critical issue of weight control of the jets and resulted in serious challenges for BBJ completion centers, especially Raytheon Waco. The point is that limitations of the weight to achieve long-haul performance expected by the customers is 12, 400 pounds, while customization in some cases for the BBJ interior changes the balance and requires cutting of maximum range to 120 miles. The author argues that using shelf parts for the BBJ as opposed to customized interior features can save weight and cost for the aircraft (George, 2001).

Human error is a serious issue that has been proved to be the primary cause of over 70% accidents with commercial planes. Graeber (2012) argues that typical human factor is generally associated with the flight operation itself. Growing role of this element, at the same time is recognized and addressed by Boeing BBJ in regards the maintenance operations and traffic management. How can an aircraft manufacturer incorporate human factor in

its product? Boeing BBJ division became one of the pioneers in “ human factor’ incorporation into its product and service design. The essence of this innovative approach adopted by the company back in 2009 is an integrated system that allows gathering information about human abilities and limitations and further R&D activities aimed to enact solutions and preventive features into product design, systems, jobs and other human operations (Graeber, 2012). This product design challenge resulted in significant contribution to the company’s image in regards to safety and security of the BBJ aircrafts. Customer feedback provides evidence to feasibility and value that such integrated approach brings to product and service design operation by outlining the safety, effective and comfortable use of the tools and machines in all Boeing 737 series and estimated contribution to 0 accidents with these planes.

## **Service Quality and Six Sigma**

Continues improvement and optimization of the operations on upstream side of the supply chain became critical for the organizations around the world. While product design, safety and convenience as well as customer relationships in general remain critical for large corporation, increasing costs of production and pressure of the competitive market environment, made the philosophy, incorporated once within leading Japanese organizations, such as Toyota extremely popular in manufacturing and production operations in general.

Two prominent components of the supply-side competitiveness have been building on Boeing’s strategic focus for the last thirty years: service quality

assurance and Six Sigma philosophy. Boeing have implemented a companywide Quality Management Service Deployment procedures that define the requirements and characteristics of the Quality Management System (QMS), enacting the ISO 9001: 2008 regulation and focusing on delivering superior quality to the customers and internal stakeholders. The company has adapted a process-based approach to service quality through process-based management corrective and preventive system, based on five elements: internal audit, control of non-conforming products, corrective and preventive actions, documentation control and backwards service quality control within QMS. The company takes this philosophy further up the supply chain and applies strict quality control measures with its suppliers through Boeing Suppliers Quality organization (QS). The organization has developed a framework of approved tools that assist in selection of subcontractor, their performance and QMS compliance and brings it to the Boeing Enterprise Supplier Tool (BEST) rating (Boeing, 2012).

Six Sigma approach is disciplined in a way to bring forward an organized and structured approach to continuous improvement through the following steps: define, measure, analyze, improve and control. Kent Kuiper is an expert working for the entire commercial airplane segment with Boeing on implementing and maintaining Six Sigma approach in the company. The point that the professional is making is that by continuously testing aircraft parts for failures is the approach that takes the company down, when a part is taken out from production, the company loses money, when the same part is taken out from an aircraft in operation, the company loses twice as much (Boeing, 2012). He describes the contribution of this philosophy as critical to

achieve better performance and critically reduce human failures. The core of the philosophy lies in improvement of internal manufacturing practices and evaluating component availability and mean times between the failures. The vision of the company in regards to Six Sigma is to fully integrate the culture that will help to create “ design-for-quality” rather than “ testin-for-quality” quality standards.

## **Sales and Operation Planning**

Sales and Operation Planning (S&OP), developed back in 1980 by Oliver Wight until today places an important role in constructing the entire supply chain of large corporations. The objective of this element is to find a demand-supply balance in downstream of the supply chain by bringing together business planning and master planning processes. The reality shows that proper S&OP can help the company to achieve minimum costs and reduce waste. This can only be done if S&OP is integrated and equally effective throughout the company. The essence of the system is to (Wallace, 2004):

- Provide management with the tools to create equilibrium between the demand expectations of the market and actual supply that the company can and should achieve through the year. The review and adjustment of the S&OP is done generally on a monthly basis against a full year plan.
- The S&OP system is used within the supply chain links as a driver for capacity and material sourcing planning through the master production process. This regulates the availability of the final product to the customer and, therefore, is critical to deliver on commitments made with the clients.

- S&OP generally becomes a critical tool to measure financial performance of the company against initial forecast.

Boeing BBJ S&OP system works in a similar way. The company aims to build accurate annual forecast for the business jet market based on internal evaluation tools, such as customer feedback and internal market analysis group as well as with the market information released by such research agencies as Honeywell Group. Boeing BBJ realized long time ago that forecasting based on historical sales data does not give the return on quality and accuracy needed by the company to achieve efficiency within its supply chain. The forecasting for corporate business jets is annual with monthly correction for more accurate qualitative and quantitative data, outlined as planning. Forecasting and planning operation within the division, therefore, allows the management team to report and communicate changes and expectations along the supply chain and bring the accuracy of forecasting to the upstream of Boeing BBJ supply chain.

## **Conclusion**

Integrated supply chain of Boeing BBJ division is extremely complex from both, vertical and horizontal frontier. The benefits of Shared Value within the supply chain is realized by the company long time ago and while critical features and practices brought Boeing organizational culture through to BBJ division, challenges that commercial business aviation is facing with had to steepen learning curve and bring new and more sophisticated ways to achieve leaner and more effective operation within the supply chain operations. The reality shows that sourcing and manufacturing within

business jet sector is challenging influenced by two core characteristics: 1) Sales and Operations Planning and 2) product design challenges. First of all, S&OP has much shorter accurate lifespan, comparing to military or other commercial aircrafts. This short-time planning is determined by the smaller size of the sector and higher fluctuation of demands that generally do not exceed five years span. Secondly, BBJ customer proposition is personalized and individual approach to the aircrafts and, thus, make-to-order approach in the supply chain put a lot of pressure on cost and delivery times. Some of the additional learning and challenge comes from actual product specifications, highly influenced by smallest changes in such element as interior design.

Integrated supply chain under contemporary business environment is critical to achieve needed benefits and savings in costs and lead times. Boeing has experienced numerous issues related to delays in delivery, related to the failures in supply chain management and upstream forecasting in spite of its strong focus on quality assurance and sustainable stakeholder management. With competition growing strong in the specific BBJ niche of the industry, the company will continue investing in R&D and improvement opportunities related to up- and midstream operations as opposed to final product, as such strategic positioning is seen as the key for sustainability.

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Appendix

AI - Strategic Capacity Management - Stakeholders