

Boeing's Behavior in a Liberalized Marketplace: The 787 Dreamliner Project and Impact on
Puget Sound Workers

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A thesis

submitted in partial fulfillment of the
requirements for the degree of

Master of Arts

University of Washington

2014

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Program Authorized to Offer Degree:
Interdisciplinary Arts and Sciences Tacoma

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ACKNOWLEDGMENTS

I would like to give a huge thank you to all the people who made it possible for me to complete my thesis. To Dr. Honey, thank you for sacrificing your time and taking on the role of my committee chair. Your teaching at this institution, writing, and work with the community is a true inspiration. In the spring of 2013 you gave me positive feedback of my initial proposal, which gave me confidence to move forward with my research. Dr. Begun, thank you for being a committee reader and terrific professor. Comparative Economic Development was a joy. Your clear presentation of the materials solidified my understanding of fundamental economic principles. Dr. McGuire, although I was never your student, you were still willing to give me your time and attention. With a professor's busy schedule, that means a lot. You're one heck of an economist!

I'm also grateful to all the professors and faculty in the MAIS program: Linda Kachinsky, thanks for helping me navigate the program, enjoy your retirement!; Dr. Parker, who opened my eyes to important concepts in 503 and 504; Dr. Williams, knower of all things politics and one cool dude; Dr. Ignacio, the excel files really helped!; And last but certainly not least, Dr. Thompson, who took an active role in helping me find a committee, helped focus my writing, and has done a world of good for the MAIS program.

To my peers in Interdisciplinary Studies, you all are an inspirational bunch, with work ethics I can only strive to emulate. A diversity of people with different backgrounds and passions is what makes this program so great. Thank you for being there along the ride with me through this trying yet rewarding experience. I also want to thank the University of Washington for accepting me into this program and providing me much needed grants.

Finally, I would like to thank my loving Mother and Father, Walid and Annete Mseitif. Without whom, I could never have earned this degree. In the fall of 2010, you encouraged me to go back and finish my Associates Degree. Little did I realize your vote of confidence would ultimately lead me to complete a master's degree three and a half years later. You believed in my ability to succeed, made many sacrifices, and cheered me all the way through. For that and more, I love you both very much.

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ABBREVIATIONS

ADA	Airline Deregulation Act
ATCA	Agreement on Trade in Civil Aircraft
CAB	Civil Aeronautics Board
GPNs	Global Production Networks
IAM 751	International Association of Machinists District Lodge 751
LCA	Large Commercial Aircraft
LCC	Low Cost Carrier
NLRA	National Labor Relations Act
NLRB	National Labor Relations Board
SPEEA 2001	Society of Professional Engineering Employees in Aerospace Local 2001
TFP	Total factor productivity
787	Boeing 787 Dreamliner

ABSTRACT

Discourse on the outsourcing of commercial aircraft production has taken place in the fields of economics and labor studies, each with differing observations. Cloud (2011) and Greenberg et al. (2010) argue Boeing's pervasive outsourcing, with the goal of cutting labor costs and maximizing profits, has negatively impacted Boeing's workers and labor unions. On the other hand, economics research suggests outsourcing will create greater productivity, resulting in job creation and higher domestic wages (Ruffin, 2002; Zhao and Makoto, 2010). The 787 Dreamliner production model challenges this assumption. The 787 strategy caused financial losses for Boeing, while simultaneously weakening IAM District 751 and SPEEA Local 2001. Denning (2013), Tang and Zimmerman (2009) provide evidence Boeing over-utilized outsourcing, which I integrate with labor's critique. I focus on the 787 three-tier supply chain and final assembly plant in Charleston, South Carolina. I conclude highlighting the experiences of three local Boeing workers and one union official. I contend that Boeing curtailing further outflow from the Puget Sound may benefit both Boeing and the local workforce.

INTRODUCTION

In the last twenty years Boeing has begun to move factors of commercial aircraft production away from the Puget Sound. A divergence from previous production strategies has been especially evident on the 787 Dreamliner. Boeing announced development of its “game changer” in 2004.¹ This quickly attracted market attention due to its promise of high fuel efficiency and increased passenger comfort. While the Dreamliner has been the fastest selling plane in aviation history, it’s also one of the most flawed models of production.²

To reduce costs and development time, Boeing produced the 787 using an unconventional three-tier supply chain. The implementation of which led to a substantial rise in outsourcing. Boeing outsourced 70% of production on the Dreamliner, a record level within the company. Workers at Boeing perceive the rise in outsourcing as one of the main threats to job security.³

Boeing’s fundamental goal was to keep manufacturing and assembly costs low while spreading the financial risks to global partners.⁴ Rather than assembling the thousands of components in the Puget Sound, Boeing took the role of system integrator. Fifty outsourcing partners in eleven countries assembled complete aircraft sections. These whole sections were then delivered to Everett and assembled in three short days.⁵ The production strategy led to

¹ “Boeing 787 Dreamliner Provides New Solutions for Airlines, Passengers,” *Boeing Co.*, Accessed April 26, 2014, <http://www.boeing.com/boeing/commercial/787family/background.page>.

² Christopher S. Tang, and Joshua D. Zimmerman. “Managing New Product Development and Supply Chain Risks: The Boeing 787 Case,” *Supply Chain Forum: An International Journal* 10, no. 2 (2009):74.

³ Lynn Lunsford, “Outsourcing at Crux of Boeing Strike,” *The Wall Street Journal*, September 8, 2008, <http://online.wsj.com/news/articles/SB122083149762108451>.

⁴ Ian McCarthy and Angela Anagnostou, “The Impact of Outsourcing on the Transaction Costs and the Boundaries of Manufacturing.” *International Journal of Production Economics* 88 (2003): 62.

⁵ David Pritchard and Alan McPherson, “Outsourcing US Commercial Aircraft Technology and Innovation: Implications for the Industry’s long term design and build capability,” *Canada-United States Trade Center Occasional Paper*, no. 29 (2004):2.

billions in cost overruns, years of delays, and mechanical failures.⁶ Meanwhile, a South Carolina supplier's failure to meet delivery deadlines resulted in Boeing's purchase of the company. This contributed in the company's decision to build a 787 final assembly plant adjacent to the facility.⁷ For the first time in company history, a final assembly would be located away from the Puget Sound. Local workers, already feeling threatened by high levels of outsourcing, viewed it as a move to decrease union jobs and force collective bargaining concessions.⁸

The International Association of Machinists & Aerospace Workers District 751 (IAM 751) and Society of Professional Engineering Employees in Aerospace Local 2001 (SPEEA 2001) have both been impacted by Boeing's shifting production methods. The unions, representing 67,000 local machinists, engineers, and technical workers, blame job relocation and outsourcing for weakening union power.

In 2011, Boeing maneuvered its way out of a National Labor Relations Board complaint against Boeing for building a 787 plant in South Carolina.⁹ This monumental decision gave Boeing a springboard to search out competing states to build the 777X.¹⁰ The unions, wanting to

⁶ Dominic Gates, "Boeing Celebrates 787 Delivery as program's cost top \$32 billion," *The Seattle Times*, September 24, 2011, http://seattletimes.com/html/business/technology/2016310102_boeing25.html. Details the cost overruns and missteps that brought the project over budget.

⁷ Boeing purchased Vought Enterprises in S.C., builder of 787 rear fuselages. Boeing, already having major sub-assembly work done in the region, coupled with a non-unionized workforce, contributed to management decision to build a second 787 assembly plant in Charleston, SC. The 2011 NLRB complaint details Boeing's rationale. Within, it cites multiple media reports with Boeing management talking about the decision.

"National Labor Relations Board Complaint and Notice of Hearing," *NLRB Region 19*. April 20, 2011. http://www.nlr.gov/sites/default/files/attachments/basic-page/node-3310/cpt_19-ca-032431_boeing__4-20-2011_complaint_and_not_hrg.pdf.

⁸ Eric Pyne, "Boeing to fight NLRB complaint on 787 South Carolina plant," *The Seattle Times*, April 20, 2011, http://seattletimes.com/html/business/technology/2014824566_charleston21.html. Statement made by 751 president Tom Wroblewski.

⁹ Steve Greenhouse, "Labor Board Drops Case Against Boeing After Union Reaches Accord," *The New York Times*, December 9, 2011. IAM 751 asked the labor drop the complaint in exchange for Boeing agreeing to build the new 737 Max in Renton, WA.

¹⁰ Dominic Gates, "Machinists say yes, secure 777X for Everett," *The Seattle Times*, January 3, 2014. http://seattletimes.com/html/business/technology/2022593956_machinistsunionvotexml.html.

keep the project in the region, conceded worker pensions. The state government increased tax incentives and state spending on aerospace infrastructure. One union representative called it “a corporate extortion plan by Boeing trying to make aerospace a race to the bottom.”¹¹ Boeing’s behavior signals a desire to move away from the Puget Sound and its unionized workers. Ironically, on the 787, the strategy has not led to higher profits or more satisfied customers.

Management at Boeing has admitted that perhaps it did overextend outsourcing. Boeing Commercial Chief Executive Officer said, “We spent a lot more money in trying to recover than we ever would have spent if we’d tried to keep the key technologies closer to home.”¹² While acknowledging implementing a flawed model on the 787, Boeing continues moving jobs from the Puget Sound. Vice president of engineering Michael Delaney says the company is committed to being “a larger, more globally competitive company with expanded production capacity and a more geographically diverse manufacturing and engineering footprint.”¹³ Although not mentioned explicitly, work stoppages and machinist strikes have contributed to the company’s movement from the region.

Launched in November, 2013, the 777X is Boeing’s newest commercial aircraft. It shares similar composite technologies to the 787 and will be the largest and most efficient twin-engine jet in the world. It boasts the lowest operating costs per a seat, attracting buyers for long-range international flight. —“777X details and specifications,” *The Boeing Co.*, <http://www.newairplane.com/777x/>.

¹¹ Doug Cunningham, “Extremely Upset IAM District 751 Workers File NLRB Charges, Demand Re-Vote On Boeing ‘Corporate Extortion Plan,” *Workers Independent Radio*, January 7, 2014, <http://laborradio.org/2014/01/extremely-upset-iam-district-751-workers-file-nlr-charge-and-demand-re-vote-on-boeing-corporate-extortion-plan/>.

¹² Stephen Denning, “Boeing’s Offshoring Woes: Seven Lessons every CEO Must Learn,” *Strategy and Leadership* 41, no. 3 (2013): 29.

¹³ Aubrey Cohen, “Boeing moving engineering work out of Washington,” *The Seattle P.I.*, May 31, 2013, <http://www.seattlepi.com/business/boeing/article/Boeing-moving-engineering-work-out-of-Washington-4565734.php>.

Outsourcing and Mechanical Issues

The 787s problems have persisted past development and production stages. Most troubling are the mechanical issues occurring on in service aircraft. Since first delivery to All Nippon Airways in 2011, Boeing has dealt with problem software systems, engines, wings, hydraulics, and fuel tank leaks.¹⁴ As shown throughout my thesis, these issues are mostly the result of component production and system integration done by suppliers, and not internal to Boeing.¹⁵ The plane's lithium ion batteries have proven the most costly and raised the biggest safety concerns. January of 2013, batteries on two 787s caught fire, leading the FAA to ground the entire fleet for three months.¹⁶ Boeing never found the precise cause for the battery fires, but redesigned the battery system and implemented safety measures to contain future issues. Despite the precautions, approximately a year after the first fire, a battery in a Japan Airlines airliner caught fire and emitted gases.¹⁷ These and a plethora of similar problems have damaged public trust in Boeing, while raising public scrutiny about quality control of production.

The assembly stage of production has remained equally problematic. In February, 2014, machinists at the 787 assembly plant in Everett, Washington, reported receiving fuselages with wiring and hydraulic lines missing.¹⁸ Everett receives the fuselages from Boeing's new facility in North Charleston, South Carolina, where production problems have persisted for several

¹⁴ David Schaper, "Problems Linger for Boeing's Flagship 787 Airliner," *NPR*, February, 25, 2014, <http://www.npr.org/2014/02/25/282431939/boeings-787-dreamliner-can-t-shake-major-malfunction-issues>.

¹⁵ The caveat to that are the production issues on the 787 assembly line in Charleston, South Carolina.

¹⁶ Dominic Gates, "787 Grounded, but Boeing to keep building," *The Seattle Times*, January 16, 2013, http://seattletimes.com/html/business/technology/2020148677_787groundedxml.html.

¹⁷ Rubert Wingfield Hayes, "Boeing 787 Aircraft grounded after battery problem in Japan," *BBC*, January 14, 2014, <http://www.bbc.com/news/business-25737515>.

¹⁸ Dominic Gates, "787 assembly problems in Charleston drag on Everett," *The Seattle Times*, February 3, 2014, http://seattletimes.com/html/business/technology/2022830424_boeingcharlestonxml.html.

years. March, 2014, Mitsubishi Heavy Industries, makers of Boeing's 787 carbon fiber wings, found cracks in the wings of forty planes still in the assembly stage of production.¹⁹ Continual global production issues coupled with a survey of past production models (where Boeing kept sub-assembly in house), supports my argument that Boeing pursued a flawed business model.

My analysis on the 787 model of production includes an inquiry into management motivation for radically diverging from previous production strategies, its final outcome, and impact on Puget Sound workers. Despite efforts to cut costs, all evidence shows Boeing has not created additional value.²⁰ In the process, it has weakened IAM 751 and SPEEA 2001 through losses to jobs, benefits and bargaining power.²¹ Boeing adopted a high risk model on an aircraft which won't profit until 2020 at the earliest.²² Although there is a learning curb and high up-front costs for any new project, past project do not match the enormous cost overruns of the 787. Analysts expected the development costs alone to be \$5.8 billion. These costs ended up being over \$15 billion.²³ Furthermore, statements made by Boeing management suggest they knew these decisions had a high potential of being unprofitable. This leads to a conclusion that Boeing's calculus was directed at weakening the power of IAM District 751 and SPEEA Local 2001.²⁴

¹⁹ Jad Mouawad, "Wing Cracks Delay Boeing 787 Assembly," March 7, 2014, *New York Times*. http://www.nytimes.com/2014/03/08/business/wing-cracks-delay-boeing-787-assembly.html?_r=0.

²⁰ Dominic Gates, "Boeing Celebrates 787 Delivery as costs top \$32 billion," *The Seattle Times*, September 24, 2011. http://seattletimes.com/html/businesstechnology/2016310102_boeing25.html.

²¹ Dominic Gates, "777X vote shows bitter rift in Machinists leadership," *The Seattle Times*, November 16, 2013. http://seattletimes.com/html/businesstechnology/2022276110_boeingmachinistproposalxml.html.

²² Dominic Gates, "Boeing Celebrates 787 Delivery as program's costs top \$32 billion," *The Seattle Times*.

²³ Daniel Ferry, "Will the 787 Dreamliner Be Profitable at Last?," *The Motley Fool*, October 24, 2013. <http://www.fool.com/investing/general/2013/10/24/will-the-787-dreamliner-be-profitable-at-last-for.aspx>.

²⁴ "Documents show Boeing saw Charleston as riskiest option for 787," *IAM 751*, November, 2011. <http://www.iam751.org/pages/news/9262011.html>. The documents, part of NLRB complaint against Boeing, show that Boeing execs saw Charleston the highest risk option studies, it would have long-term negative impacts on program profitability, Charleston workers would not be as productive, and two 787 lines 3,000 miles apart would cause "skill dilution".

The question of Boeing's movement from the region is of critical importance to the Puget Sound, as a large share of the local economy relies on the Boeing and its local suppliers.²⁵ The aerospace giant is the United States' largest exporter and also Washington State's largest employer, totaling 72,900 jobs.²⁶ Boeing has five plants in the state, all in the central Puget Sound. Furthermore, 175 aerospace firms support Boeing, with an additional 1,175 locations for aerospace-related businesses.²⁷ These businesses support another 253,400 jobs across the state.²⁸ There are few United States corporations who can claim such economic benefits concentrated in one region.

Boeing's revenues in 2012 totaled \$48.9 billion, with \$7.2 billion paid in wages and \$3.3 billion in tax revenues.²⁹ The median wages paid to employees is \$96,684, as compared to a statewide median household income of \$56,444.³⁰ The high-quality jobs, rich history in the region, and enormous economic contributions, are why Puget Sound residents take pride and embrace its local presence. More than anything, they value its job opportunities and want to protect the jobs for generations to come.

Rather than implicating Boeing as the sole actor responsible for an economic shift from the Puget Sound, I address other contextual factors. Economic policies have liberalized the marketplace, allowing Boeing access to new markets. East Asia is one of the most important

²⁵ *Washington Aerospace Partnership*. <http://www.washington-aerospace.com/>. The WAP November, 2013 report provides the most recent data quantifying Boeing's impact to the Puget Sound (direct, indirect, and induced benefits). The Partnership is a collaboration of industry, labor, and government "working together to ensure Washington State continues to be a thriving global leader in aerospace excellence." WAP develops policies facilitating the building of new aircraft in Washington. They work to gather support of state legislators, citizens, and union members. This 87 page report was used to urge passage of legislation awarding WA the 777X contract, including tax incentives and aerospace training at local educational institutions.

²⁶ "Aerospace Impact Analysis", ii.

²⁷ Ibid.

²⁸ 253,400 supported jobs comes from indirect and induced impacts, including supply chains, vendor sales, and additional income created and spent throughout the state economy (multiplier effects).

²⁹ Ibid. iii-iv.

³⁰ Ibid., ii.

markets, playing a strategic role in the production of Boeing's commercial aircraft.

Governmental deregulation creates a climate where Boeing, being the "rational actor," seeks the lowest cost production inputs. While not fully implicating access to global markets for the problems at Boeing, I show this is a fundamental cause for transforming models of production.

In a free-market society, Boeing's actions are perfectly legal. Therefore, some may question if I then am critiquing the free market system. I am most certainly not. I'm a proponent of the free market, believing it has aided in Puget Sound's prosperity. A thriving aerospace industry is driven by fair competition. Presented are the facts about the 787 Dreamliner case and how Boeing over-utilized the global market in search of gains.³¹ The liberalized policies were the harbinger of change. Does that mean the policies are bad? Not necessarily, there have been great benefits for some workers, consumers, and regions, and losses for others. The issue has many nuances, and it's still true today that Boeing does much greater local economic good than any harm. What I hope to articulate is that in this instance, not only did the production decisions and outcome do harm to the workers, it did not lead to greater gains for Boeing. This is not simply the case of one corporation; this is the interplay between an industry intertwined with governments, international bodies, and other industries.

Paper Organization

My thesis is organized in to three chapters, each analyzing a different facet of the research problem. Chapter I provides a historical overview of commercial aircraft production in the Puget Sound. This is followed by a spotlight on IAM District 751 and SPEEA Local 2001,

³¹ It is my position that Boeing over-utilized the market by partnering with un-tested suppliers for 787 sub-assembly, system integration, and building the second 787 assembly line to Charleston, South Carolina.

and each of their roles in growing commercial aircraft production. I then focus on policy changes creating a globally integrated marketplace.

Chapter II lays out the specifics of the 787 supply chain, South Carolina 787 assembly, and causes of production failures. The final chapter shows how Puget Sound workers have been affected by production changes, including losses to jobs, benefits, and collective bargaining agreements. I end with the narratives of three Boeing workers and one union official. Their personal experiences showcase the local impact of Boeing. I conclude by recapitulating my analysis of the case study, and how this research may be used in future studies.

LITERATURE REVIEW

A significant amount of research has been devoted toward unpacking the effects of production outsourcing. I focused on the insights found in economics, political economy, business management, and labor studies. Gathering knowledge from varying epistemologies provides me a compressive springboard to explore the research problem.

Economists studying international trade are often interested in its aggregate effect on the economy. They find an open market may negatively impact a segment of the population. However, if an economy has overall growth, an economist would conclude that trade is a net positive.³² Economists studying industrial organization focus on the behavior of an individual

³² Paul Krugman, "Increasing Returns, Monopolistic Competition, and International Trade," *Journal of International Economics* 9, no.4 (1979): 476-478. 3.2, "effects of trade". General equilibrium model, trade opened between two economies with zero transportation costs.

Avinash K. Dixit, and Joseph E. Stiglitz. "Monopolistic Competition and Optimum Product Diversity". *American Economic Review* 67 (1977): 297-298.

firm. To produce goods as efficiently as possible, production inputs must be attained at the lowest cost. Firm outsourcing is considered optimal if it creates operational efficiency.³³

Paul Krugman's work in international trade theory (or "new trade theory") aids in our knowledge of how firms make gains from trade.³⁴ He shows that gains may occur between countries with *identical* resources and technology. Previous research had focused on trade between countries with dissimilar resources and technology, based on the laws of comparative advantage.³⁵ Gains come from *intra-industry* specialization due to scale economies internal to firms. Applying the model to Boeing, profits have led to increased size and economies of scale, and therefore decreased marginal costs. With a desire for operational efficiency, Boeing specializes in engineering and final assembly, while countries with similar endowments (e.g. Japan, Italy) specialize in components.³⁶

Holger Gorg finds outsourcing directly correlates to increased plant productivity.³⁷ He argues benefits accrue when a multinational firm outsources inefficient factors of production.³⁸ The firm purchases high-quality intermediate outputs (Boeing- aircraft components) and focuses resources on its most proficient capabilities. He includes the caveat that substantial costs to outsourcing, such as transportation, have the potential to cancel out any cost savings.³⁹ He

³³ Holger Gorg, "Productivity effects of International Outsourcing, evidence from plant level data," *Canadian Journal of Economics* 41, no 2 (2008): 671-73. Includes a lit review of research using industry level data, and introduces original research using plant-level data. The lit-review is an insightful discussion of outsourcing and productivity.

³⁴ Paul Krugman, "The Increasing Returns Revolution in Trade and Geography," *Nobel Prize Lecture*, Princeton University, December 8, 2008.

³⁵ David Ricardo, *On the Principles of Political Economy and Taxation* (London: John Murray, 1817), see chapter VI on Foreign Trade.

³⁶ Paul Krugman, "Increasing Returns, Monopolistic Competition, and International Trade," *Journal of International Economics* 9, no.4 (1979): 469.

³⁷ Holger Gorg, "Productivity effects of International Outsourcing, evidence from plant level data," 676.

³⁸ The parts of production the firm does least efficiently, such as labor intensive low-skilled work.

³⁹ *Ibid.*, 677.

concludes stating that in general, exporters like Boeing, already embedded in international production networks, will face lower costs and risks.⁴⁰

The contribution of Ben Kitcher et al. is through econometric analysis, specifically the Cobb- Douglas (1922) production function, $Q(L,K)=AL^\beta K^\alpha$.⁴¹ Their research focus is on third variable (K), or total factor productivity (TFP). TFP accounts for other impacting variables beyond capital and labor. Outsourcing performance is contingently dependent on how TFP combines with labor and capital.

The researchers unpack the total factor productivity component using the Ishikawa diagram (1990); breaking down variables influencing TFP.⁴² Sub-variables are broken down even further until each can be individually measured. They address four pertinent situations: customer, financial, internal business process, and learning and growth.⁴³ Kitcher et al. use the example of an aerospace company considering different engine component suppliers. They look at all contingent factors (e.g. reputation, location) before making a decision to outsource. Exercising this method allows firms to more accurately assess if outsourcing decision will be profitable. This conveys that outsourcing is not a panacea, and doing so will not always be beneficial. Although I cannot empirically prove Boeing did not take such precautions, copious supplier failures would suggest they did not go to any such length.⁴⁴

⁴⁰ Ibid.

⁴¹ Ben Kitcher, Ian McCarthy, Sam Turner, and Keith Ridgway, "Understanding the effects of outsourcing: unpacking the total factor productivity variable," *Production Planning and Control: The Management of Operations* no 4-5 (2013): 308. The output (y), is the quantity of goods produced, in this case aircraft, and the inputs (L,K), are capital and labor. K is the total factor productivity, or tfp . This is an algebraic expression relating production output to production input.

⁴² Ibid,313.

⁴³ Ibid. 308-309.

⁴⁴ Stephen Denning, "Boeing's Offshoring Woes: Seven Lessons every CEO Must Learn," *Strategy and Leadership*, 29. Denning and others highlight the unforeseen issue with Boeing's increase in outsourcing. Boeing explicitly states that the 787 model was intended to speed up development, spread costs and financial risks.

Feenstra and Hanson focus in on outsourcings effects to the labor market. They find that the United States outsourcing to dissimilar countries, such as Mexico, has driven up wage inequality.⁴⁵ U.S. corporations shift away from labor intensive manufacturing, injecting capital in to Mexico for lower cost production inputs. These firms then focus endogenous spending on inputs which are intensive on skilled labor. The shift of resources creates a drop in U.S. demand for unskilled labor, having the effect of lowering wages. While Mexico is not a major partner in aerospace, Boeing's FDI has had a similar effect. This is demonstrated by the 787 supply chain and decreased low skilled assembly jobs relative to previous projects.⁴⁶

Zhao and Okamura's research looks at the wage effects of outsourcing in the Southern hemisphere. Their method of analysis is game theory using the examples of Boeing and Airbus.⁴⁷ They find if wages in the host country are significantly high, outsourcing will benefit both the firm and union.⁴⁸ However, if wages are significantly lower, outsourcing will drive down union wages. They encourage strategic outsourcing as a way for Boeing to have a competitive advantage over Airbus. Sven Arndt concurs, saying it enhances a producer's ability to deal with foreign competition.⁴⁹

Stephen Denning, an expert in management strategies, focuses specifically on the case study of 787 outsourcing and supply chain. He indicts Boeing management for failing to

⁴⁵ Robert C. Feenstra, and Gordon H. Hanson, "Foreign Direct Investment and Relative Wages: Evidence From Mexico's Maquiladoras," *Journal of International Economics* 42 (1997): 371.

⁴⁶ In chapter III I correlate the 787 supply chain/outsourcing with a decrease in low skilled jobs. I do not outright claim this as a contribution to macro level effects of wage inequality, yet it would be reasonable to suggest that Boeing's practices are generally the kind that contributes.

⁴⁷ Lex Zhao, and Makoto Okamura, "Competing to Outsource in the South," *Review of International Economics* 18, no. 3 (2010): 427.

⁴⁸ *Ibid.*, 428. In the case of FDI, the authors cite the example of high wages in China's cost cities. They say the competition will still benefit firm, unions, and host country. This is supported by empirical evidence on increased plant productivity and rising domestic wages between 1997-2004. During that period, wages among low-skilled workers rose 6.3%. They go on to say that FDI may diffuse a protectionist threat.

⁴⁹ Sven W Arnt, "Globalization and the Open Economy," *North American Journal of Economics and Finance* 8, no. 1 (1997): 75.

calculate the full costs of increasing outsourcing on the 787. “In analyzing offshoring, firms must get beyond rudimentary cost calculations focused on short-term profit, such as the cost of labor, and instead consider the total cost and risk of extended supply chains”.⁵⁰ A myriad of media reports back up the charge that Boeing only looked at a small set of factors, namely capital and labor inputs.⁵¹ Denning goes on to explain that the problem isn’t exclusive to Boeing. “It is found throughout the economy, devastating whole industries, and hampering United States ability to compete long term.”⁵² He suggests U.S. firms start thinking about returning manufacturing stateside.⁵³ Hary Mosser, founder of the Reshoring initiative, claims that while offshoring may cost 30% less than producing goods in the U.S., the total (and often overlooked) costs may add to more than 30%.⁵⁴

Christopher Tang and Joshua Zimmerman take an even greater focus on Boeing’s 787 supply chain, highlighting the suppliers most responsible for production problems.⁵⁵ They find South Carolina’s Vought Enterprises to be a main contributor. This implicates Boeing’s domestic suppliers as much as foreign.

⁵⁰ Stephen Denning, “Boeing’s Offshoring Woes: Seven Lessons every CEO Must Learn,” *Strategy and Leadership* 41, no. 3 (2013): 30.

⁵¹ Stephen Denning, “What Went Wrong at Boeing?”, *Forbes*, January 13, 2013, <http://www.forbes.com/sites/stevedenning/2013/01/21/what-went-wrong-at-boeing/>.

⁵² *Ibid.*

⁵³ Stephen Denning, “Boeing’s Offshoring Woes: Seven Lessons every CEO Must Learn,” 31. Although a call to return manufacturing stateside may be at odds with past evidence on the benefits of outsourcing, using the example of the 787, Denning argues firms like Boeing over-extended outsourcing efforts. He references the Reshoring initiative analytic tool enabling companies to calculate the full costs and risks of outsourcing, the Total Cost of Ownership Estimator.

⁵⁴ *Ibid.*, 31.

⁵⁵ Christopher S. Tang, and Joshua D. Zimmerman. “Managing New Product Development and Supply Chain Risks: The Boeing 787 Case.” *Supply Chain Forum: An International Journal* 10, no. 2 (2009): 74-75.

Economic geography literature addresses the— “location of factors of production in space.”⁵⁶ Again, Krugman produced valuable insights, showing how a producer who serves *two* markets considers location.⁵⁷ Previous work only addressed producers serving internal markets. Given the example of a producer considering either one or two plants, considerations include worker cost of living or transportation costs.⁵⁸ We can use Krugman’s insights to think about Boeing decision to open a second 787 assembly plant in South Carolina. Although transportation costs exist for moving components and aircraft sections from Charleston to Everett, other advantages may outweigh costs, thus contributing to Boeing’s decision to move.⁵⁹

Steve Wilhelm proclaiming “the South is winning,” writes about Boeing’s move and causes for growing industrial concentration. He cites lower costs, job hungry political leaders (enticing firms with subsidies), and a non-unionized workforce as motivators for relocation to the region.⁶⁰ The auto and aerospace industry also share cutting edge technologies. “The synergy between those industries has helped the South build a formidable network of engineers and engineering skills.”⁶¹ This has resulted in trans-local firms such as BMW, General Electric, and Airbus, to take advantage of the region’s growing specialization.

Government relinquishing control of the aerospace industry has awarded Boeing its ability to outsource. Outsourcing as defined by Daniel Horgos is “the procurement of inputs from

⁵⁶ Paul Krugman, “Increasing Returns and Economic Geography,” *The Journal of Political Economy* 99, no. 3 (1991): 483.

⁵⁷ Paul Krugman, “The Increasing Returns Revolution in Trade and Geography”, Nobel Prize Lecture, *Nobel Prize.Org* (2008):343.

⁵⁸ *Ibid.*,343. Worker cost of living dictates the wages the employer will need to pay the employee.

⁵⁹ Advantages for moving to S.C. may include lower capital and labor costs, being adjacent to 787 rear fuselage assembly, and the region’s growing agglomeration of tech and manufacturing.

⁶⁰ Wilhelm, Steve, “The South is Winning: Why the Puget Sound area will keep Losing Boeing Jobs.” *Puget Sound Business Journal.*, July 4, 2013, <http://www.bizjournals.com/seattle/news/2013/07/05/the-south-is-winning-why-the-puget.html?page=all>.

⁶¹ *Ibid.*

an external supplier.”⁶² John Bowen outlines how trade liberalization garnered Boeing access to global suppliers. Boeing in turn set up what Bowen calls global production networks (GPNs); a complex linkage of firms across space.⁶³ Lower production costs from GPNs helped give Boeing the competitive advantage over smaller aircraft producers, turning the industry in to an even greater oligopoly. Boeing’s trans-border relationships are reliant on government institutions, and augmented by national economic development efforts.⁶⁴

Airline deregulation had a similar effect. It lowered the cost of travel and brought air carriers to new international locations. This in turn drove up demand for aircraft and increased sales for Boeing. Hamilton and Quinlan’s empirical findings go even further in their support of liberalization. Using quantitative analysis, they show commercial airliners built in the US and EU have increasingly been sold on both sides of the Atlantic, thus mutually benefitting both economies. The authors say the data proves liberalization has created a “healthy two way street.”⁶⁵ They call for even greater liberalization by allowing universal cross border competition. Boeing’s production model is directly tied to the effects of trade liberalization.

Dana Cloud’s research looks at how liberalization (referred to by her as neoliberalism) has altered Boeing’s behavior and impacted the unions.⁶⁶ She argues that neoliberalism, “a global economic regime characterized by off-loading, offshoring, and lean production”, has

⁶² Daniel Horgos, Labor Market Effects of International Outsourcing,” *International Review of Economics and Finance* 4 (2009): 611.

⁶³ John Bowen, “Global Production Networks, the Development State and the Articulation of Asia Pacific Economies in the Commercial Aircraft Industry,” *Asia Pacific Viewpoint* 48, no. 3 (2007): 313.

⁶⁴ Ibid. Bowen addresses the state’s role in the development of East Asia’s aerospace industry, its growing competitive advantage, production network, and relationship with Boeing 747 to the 787.

⁶⁵ Daniel Sheldon Hamilton and Joseph P. Quinlan, *Deep Integration: How Transatlantic Markets are Leading Globalization* (Washington D.C.: John Hopkins University:205): 74.

⁶⁶ Dana Cloud, *We Are the Union: Democratic Unionism and Dissent at Boeing*, (Chicago: University of Illinois Press, 2011).

weakened Boeing's unions and forced concessions.⁶⁷ Dually implicated is union leadership, and what she calls the "corporate unionists".⁶⁸ These are leaders who have overly-cooperated with Boeing management to the detriment of the rank and file. She highlights the stories of dissident groups within the unions who have agitated for greater union democracy. Cloud argues these groups are vital to restoring union power and thus the American middle-class. Despite her focus on broader economic change and weakening unions, she incorporates the 787 production techniques within her critique. A division between leadership and the rank and file is clearly seen in the 2014 IAM 751 contract extension. The contract which ended pensions for new hires, is the product of earlier concessions and legalizing Boeing's movement of production to South Carolina

Similar to Dana Cloud, Edward Greenberg, Leon Grunberg, Sara Moore, and Patricia Sikora expose how company transition has affected Boeing workers. Results were gathered using surveys given to 1,100 respondents from 1997-2006, as well a wide cross-section of interviews. As Boeing underwent developments such as mergers, layoffs, outsourcing, and global partnering, the research measured employee attitudes and opinions.⁶⁹ Their results show that, as Boeing adopted lean production techniques in the mid-1990s, unskilled or semi-skilled workers began to feel the effects of job insecurity. Boeing launched the 787 program near the end of their study period. At that time, the company begun to outsource high-skilled work like engineering and programming. They found engineers and other knowledge workers began to feel the same fears as low skilled workers.⁷⁰ Their core argument is that Boeing unnecessarily inflicted harm on its

⁶⁷ Ibid., 3.

⁶⁸ Ibid., x-xiii.

⁶⁹ Edward Greenberg, Leon Grunberg, Sara Moore, and Patricia Sikora, *Turbulence: Boeing and the State of Boeing Workers and Managers*, (Yale University Press, 2010), 14.

⁷⁰ Ibid., 13.

workforce. They contend this is emblematic of what is happening to other American companies and should be a cautionary tale for business.

The economic literature finds outsourcing to be an overall positive for the economy. It acknowledges that workers in manufacturing are likely to experience negative effects, but points to demand growth in other sectors as increasing the overall welfare of the population. The business literature specifically focuses on the 787 business model, with a consensus that Boeing's pursued a flawed model of production. The labor research moves beyond critiquing a flawed business model, focusing on the real-life impact to the men and women of Boeing. Each approach provides a unique way to look at Boeing's 787 Dreamliner production decisions.

METHODS

Design

I approached the research problem using a mix of quantitative and qualitative methods. This reflects a multidisciplinary pursuit toward knowledge creation, integrating diverse perspectives for a greater breadth of understanding.⁷¹ Developing an inclusive method is respectful of disciplines from both the humanities and social sciences, each with important insight into the research problem.

Quantitatively, the research design extrapolates from statistical data pertaining to employment numbers, project spending, subsidies, outsourcing percentages, and units of production.⁷² The numerical data is meant as a tool for qualitative analysis, plugged into the main body of research. This is qualitative in nature and uses word description in exploration of a

⁷¹ Interdisciplinary Studies (M.A), University of Washington Tacoma, Accessed April 22, 2014, <http://www.tacoma.uw.edu/uwt/admissions/interdisciplinary-studies-ma>.

⁷² "Aerospace Economic Impact Study," Washington Aerospace Partnership. November, 2013. <http://www.washington-aerospace.com/EconomicImpacts.pdf>.

main theme, the economic transition at Boeing. The case study is formatted in a chronological narrative.

At the foundation is a historical discussion of the main actors involved, Boeing and the labor unions. This is followed by a narrative detailing the catalyst for Boeing's development and production of the 787. The variables I identified for analysis are Boeing management, 787 production, geographies (Puget Sound, South Carolina), Boeing unions (IAM 751, SPEEA 2001), and policy. Without presenting a quantitative analysis, I seek to identify a cause and effect relationship between each.

Additionally, four unstructured interviews were conducted with Boeing workers. These give personal insight into the how management decisions impact worker's lives. These interviews are informal and anecdotal in nature. Nonetheless, their lived experiences provide valuable insight. Each interview revolves around a similar theme of personal narrative and perception of Boeing's production decision. I correlate the interviews with research by Edward Greenberg et al. and Dana Cloud. Both conducted surveys and interviews on Boeing engineers, managers, machinists, and technical workers.⁷³ Their research informed themes in my line of questioning.

Procedure

Data was collected and analyzed from equal parts primary and secondary sources. Primary sources include timely news stories on 787 production and resulting labor conflicts, Washington Aerospace Partnership, the National Labor Relations Board vs. Boeing, and Washington State Legislature spending packages. Secondary sources came from academic

⁷³ Edward Greenberg et al., *Turbulence: Boeing and the State of Boeing Workers and Managers*, 2010. Dana Cloud, *We Are the Union: Democratic Unionism and Dissent at Boeing*, 2011.

literature classified into four broad categories. These are labor studies, business management, political economy, and economics. Each distinctly contributed toward a better understanding of the problem.

The labor Studies literature details the history of the unions, and their tumultuous relationship with Boeing. It may also include how the structural changes at Boeing impacts workers. The business management literature analyzes Boeing management decisions and production protocol. The literature I classified as political economy analyzes the institutions and policies which liberalized the aerospace industry. The economics literature provides a theoretical framework for the production, transportation, and consumption of goods or services. In this instance, that good is 787 commercial aircraft. The theoretical framework covers international trade, economic geography, production, and firm behavior. International trade theory and economic geography puts Boeing's marketplace behavior in the context of its effects on the wider economy and intra-industry relationships. The theories of firm behavior and production are a microeconomic assessment of how a firm like Boeing uses "scarce resources" to maximize profits. The economics literature aids in an understanding of the factors leading Boeing's decision to outsource component and sub-assembly production of commercial aircraft.

Limitations

The 787 Dreamliner project and resulting labor conflicts are relatively recent, creating several limitations. All data collected is in the public domain, therefore the research process can be replicated. However, certain subjectivities are present; especially when correlating theoretical findings without employing strict quantitative measures. Similarly, while it's logical to correlate trade policy with Boeing's increased outsourcing, it's not infallible.

The calculus on Boeing's 787 profits and its impact on workers are also not static. While I contend the Boeing's 787 production decisions have resulted in losses for firm and the local workforce in the short-term, the long-term may differ. Evidence shows management decisions have put the project billions over budget, causing time delays, and groundings due to technological problems. Nonetheless, the strategy may eventually lead to greater profits as the benefits from reduced labor inputs exceed these early costs. The workers' decision to ratify the 2011 contract extension, which dropped the NLRB case against Boeing, may prove to be a net positive for the labor union with the economic benefits of the inclusion of the 737 MAX. My conclusion is limited to the financial state of the Dreamliner project at the time of publication.

Workers Lived Experience

To provide a personalized perspective on Boeing's outsourcing and move to South Carolina, I conducted four conversations with men and women representing each of Boeing's unions. They aren't all directly tied to the specific case study of the 787 Dreamliner, its production problems, and the conflict resulting from the assembly line opening in Charleston, South Carolina. Nonetheless, each has been affected by Boeing's altered production practices in various ways. Their experience underscores the negative consequences of Boeing's movement from the region.

The men and women represent workers from SPEEA Local 2001 and IAM District 751, Boeing's two major unions. The first is a retired Boeing engineer from SPEEA Local 2001. Two are District 751 machinists working on the 767 assembly line in Everett, Washington. The final participant is a union representative from IAM 751. Both unions have been affected by production movement, loss of benefits, and job insecurity. The objective was to get their opinions on Boeing's changing production methods. Most importantly, I wanted to know their

thoughts about the opening of the 787 Dreamliner assembly plant in Charleston, South Carolina, and what they believed it meant for the future of Boeing commercial aircraft production in the Puget Sound.

Chapter I

Boeing Commercial Aircraft Production in the Puget Sound

Boeing's shifting production methods are best understood by examining past aircraft production. This provides context of the factors which altered the company's relationship with the Puget Sound.

William Edward Boeing began producing aircraft in 1916. The Yale engineering graduate formed Pacific Aero Products 1916, becoming Boeing two years later. He recruited engineers from the University of Washington, while also funding the school's aeronautics program.⁷⁴ Early success came from military contracts in World War I and World War II. An additional boost resulted from passage of the Kelley Act in 1925. This permitted the federal government to contract private carriers. Boeing went on to form Boeing Air Transport in 1927. In 1934, Boeing Air Transport became United Airlines after anti-trust legislation prevented manufacturers from owning mail-carrying services⁷⁵. Government contracts were the main source of revenue until 1950s. Today, space and defense remains an important source of revenue.

Boeing gained a foothold in civil aviation with the development of the 707. It continued growth with the 737 in the 1960s. The single-aisle twin-engine craft would become the best-selling commercial plane in aviation history.⁷⁶ In 2014, there remains high demand for the 737. Low-cost carriers (LCCs), who gained a share of the market after airline deregulation, favor the

⁷⁴ "The Boeing Airplane Company...First Flight," *Boeing The Beginnings, 1903-1926*, Accessed April 30, 2014, <http://www.boeing.com/boeing/history/narrative/n003boe.page>.

⁷⁵ "The Boeing Co...Breaking Up," *Boeing, The Early Years: 1927-1938*, Accessed May 16, 2014, <http://www.boeing.com/boeing/history/narrative/n014boe.page>.

⁷⁶ Jeffrey D Kienstra, "Cleared for Landing: Airbus, Boeing, and the WTO Dispute over Subsidies," *Northwestern Journal of International Law and Business* 32, no. 3 (2012):573.

plane for regional flights. Southwest Airlines, United States largest discount air- carrier, exclusively flies 737s.⁷⁷ In 2011, Puget Sound machinists won the contract to build the new 737MAX in Renton, Washington, a big win for the Puget Sound.⁷⁸ Boeing had shown an interest in building the new model out of state. However, facing federal litigation for illegally building a Dreamliner assembly plant in South Carolina, Boeing wisely made a trade-off with the machinists union.⁷⁹ The South Carolina assembly plant is central to my analysis. It will be discussed at greater length in the following chapters.

In the 1960s Boeing developed the wide body 747. John Bowen says “the jet’s bulbous nose became an icon of the Jet Age, an easily recognizable symbol for air travel.”⁸⁰ The aircraft was more than double the size of any airliner preceding it. This helped lower the cost and increase the accessibility of air travel. Companies outside of Boeing made financial contributions toward development of the plane, making it the largest private sector enterprise of the era.⁸¹ Pratt & Whitney had one billion dollars invested in developing the jet engines. Pan Am had twenty-five orders worth \$550 million. Boeing initially projected spending to be \$750 million, but total spending was closer to \$2 billion.

The Boeing 747 helps illustrate that production networks and cost overruns existed long before the 787. Specialization and scale economies are a natural progression of any growing company, as they help to lower costs over time. As John Bowen comments, “the stakes involved in large commercial aircraft (LCA) development are so huge that *New Yorker* writer John

⁷⁷ “The secret of Southwest’s continued success,” *The Economist*, July 8, 2012, <http://www.economist.com/blogs/gulliver/2012/06/southwest-airlines>.

⁷⁸ “737 MAX stays in Renton Under Boeing, union agreement,” *AP and King 5 news*, November 30, 2011, <http://www.king5.com/news/business/Boeing-Machinists-agreement-737-Max-134767063.html>.

⁷⁹ *Ibid.*

⁸⁰ John Bowen, *The Economic Geography of Air Transportation: Space, Time, and the Freedom of the Sky*, (New York: Routledge, 2010), 39.

⁸¹ *Ibid.*

Newhouse titled a book about the industry, *The Sporty Game*. Companies who want to play the game have to bet big. Boeing did and came out a winner.”⁸² The financial risks are inherent to building commercial aircraft, which is why very few companies have been as successful as Boeing.

In assembling its commercial aircraft, Boeing never produced all the components, and engines always came from outside sources.⁸³ Four and a half million components came from suppliers across forty-eight states. Sections of the fuselage were built in Kansas and California. However, importantly all the sections were built in the United States, and completed in Washington State. The levels of production disaggregation and logistical challenges were on a much smaller scale. Boeing continued its dominance of the commercial market until the 1990s. Despite having a large share of the market, there were several other manufactures competing with Boeing, including McDonnell Douglass and Lockheed Martin. Up until the 1990s, production was concentrated in the central Puget Sound, with final assembly plants in Everett and Renton, Washington.

Boeing’s use of outsourcing was minimal early on. It outsourced 2% of production in the 1960s, 30% in the 1990s, and rising to 70% in the 2010s.⁸⁴ Policy changes are one of the main factors accounting for growth in outsourcing. Early outsourcing was almost exclusively in the production of components, whereas current outsourcing includes engineering, design, and sub-assembly.

Liberalization: Policies freeing Boeing to go global

⁸² Ibid.,41.

⁸³ Ibid., 40.

⁸⁴ David Pritchard and Alan Mcpherson, “Outsourcing US Commercial Aircraft Technology and Innovation: Implications for the Industry’s Long Term Design and Build Capability,” *Canada-U.S. Trade Center Occasional Paper*, no 3 (2004): 3.

Liberalization in the 1970s significantly altered Boeing's market behavior. Knowledge of these policies is the best way to understand Boeing's current mode of operation. John Bowen, an economic geographer specializing in aerospace, says liberalization has two driving forces, "privatization and deregulation."⁸⁵ Privatization takes government out of ownership, and deregulation removes barriers to trade. Each granted Boeing freedom to offshore and outsource. Although these policies have often been beneficial for producers and consumers, they have also decreased low-skilled American jobs.⁸⁶

The 787 Dreamliner illustrates the over-indulgence of outsourcing, brought on by governmental deregulation. International trade agreements liberalized the aerospace industry, allowing Boeing to externalize production of commercial aircraft. The first and most important was 1992 Agreement on Trade in Civil Aircraft (ATCA); built upon the 1979 GATT Tokyo round of multilateral trade negotiations. The preamble states the agreement should "achieve the expansion and ever-greater liberalization of world trade through, *inter alia*, the progressive dismantling of obstacles to trade and the improvement of the international framework for the conduct of free trade."⁸⁷ The removal of trade obstacles, such as tariffs and subsidies, included all civil aircraft, components, and sub-assembly. This allowed it to become possible for Boeing to foster international relationships.

Greenberg et al. suggest governmental deregulation shares responsibility for shifting corporate behavior. Firms increasingly felt pressure to produce short term returns in a market dominated by investors. They go on to state that after Boeing merged with McDonnell Douglas

⁸⁵ John Bowen, *The Economic Geography of Air Transportation*, 92.

⁸⁶ "America's jobless men. Decline of the working man .Why ever fewer low-skilled American men have jobs," *The Economist*, April 28th, 2011, <http://www.economist.com/node/18618613>.

⁸⁷ "Preamble, Agreement on Trade in Civil Aircraft," Tokyo Round 1973, *World Trade Organization*, 181, http://www.wto.org/english/docs_e/legal_e/tokyo_air_e.pdf.

in 1997, the company shifted from a primary focus on building the highest quality planes, what he calls the “total quality period,” to the “shareholder value period.” This term was first referenced by Phil Condit, CEO at Boeing during the company’s rapid transition: “everything at Boeing seemed to change- corporate culture and identity, business strategy, governing ethos and ethics, and more.”⁸⁸ The organization transformation was designed to create the greatest returns for the least investment. It had the side effect of negatively affecting the morale of Boeing workers. Some of the challenges Boeing is facing on the Dreamliner is a direct result of these past decisions to focus on short- term gains.

There seems to be a causal relationship between high levels of outsourcing on the 787 and trade liberalization. I draw this conclusion from its growth after the policy change.⁸⁹ In turn, this equates to a decrease in local manufacturing. The growth in outsourcing, along with technological efficiency, leads to a decline in demand for low-skilled workers in Puget Sound.⁹⁰ In the past, layoffs at Boeing were due to a decrease in the demand for airliners and fluctuations in the business cycle. In the case of the 787, aircraft demand continues to increase while jobs do not. Yet efficiency created by outsourcing has the potential to create local economic growth, thus increasing jobs in related sectors.

The trajectory of commercial aircraft production was further transformed by The Airline Deregulation Act (ADA) of 1978. Signed into law by Jimmy Carter, the bill effectively ended

⁸⁸ Greenberg et al., *Turbulence*, 13. Phil Condit was Boeing’s CEO from 1996-2003.

⁸⁹ Kyle Peterson, “ Outsourcing at Boeing: How the Aerospace Giant Looks Abroad for Key Suppliers in Dreamliner,” *Reuters*, January 20, 2011, http://www.huffingtonpost.com/2011/01/20/a-wing-and-a-prayer-outso_n_811498.html.

⁹⁰ Steve Wilhelm, “ Boeing to lay off 800 workers due to increased 787 line efficiency,” *Puget Sound Business Journal*, March 22, 2013, <http://www.bizjournals.com/seattle/news/2013/03/22/boeing-to-lay-off-800-workers-from-787.html?page=all>.

the Civil Aeronautics Board (CAB), who had regulated the airline industry since 1938.⁹¹ CAB controlled routes air carriers could travel, flight schedules, and rates customers could be charged. Passage of the ADA opened barriers to the airline industry and resulted in increased price competition for passenger air travel. As airfares dropped, more passengers began to travel. Boeing saw dynamic growth as air carriers demanded more airplanes. Boeing in turn demanded more workers. Despite increased demand for Boeing aircraft in the latter half of the 20th century, relative demand for Puget Sound unskilled and semi-skilled workers did not increase.⁹²

To be fair, decreased worker demand in the Puget Sound is not solely due to free trade. By the 1990s, Boeing had made many changes to the complex process of manufacturing planes. Computers and information communication technology revolutionized the workplace. Word processing, digital design, desktop publishing, web-based tools, and e-mail all made the process of developing and producing aircraft much more efficient.⁹³ Introduced in 1994, the Boeing 777, a wide-body long range commercial aircraft, became the first aircraft completely designed using computer- based virtual design. Revolutionary for its time, it was designed on a single system using three-dimensional representation. This bypassed the need to construct a full-scale model.⁹⁴

Computer design and engineering also helped foster global partnering. With ease, Boeing had the ability to collaborate with technologically advanced East Asian economies. In turn, the relationship developed is a factor in Asia accounting for a significant percentage of Boeing's commercial orders. Japan leverages orders for new aircraft through aircraft component

⁹¹ John Bowen, *The Economic Geography of Air Transportation*, 95.

⁹² "Aerospace Economic Impact Study," *Washington Aerospace Partnership*. November, 2013, <http://www.washington-aerospace.com/EconomicImpacts.pdf> ,v. Data shows company growth at a higher rate than jobs.

⁹³ Greenberg et al., *Turbulence*, 26.

⁹⁴ *Ibid.*,27.

contracts.⁹⁵ John Bowen says “Japanese manufacturers have attained unparalleled importance on the newest Boeing jet, the 787, and technological expertise is a key reason.”⁹⁶ In particular, Japan has been at the forefront of composite materials development, a key technology in the 787.

Assembly worker duties were also transformed by the 1990s. Large scale inflexible tools were replaced with mobile, flexible multi-use tools.⁹⁷ Workers now had preassembled parts and tool kits, easy to see visual displays on the line, and were given the ability to stop or start the line to fix problems.⁹⁸ The DCAC/RM computer system streamlined the process of producing aircraft, and electronically tracked and ordered parts on the supply chain.⁹⁹ These and countless other measures cut waste, costs, and unfortunately for many workers, jobs.

Peter Edelman addresses the phenomena of American industrial job loss and decreased union strength. He contributes the convergence to a multitude of factors. A main contributor he finds is weakened union power as a result of

“employer opposition and weaker laws, structural changes in the economy toward white-collar work and largely decentralized services away from sectors where unions were traditionally strong, and more product and labor market competition around the world.”¹⁰⁰

Not only is it an integrated world economy and a move toward service work that has hurt the unions, Edelman goes further in suggesting unions were a victim of their own success. They were not prepared for the aggressive posture corporations would increasingly take in the 1970s.

⁹⁵ John Bowen, “Global Production Networks, the Development State and the Articulation of Asia Pacific Economies in the Commercial Aircraft Industry.” *Asia Pacific Viewpoint* 48, no. 3 (2007): 315.

⁹⁶ *Ibid.*, 317.

⁹⁷ Greenberg et al., *Turbulence*, 28.

⁹⁸ *Ibid.*

⁹⁹ *Ibid.*, 29.

¹⁰⁰ Peter Edelman, *So Rich So Poor* (New York: The NY Press, 2012):51.

All the while, National Labor Relations Board began to have members stacked in favor of corporations.

Jacob Hacker and Paul Pierson also analyze the economic transition of the 1970s, including Ronald Reagan's actions of firing of 12,000 striking air- traffic controls in 1981. The following years, union strikes plummeted.¹⁰¹ In the past, Boeing was always dependent on workforce stability, never making serious attempts to rid the company of unions. A stride toward weakening unions didn't come until the 1990s, with the implementation of lean production techniques coupled with increasing market pressure from Airbus.

Aerospace liberalization has many proponents, with Boeing among them. Boeing co-sponsored a quantitative study in 2005 called "Air Service Liberalization."¹⁰² To borrow a term from economists (who tend to favor economic liberalization), one may consider this study "rent seeking behavior". That is to say, its publication is meant to manipulate political institutions into policy decisions which provide favorable tax incentives and subsidies for aerospace. Washington State, South Carolina, and the U.S. Federal Government all rely on revenue from Boeing. Therefore they are coerced easily by the aerospace giant. In a similar regard, John Richards finds domestic politicians create international institutions, such as the World Trade Organization, primarily for domestic political ends.¹⁰³ He contends policy creation like the Agreement on Trade in Civil Aircraft, is not for economic efficiency, but for" potential domestic political

¹⁰¹ Jacob S. Hacker, and Paul Pierson, *Winner-Take-All Politics* (New York: Simon& Schuster, 2010):58.

¹⁰² "An Economic Impact Of Air Service Liberalization," *The Boeing Company*, 2005.

<http://www.boeing.com/boeing/commercial/liberalization/index.page>

¹⁰³ John E Richards, "Towards a Positive Theory of International Institutions: Regulating International Aviation Markets," *International Organization Cambridge Journals* 53, no. 1 (1999): 2.

gains.”¹⁰⁴ In summary, it would be naïve to assume free trade policies are for the sole purpose of economic growth.

IAM DISTRICT 751 AND SPEEA LOCAL 2001

As Boeing CEO Frank Shrontz stated in 1986: “to ensure our continued success, we support our most important resource, the people of Boeing....At Boeing, we inspire and recognize individual talent, provide job security based on performance, and foster a team spirit and the feeling of personal satisfaction that comes from a job well done”.¹⁰⁵

This address reflects a bygone era at Boeing. A time where workers felt valued and reciprocity created a “family atmosphere.”¹⁰⁶ In the decade to follow, Boeing would transform as a result of altered management strategies, broad global partnerships, lean production techniques, technological changes, outsourcing, and massive layoffs.¹⁰⁷ The 787 Dreamliner project reflects the very height of those changes. The following provides an introduction to Boeing’s workers and unions, each playing a pivotal role in the company’s success.

SPEEA Local 2001

Formed by engineers in 1944, the Society of Professional Engineering Employees in Aerospace (SPEEA) represents 22,000 Puget Sound engineers and technical workers. During its post-war growth, Boeing had fostered an engineering centric culture. In response to pressure from Airbus, a European manufacturer and Boeing’s number one competitor, Boeing merged with McDonnell Douglas in 1997. This led to a dynamic shift between management and

¹⁰⁴ *Ibid.*, 3.

¹⁰⁵ “The Challenges of Being Ethical and Competitive,” *AW Pages Society*, Accessed May 18, 2014, <http://www.awpagesociety.com/wp-content/uploads/2011/09/Boeingcase.pdf>.

¹⁰⁶ Greenberg et al, *Turbulence*, 41.

¹⁰⁷ *Ibid.*,2.

engineers. The engineers perceived their status and pay declining compared to the machinists in IAM.¹⁰⁸ Two years after the McDonnell Douglas merger, SPEEA affiliated with the International Federation of Professional and Technical Engineers (IFPTE) and American Federation of Labor- Congress of Industrial Organization (AFL-CIO). The historically amenable union had a new found militancy. SPEEA rejected Boeing's contract proposal in 1999, only the second strike in the union's history. This slowed production, halted projects, and forced Boeing into meeting the union's demands.¹⁰⁹

Not until the 787 did engineers face the challenges their machinist counterparts had faced for decades. Outsourcing of component production had mostly led to a decreased demand for labor. The strategy of the 787 had global partners taking over the engineering of whole systems. Boeing has also begun to move engineering jobs out of Washington.¹¹⁰ Boeing's vice president of operations says this strategy allows the manufacturer to "become a larger, more globally competitive company with expanded production capacity and a more geographically diverse manufacturing and engineering footprint."¹¹¹ Currently, Boeing is moving engineering work to places like South Carolina, California, and a possible facility in Kiev, Ukraine.¹¹²

Greenberg et al.'s longitudinal research on Boeing workers found that in 1997, engineers were far less worried about threats to job security than hourly production workers.¹¹³ By 2003,

¹⁰⁸ Woodruff Imberman, "Why Engineers Strike: The Boeing Story." *Business Horizons* 44, no. 6 (2001):37.

¹⁰⁹ *Ibid.*

¹¹⁰ Aubrey Cohen, "Boeing moving engineering work out of Washington," *Seattle pi*, May 21, 2013, <http://www.seattlapi.com/business/boeing/article/Boeing-moving-engineering-work-out-of-Washington-4565734.php>.

¹¹¹ *Ibid.*

¹¹² Dominic Gates, "Boeing moving 1,000 more engineering jobs to California," *The Seattle Times*, April 10, 2014, http://seattletimes.com/html/businesstechnology/2023341837_boeingcasengineeringxml.html.

¹¹³ Greenberg et al., *Turbulence*, 11.

the year the Dreamliner was announced, the level of concern was similar. In section 4, we will return to the 787s impact on Boeing engineers.

IAM District 751

IAM District 751, representing 27,000 machinists and assembly workers, has a long tradition of militancy. During the 1940s, mass production workers galvanized to form democratic industrial unions. Most of these industrial unions, such as the United Auto Workers, became affiliated with the Congress of Industrial Organizations. The IAM was one of the few exceptions, and affiliated with the more traditional American Federation of Labor. Local 751 signed its first contract with Boeing in 1936.¹¹⁴

Compared to other industries, Boeing had a relatively relaxed attitude toward unionization. The economic realities of aircraft manufacturing demanded a regularization of the workforce. In the 1970s, rampant union busting alongside growth in offshoring, outsourcing, and subcontracting led to a decline in IAMs power. Boeing made significant concessions to the union during its 2005 and 2008 strikes, both costing Boeing hundreds of millions. The 2008 eight week strike marked a huge boost to the labor movement as the collective bargaining agreement protected local assembly jobs, prevented some outsourcing, and preserve health benefits.¹¹⁵

Boeing can attribute some of its financial losses in the late 2000s to production workers militancy against outsourcing. Ironically, those same strikes were part and parcel of Boeing's decision to move 787 productions to South Carolina. The contract extension of 2011 and 2014 continues a pattern of machinist wins and losses. In 2011, machinists lost work to Boeing's new

¹¹⁴ John McCann, *Blood in the Water: A History of District Lodge 751 of the International Association of Machinists and Aerospace Workers*, (Seattle: District Lodge 751 of the IAM & AW, 1989), 23.

¹¹⁵ Karen West, "Labor Movement gets boost from Boeing strike," *NBC News*, November 11, 2008, http://www.nbcnews.com/id/27478691/ns/business-us_business/t/labor-movement-gets-boost-boeing-strike/#.U3mHj7VOXIU.

787 assembly plant in South Carolina, but simultaneously won the rights to build the 737MAX. In 2014, machinists lost worker pensions, but won the contract to build the 777X.¹¹⁶

Workers willingness to compromise has allowed Puget Sound to retain production of Boeing's two newest commercial aircrafts, bringing great economic benefits to the region. At the same time, concessions are having negative impacts in the lives of workers. It would be unfair to second guess any of these democratically made union decisions. Boeing might also say it unfair for me as an outsider to second guess the companies decisions. Nonetheless, from an ethical standpoint, I believe Boeing must refrain from forcing further benefit losses under threat of continual movement from the region. In chapter III, machinist trade-offs associated with the 787 will be discussed in further detail.

Chapter II

787 Dreamliner Production and Supply Chain

The Dreamliner model of production can be traced to structural changes at Boeing in the 1990s. After purchase of McDonnell Douglas in 1997, Boeing began to diversify and put focus on profits and stock price. Reflecting this diversification, and wanting to be in a location with greater global accessibility, Boeing moved its headquarters to Chicago in 2001. Although this

¹¹⁶ Dominic Gates, Machinists say yes, secure 777X for Everett," *The Seattle Times*, January 3, 2014. http://seattletimes.com/html/business/technology/2022593956_machinistsunionvotexml.html.

provided Boeing greater international access, some believe it also reflected the company's desire to separate itself from local labor.¹¹⁷

Prior to the 787, Boeing solely outsourced component production, with parts from suppliers delivered to Everett and Renton for assembly.¹¹⁸ This model had a high demand for low and medium skilled unionized workers in the Puget Sound. Management, engineers, and machinists worked closely together ensuring a safe and high quality product. Greenberg et al. found during this time workers and managers held positive attitudes toward Boeing and had faith in their job security.¹¹⁹

Boeing's loss of market share to Airbus in the 1990s led the decision to create the 787 Dreamliner.¹²⁰ Formed in 1970, Airbus started as a consortium of European firms meant to rival Boeing Commercial.¹²¹ By the 1990s, Airbus had formed a full line of commercial aircraft, each competing with Boeing's aircraft.¹²² Airbus's A320 competes with Boeing's 737, A330-747, A330-767, A340-777 and the A350-900 the 787 Dreamliner.¹²³

Airbus's success came largely thanks to generous government subsidies by member nations.¹²⁴ Airbus received financing for development of each aircraft. Airbus went from 15%

¹¹⁷ John Bowen, *the Economic Geography of Air Transportation*, 61.

¹¹⁸ Christopher S. Tang and Joshua D. Zimmerman, "Managing New Product Development and Supply Chain Risks: The Boeing 787 Case," *Supply Chain Forum* 10, no. 2 (2009):77.

¹¹⁹ Edward S. Greenberg et al. *Turbulence: Boeing and the state of American Workers and Managers*, 11.

¹²⁰ Tang and Zimmerman, "Supply Chain Risks: The Boeing Case," 74.

¹²¹ Jeffrey Kienstra, "Cleared for Landing: Airbus, Boeing, and the WTO Dispute over Subsidies," *Northwestern Journal of International Law and Business* 32, no. 3 (2012):575.

¹²² *Ibid.*, 576.

¹²³ *Ibid.*, 576-578.

¹²⁴ *Ibid.*, 575. Boeing also receives generous state and federal subsidies, especially true in the case of Boeing Space & Defense. The duopoly's subsidy dispute through the World Trade Organization is a contributing factor in both firms behavior and deserves much consideration. Unfortunately, this thesis must limit its focus to Boeing's behavior.

market share in 1987, to 29% in 1996, to over 50% and overtaking Boeing in 1998.¹²⁵ In 2003, during the develop stages of the 787 (then called the 7E7) Airbus delivered more commercial aircraft than Boeing for the first time. Since then, each company has taken turns dominating the market. Boeing's strategy since the 1990s has always been with Airbus in mind.

To attract attention from buyers and away from Airbus, Boeing developed the mid-sized twin aisle aircraft using fifty percent lightweight carbon-composite materials.¹²⁶ The lightweight composites allowed for increased humidity and pressure to be maintained in the passenger cabin, offering an improved flight experience. The aircraft uses 30% less fuel than its counterparts, allowing for non-stop international flights at lower cost.¹²⁷ Due to the value provided to airlines and customers, the 787 became the fastest selling aircraft in aviation history.¹²⁸

The Boeing Dreamliner model was meant to optimize production, while cutting costs from \$10 to \$6 billion.¹²⁹ The outcome has been the opposite. To date, the program's cost has topped \$32 billion. Recurrent mechanical and technical problems are still adding to this price tag in 2014. As Greenberg et al. notes, companies do not usual try such drastic measures unless they have no other choice. "Large scale modifications are simply too expensive, time consuming, disruptive, and risky to tackle when things are going well."¹³⁰ Boeing had the belief that unless they created a revolutionary product, Airbus would remove all ability to compete. The onus was on Boeing management to produce a jetliner to reclaim dominance.

¹²⁵ Ibid., 577

¹²⁶ Ibid.

¹²⁷ Greenberg et al., Turbulence, 37.

¹²⁸ Ibid., 75.

¹²⁹ Christopher S. Tang, and Joshua D. Zimmerman. "Supply Chain Risks: The Boeing 787 Case." *Supply Chain Forum: An International Journal* 10, no. 2 (2009): 75.

¹³⁰ Greenberg et al., Turbulence, 22.

Supply chain management specialists Christopher Tang and Joshua Zimmerman provide a clear picture of the 787 supply chain and how it diverged from previous models.¹³¹ The chain has three tiers of suppliers, each responsible for a different stage of production. Rather than Boeing's traditional role of assembling the thousands of components in Everett, Washington, global partners were tasked to integrate the components before final assembly in Everett. Tier three partners supplied the aircraft components, the same as all previous projects. Tier two partners integrated the components from tier three partners into systems and structures. Tier one partners (fifty firms in eleven countries), fabricated complete plane sections from the systems built by tier two partners. This model removed much of the labor intensive work in Everett. Everett final assembly was cut from thirty days to three. Japan is one of most important of these tier one system integrators. Three prominent firms are responsible for aircraft sections such as forward fuselage, wings and gear wells: Kawasaki, Mitsubishi, and Fuji.¹³² Initially Boeing's workers were thrilled about the 787 and prospect of gaining an advantage over Airbus, not yet aware of the full implications.¹³³

Boeing borrowed its three-tier model from Toyota, untested in the aerospace industry. Toyota had maintained tight control over design and engineering, whereas Boeing outsourced the design and engineering of subassembly process and tooling.¹³⁴ Toyota had successfully outsourced to a small group of trusted firms. These firms had already established a proven track

¹³¹ Tang, and Zimmerman. "Supply Chain Risks: The Boeing Case,"77. See page 81 for a chart that I modeled using theirs.

¹³² Ibid.,78. For a closer look into East Asia's role in Boeing production see John Bowen, "Global Production Networks, the Development State and the Articulation of Asia Pacific Economies in the Commercial Aircraft Industry." *Asia Pacific Viewpoint* 48, no. 3 (2007): 312-329.

¹³³ The implications being the 787 assembly plant in South Carolina, job loss, weakened union contacts, and increased work load repairing faulty fabrication. See footnotes 9-22. Also see Greenberg et al., *Turbulence*, 13. The study documents shifting worker feelings during study period, based upon where Boeing in the Business cycle.

¹³⁴ Stephen Denning, "What Went Wrong at Boeing?" *Forbes Magazine*, January 21, 2013. Denning is a premiere author on radical management, leadership, innovation, and business narrative. He wrote several stories on Boeing's 787 issues for Forbes and published an article in *Strategy & Leadership* under the same name.

record for their ability to deliver product with the required timeliness, quality, and cost.¹³⁵

Boeing fostered new partnerships with a large group of suppliers who were unproven at aircraft system integration. Boeing was overly optimistic about its ability to replicate the results from an entirely different industry.

The rise in outsourcing compared to past projects is striking. Boeing's best-selling aircraft, the 737, outsources 30% of production whereas the 787 program outsources 70%.¹³⁶ The suppliers, who traditionally had been sub-contractors, now shared in the project's financial risk. American, European, and Asian firms all paid high upfront dollar amounts. Each contributed to design, engineered the tooling and manufacturing process, and built factory space for assembly.¹³⁷ Suppliers in Italy, Korea, Australia, France, and England are all integral partners in the subassembly process. In the United States, important suppliers exist in Ohio, California, Kansas, and South Carolina (before Boeing purchase).¹³⁸ The only section of the aircraft fabricated in Puget Sound is the Tail fin, outside of Tacoma in Fredrickson, Washington.

The supply chain decreased local demand for unskilled to medium skilled labor. This is reflected in a comparison to the 777, Boeing's last major project. Jobs statewide for the 777 were 56,900, compared to 42,800 for the 787. While there are several reasons for this, such as technological sophistication, we can deduct the most direct reason to be outsourcing. In his *New York Times* column, Paul Krugman discusses outsourcing's effects of driving down labor demand and wages. "Fears that low-wage competition is driving down U.S. wages have a real basis in both theory and fact. When we import labor-intensive manufactured goods from the third

¹³⁵ Ibid.

¹³⁶ Christopher S. Tang and Joshua D. Zimmerman, "Managing New Product Development and Supply Chain Risks: The Boeing 787 Case," *Supply Chain Forum* 10, no. 2 (2009):77.

¹³⁷ Greenberg et al., *Turbulence*, 50.

¹³⁸ Tang and Zimmerman, "Supply Chain Risks: The Boeing Case," 78.

world instead of making them here, the result is reduced demand for less-educated American workers, which leads in turn to lower wages for these workers. And no, cheap consumer goods at Wal-Mart aren't adequate compensation."¹³⁹ Krugman does not believe U.S. protectionism and cutting off trade to be the answer. He notes the negative implications this would have on the global economy if other wealthy nations followed suit. However he does believe domestic policy, such as progressive taxation, may ameliorate rising income inequality.

CEO Jim McNerney and company strategists believed Boeing's cost sharing strategy would be enough to keep the 787 project on schedule and within budget. They demonstrated inadequate foresight into the logistical challenges of engineering and fabrication being spread globally. The first 787 was delivered to Japan's Nippon Airlines, September 26, 2011, approximately three years after projections. Another three years later, a myriad of production problems persist. At an annual investor's conference, McNerney sounded off. "I'm sounding like Darth Vader here. We have a no fly list across the company. If a certain group is not working with us ...they'll be on the no fly list. They'll not be allowed to bid on new programs with Boeing."¹⁴⁰ The comments reflect frustration with the suppliers Boeing had put such faith in.¹⁴¹

Production rates since the first plane came off the assembly line have fluctuated due to mechanical problems and supplier issues. To meet delivery quotas, they are being produced at the rate of 10 a month, the highest rate ever for a twin aisle commercial aircraft.¹⁴² Due to the

¹³⁹ Paul Krugman, "Divided Over Trade." *The New York Times* (New York: NY), May 14, 2007.

¹⁴⁰ Dominic Gates, "McNerney: Boeing will squeeze suppliers and cut jobs," *The Seattle Times*, May 22, 2013, http://seattletimes.com/html/businesstechnology/2021037931_boeingmcnerneyxml.html.

¹⁴¹ *Ibid.*

¹⁴² Dominic Gates, "assembly problems drag on Everett", *The Seattle Times*, February 3, 2014, http://seattletimes.com/html/businesstechnology/2022830424_boeingcharlestonxml.html.

planes three years of delays and operational issues, several major air carriers cancelled orders.¹⁴³ However this loss is being offset by dynamic growth in international air travel. The Middle East and Asia markets are placing the largest orders. Boeing projects the Asia Pacific will account for one-third of deliveries worldwide. Randy Tinseth, vice president of Marketing for Boeing Commercial Airplane says “this demand is driven by the fact that Asia Pacific will account for 44 percent of travel in 20 years’ time, up from around 34 percent today.”¹⁴⁴

Organizational Change

Pressure to increase outsourcing also came from outside management consulting firms. Boeing’s consultants saw that other corporations had success with this strategy, but failed to recognize the key differences of producing a technological marvel like a Dreamliner. Boeing specialist Jonathan Baskins explains the missing logic. “While this idea might make sense for sourcing coffee makers, it was a nonsense approach to assembling perhaps the most complicated and potentially dangerous machines shy of nuclear reactors.”¹⁴⁵ There are few products as complex as an aircraft, so one supplier’s mistake has devastating consequences.

Several of Boeing’s partners subcontracted work without Boeing’s knowledge. South Carolina’s Vought Enterprises, makers of the rear fuselages, was a main offender. Vought outsourced work to Advanced Integration Technology, causing delays. Boeing was unaware of issues, setting off a chain reaction of further delays. To fix the mistake, Boeing spent one billion buying out Vought’s share. Boeing eventually decided it would be efficient to build a final

¹⁴³ Ben Mutzaboagh, “Boeing hit by biggest-ever order cancellation,” *USA Today*, August 24, 2012. Qantas cancelled orders for 35 787 Dreamliners.

¹⁴⁴ “ News Releases/ Statements, Boeing Update: Asia Pacific to Account for One-Third of Airplane Deliveries Over Next 20 Years, *The Boeing Co.*, March 7, 2011, <http://boeing.mediaroom.com/index.php?s=20295&item=1650>. Boeing has 1,030 total orders from 60 customers worldwide. To date, only 115 have been delivered.

¹⁴⁵ Stephen Denning, “What went wrong at Boeing: Seven Lessons every CEO most learn,” 30-31.

assembly plant onsite.¹⁴⁶ This action sent shock waves through Boeing's Everett plant, raising machinists concerns over job security. A year after Vought's purchase, IAM 751 went on strike. In 2013, Boeing spent another one billion dollars to expand South Carolina production capabilities.¹⁴⁷

The problems that have occurred due production problems have doubled Boeing's 2004 projections of \$16 billion to \$32 billion. Included in this total was a payment of \$1.9 billion in advances to global suppliers. Not included however, is the penalty payments to suppliers and customers for three years of delays, a number harder to quantify.

In July of 2009, Boeing bought Vought's North Charleston operations for \$580 million.¹⁴⁸ In December, 2009, Boeing bought out Alenia's adjacent mid-fuselage assembly plant for an undisclosed amount, bringing what analysts believe the total costs to be \$1 billion. In October of the same year, not coincidentally, Boeing selected North Charleston to be the site of the second 787 assembly line.¹⁴⁹ While the site selection was a function of supply chain issues, the opportunity to construct planes with a non-unionized workforce was another large draw. At the time, Connie Kelliher, IAM representative said, the South Carolina workforce could not match the skill of the Puget Sound workforce. "Puget Sound has the highest productivity and the least amount of risk of any potential site where Boeing could build airplanes".¹⁵⁰

¹⁴⁶ Ibid.

¹⁴⁷ Bruce Smith, "Boeing plans \$1 billion expansion in S.C.," *USA Today*, April 9, 2013, <http://www.usatoday.com/story/money/business/2013/04/09/boeing-expansion-south-carolina/2066469/>.

¹⁴⁸ Dominic Gates, "Boeing's tab for the 787: \$32 billion and counting," *The Seattle Times*, September 24, 2011, http://seattletimes.com/html/businesstechnology/2016310096_787factbox25.html.

¹⁴⁹ "Boeing South Carolina," *The Boeing Co.*, Accessed May 5, 2014, <http://www.boeing.com/boeing/commercial/charleston/index.page?>

¹⁵⁰ Dominic Gates, "Boeing Exec: Charleston 787 plant could match Everett someday," *The Seattle Times*, June 8, 2011, http://seattletimes.com/html/businesstechnology/2015331150_airshowside19.html.

The 787 model of production removes Puget Sound inputs from Boeing's production function. Evidence is found when comparing the 787 to the 777, Boeing's last major project. Jobs statewide for the 777 were 56,900, while the 787 has 42,800.¹⁵¹ While there may be several reasons for this, I deduct a direct cause is aircraft sections assembled out of state and a final production plant in South Carolina. Tier one and tier two partners become component integrators, removing the amount of labor-intensive work necessary for assembly.¹⁵²

Despite a percentage of worker jobs being displaced, a sophisticated counterfactual analysis of outcomes would be necessary to quantify losses to the region. We may hypothesize that units of labor put into SC assembly plant would be allocated in to the Puget Sound economy, yet a Puget Sound economy of scale would lower need for equivalent ratio of workers, as the marginal product curve decreases.¹⁵³ Nonetheless, a surplus supply of low to medium skilled workers, coupled with the proliferation of lower wage workers creating production issues in South Carolina, 787 production methods likely didn't maximize economic gains for the Puget Sound economy. An even greater effect has been the precedent it sets for the labor force.

At the very least, there is a consensus that the 787 model of production was flawed. Development time went much longer than projected, various parts and systems were sub-standard, and customers were dissatisfied when orders could not be fulfilled. Yet it's hard to quantify the true economic impact from the data Boeing makes public.

¹⁵¹ "Aerospace Impact Analysis", *Washington Aerospace Partnership*, November, 2013:iv

¹⁵² Dominic Gates, "Boeing will squeeze suppliers, cut jobs," *The Seattle Times*, May 22, 2013.

¹⁵³ Adding labor input, marginal product will increase only up to a certain point, after which there will be decreasing returns. This is why I believe if S.C. units were brought to Washington, Boeing wouldn't need an equivalent number of workers.

Stock prices declined in the fourth quarter of 2013, with the announcement profits would grow less than analysts expected.¹⁵⁴ Nonetheless, Boeing is still profiting, with 1.23 billion in the fourth quarter of 2013.¹⁵⁵ Diversification and offsetting of costs through its other programs allow Boeing to continue profiting. Critical mistakes which create billions in cost overruns, removing local factors of production are not enough of an issue to face public scrutiny as long as shareholders are receiving their dividend checks.

Journal articles, news reports, and Boeing statistics and statements, provide unquestionable evidence that pervasive outsourcing and implementation of a three tier supply chain did more harm than good. For Boeing, qualifications to this assessment may be made in several years. Financially, Boeing may recover from the failed strategy, perhaps even reaping greater profits. Public perception on the other hand, may take longer to recover. In the past, Boeing Commercial had been known for a stellar safety record. The multitude of mechanical issues to in service 787s has increased public scrutiny. Fears have become heightened with news of issues like batteries catching on fire mid-flight. The 787 model's greatest implications are for Puget Sound workers. The global partnerships forged, and the South Carolina facility, have likely led to a permanent movement of some parts of the production process away from the region. In effect this has weakened local unions; having the trickle-down effect of decreased employment opportunities, benefit packages, and raising costs of attaining future production contracts.¹⁵⁶

¹⁵⁴ Joshua Freed, "Boeing Outlook sinks despite solid 4Q profit," *AP Seattle Times*, January 24, 2014, http://seattletimes.com/html/boeingaerospace/2022778412_apxearnsboeing.html.

¹⁵⁵ *Ibid.*

¹⁵⁶ Although wages are lower for engineers and machinists in South Carolina, having Boeing in the region is overall a huge benefit for the workers.

Chapter III

Impact on Boeing's Unions and Workers

The Puget Sound region and its workers have helped fuel Boeing's success for generations. In turn, our local economy has become increasingly reliant on the economic benefits it brings to the region. Boeing is Washington State's largest employer, with 85,000 employees

and a total of 172,000 employees across the nation.¹⁵⁷ This does not account for the thousands more employed at the 2,042 local suppliers and 650 aerospace related firms.¹⁵⁸ Although the region clearly is still the undisputed center of a robust aerospace industry, there is a steady outflow as disaggregation becomes a normative business practice. At Boeing, this pivot can first be traced to management's decision to move Boeing's corporate headquarters to Chicago in 2001. Currently, the fragmentation of production can be observed as a majority of the labor intensive work on the 787 is globally sourced, and one of two final assembly lines for the 787 is in South Carolina.¹⁵⁹

These decisions, as articulated by Boeing, are mostly being done as a means to cut labor costs, diversify, and stay competitive. States like South Carolina have right to work laws, providing access to workers at a lower cost. According to the Bureau of Labor Statistics, a South Carolina engineer makes 86% of what his or her Washington counterpart makes. For machinists, that number is even less. Yet a lower cost of living means these workers have an equivalent purchasing power.¹⁶⁰

To be clear, Local IAM 751 worker numbers have not diminished since Boeing launched the 787, but they haven't grown at the rate the union may have liked.¹⁶¹ Boeing workers haven't been impacted by extreme layoffs which have taken place historically, such as when the aerospace industry suffered a decline after the 9/11 tragedy, or in the 1970-71 downturn, when a

¹⁵⁷ Erin Bronkhorst, "Washington state employers: Who's biggest, and who's missing?" *Puget Sound Business Journal*, June 29, 2013, <http://www.bizjournals.com/seattle/news/2013/07/26/washington-states-largest-employers.html?page=all>.

¹⁵⁸ "Aerospace Economic Impact Study." *Washington Aerospace Partnership*. November, 2013. <http://www.washington-aerospace.com/EconomicImpacts.pdf>.

¹⁵⁹ John Bowen, *The Economic Geography of Air Transportation*, 33.

¹⁶⁰ "Cost of Living Calculator," *Bankrate.com*, accessed June 5, 2014, <http://www.bankrate.com/calculators/savings/moving-cost-of-living-calculator.aspx>.

¹⁶¹ Greenberg et al., *Turbulence*, 13. After the 787 project was announced, workers were excited about the orders flooding in. As the problems and job relocation continued, that positivity declined.

local billboard read “ will the last person leaving Seattle turn out the lights.”¹⁶² Nonetheless, harder to measure losses have put the labor unions on the defensive. Jobs being increasingly offshored has correlated to workers benefit losses and rising feelings of job insecurity.

A recent tactic taken up by Boeing was to have states compete against each other for the contract to build the 777X, Boeing newest highly-fuel efficient LCA.¹⁶³ This gave twenty-two states the opportunity to bring tens of thousands of jobs and billions of dollars in economic activity. States like California, South Carolina, Texas, and Utah had legislatures scrambling to pass spending packaged, with Boeing waiting to see who would offer the most generous tax incentives. As Missouri Governor Jay Nixon said, “Building this next-generation commercial aircraft in Missouri would create thousands of jobs across our state and secure our position as a hub for advanced aerospace manufacturing — and that’s why I am committed to competing for and winning this project.”¹⁶⁴ With state governments so hungry to bring economic activity to their region, and Washington wanting to hold on Boeing assembly jobs, IAM 751 workers were forced into concessions during collective bargaining.

In 2013, Governor Jay Inslee signed a spending package to ensure 777X jobs remained local.¹⁶⁵ Senate bill 5952 extended corporate tax breaks worth nearly \$9 billion. Senate bill 5953

¹⁶² “The Boeing Company, Dealing with Change,” *Boeing History Higher, Faster, Farther, 1970-1976*, Accessed May, 2014, <http://www.boeing.com/boeing/history/narrative/n070boe.page>.

¹⁶³ Brian M. Rosenthal, “ States salivating for 777x feast,” *The Seattle Times*, November 19, 2013, http://seattletimes.com/html/localnews/2022293812_boeingotherstatesxml.html.

¹⁶⁴ Reid Wilson, “States competing for Boeing 777X jobs project,” *The Washington Post*, November 30, 2013, http://www.washingtonpost.com/politics/states-competing-for-boeing-777x-jobs-project/2013/11/30/6359a252-59dd-11e3-ba82-16ed03681809_story.html.

¹⁶⁵ “ Aerospace Economic Impact Study.” *Washington Aerospace Partnership*. November, 2013. <http://www.washington-aerospace.com/EconomicImpacts.pdf>.

“The Washington Aerospace Industry Strategy.” Governor’s Office of Aerospace. May 2013. http://www.governor.wa.gov/issues/economy/aerospace/Industry_Strategy.pdf.

The WAP is a collaboration between local business, labor, and government, each with an interest in keeping aerospace in the region. The group has the support of Governor Jay Inslee, who has been an advocate on behalf of the aerospace industry. He spoke at Local IAM 751’s annual conference last spring. Also is responsible

provided an additional eight million in general fund money to increase enrollment in aerospace programs at local technical and community colleges.¹⁶⁶ Local government has been willing to provide generous subsidies, yet workers aren't feeling reciprocation in the form of wages and benefits from Boeing.

Boeing's earlier action of building an assembly plant in South Carolina left Puget Sound workers feeling their labor rights were violated. IAM District 751 filed a complaint with the National Labor Relations Board in 2010. They alleged the move was retaliation for past strikes, a violation of the National Labor Relations Act.¹⁶⁷ Evidence in the complaint included statements to Seattle media made by CEO Jim McNerney and Boeing Commercial CEO James Albaugh. In a March 2010 *Seattle Times* interview, Albaugh stated the company needed to "insure stability and read stability as getting away from the frequent strikes we were having."¹⁶⁸ In response, Boeing denied the statements were even made.¹⁶⁹

Boeing's CEO Jim McNerney is noted in section 6(a) of the NLRB complaint as saying the move of 787 Dreamliner work to South Carolina was "due to strikes happening every three to

for developing the Aerospace Industry Strategy. The AIS is designed to help keep a robust industry, through funding and planning in infrastructure, education, R&D, FDI, etc. This includes incentivizing our local 1,250 aerospace related firms.

¹⁶⁶ "SB 5952, SB 5953 2013-2014," *Washington State Legislature*, May 15, 2014, <http://apps.leg.wa.gov/billinfo/summary.aspx?bill=5953&year=2014>.

¹⁶⁷ "National Labor Relations Act", *National Labor Relations Board*, Accessed May 2014, <http://www.nlr.gov/national-labor-relations-act>.

¹⁶⁸ IAM Leaders, "NLRB v. Boeing", *YouTube*, May 27, 2011, <http://www.youtube.com/watch?v=RjSGvhcKOoQ>.

¹⁶⁹ *Ibid.*

four years in Puget Sound.”¹⁷⁰ McNerney’s statements back IAM’s claim that past striking is the fundamental cause for the move.¹⁷¹

Sections 6(b) and 6(c) of the NLRB complaint also provide evidence that the move to South Carolina was retaliation for past IAM strikes. Section 6(b) contains a memorandum in which Boeing informed employees that its decision was made “in order to reduce Respondent’s vulnerability to delivery disruptions caused by work stoppages.”¹⁷² Work stoppages came from IAM 751 strikes in 2005 and 2008.¹⁷³

Section 6c of the complaint refers to an article in the *Puget Sound Business Journal*, where Boeing management says “dual sourcing (assembly line in Everett, line in South Carolina) as a way to “maintain production stability and be a reliable supplier to our customers.”¹⁷⁴ These statements display the primary cause for Boeing’s move the actions by IAM 751 protected under the National Labor Relations Act.

The complaint reached acting general counsel of the NLRB, Lafe Solomon, on April, 2011. This brought the conflict in to the national spotlight. Solomon stated Boeing violated sections 7, 8, and 13 of the National Labor Relations Act. This includes the right to bargain collectively, not interfering or discriminating in the exercise of that right, and not interfering or impeding the right to strike.¹⁷⁵

¹⁷⁰ “Official NLRB Complaint, Boeing and IAM&AW 751,” *National Labor Relations Board*, April 20, 2011, http://www.iam751.org/artwork/2011_04_20%20Complaint%20&%20Notice%20of%20Hearing.pdf.

¹⁷¹ IAM Leaders, “NLRB v. Boeing,” *YouTube*, May 27, 2011, <http://www.youtube.com/watch?v=RjSGvhcKOoQ>.

¹⁷² *Ibid*.

¹⁷³ Dominic Gates, “Simmering Boeing strike scorching both sides,” *The Seattle Times*, September 29, 2008, http://seattletimes.com/html/boeingaerospace/2008212140_boeing29.html.

¹⁷⁴ IAM Leaders, “NLRB v. Boeing,” *YouTube*, May 27, 2011, <http://www.youtube.com/watch?v=RjSGvhcKOoQ>.

¹⁷⁵ Official NLRB Complaint, April 20, 2011.

While labor experts believed the NLRB would win the case, the preferred outcome for both parties was that IAM and Boeing reach a settlement. In December 2011, IAM ratified a four year contract extension, with 73% of the union members voting in favor.¹⁷⁶ The trade-off for machinists dropping the complaint was a signing bonus, preserved pension for new hires, and 2% wage increase annually.¹⁷⁷ Most importantly to winning approval was the job security in securing the building of the 737 MAX in Renton, Washington.

The NLRB counsel was satisfied with the outcome. Acting General Life Solomon said, “I have worked with the parties to encourage settlement in the hope of avoiding costly litigation.”¹⁷⁸ Governor Inslee, who was a keynote speaker at the 2013 International Association of Machinists & Aerospace Workers’ conference in Seattle, thanked the IAM for securing the contract. “The agreement you negotiated means thousands of aerospace jobs here in my state, every aerospace job is a win for every family in my state.”¹⁷⁹ There was a lot of pressure for an agreement to be secured. I believe this legitimized the movement of jobs due to strikes.

I asked Connie Kelliher Local IAM 751 communications and media representative if contract approval meant they were in effect dismissing allegations leveled against Boeing. I raised this question as I saw a wealth of criticism toward Boeing by IAM officials, then immediate silence following the ratification. Kelliher told me they still maintain Dreamliner production in South Carolina was illegal. However, their number one priority is jobs. They had

¹⁷⁶“Machinists Approve Four Year Contract extension,” *NorthwestLaborPress*, Dec 11, 2011, <http://nwlaborpress.org/2011/12/iam-4/>.

¹⁷⁷ Although the 2011 agreement was able to preserve pensions, the subsequent 2014 agreement would end them for IAM 751 new hires..

¹⁷⁸ Stephen Greenhouse, “Labor Board Drops Case Against Boeing After Union Reaches Accord,” *New York Times*, Dec 9, 2011. http://www.nytimes.com/2011/12/10/business/labor-board-drops-case-against-boeing.html?_r=0.

¹⁷⁹ Bryan Corliss “Inslee thanks IAM for 737 MAX, vows to land 777-X,” *Machinist News*, April 16, 2013, <http://iam751.wordpress.com/2013/04/16/inslee-thanks-iam-for-737-max-deal-vows-to-land-777-x/>.

the option of possibly waiting years for a resolution and risk losing more jobs, or concede the new plant opening and secure jobs for years to come.¹⁸⁰

The relationship between IAM 751 and Boeing has remained contentious. There is strong rationale for IAM 751 reaching a resolution with Boeing, yet it's another troubling example of corporate actions in a deregulated economy. While the IAM may have secured jobs in the immediate future, it's important to look at the precedent being set. It weakened the NLRA and made it much easier for corporations to continue to violate labor laws.

I interviewed my friend Amanda Eckerson, IAM 751 union member and employee of Boeing on the 767 line in Everett. I also conducted a brief interview with Anthony, a union steward on the same line. Both were involved in the 2008 strike and tell me the work culture at the Everett Boeing plant is one in which rumor and uncertainty runs rampant. Both expressed frustration with not being aware of management's decision. Amanda stated, "most the time I hear things on the news first."¹⁸¹

Dana Cloud, who completed an academic study on Boeing's unions, implicates IAM leadership for making concessions with Boeing. Cloud argues that rank and file members need to "agitate for greater union democracy, accountability, and militancy," which are "crucial to the fight to restore the power of unions."¹⁸² To put her argument in context, her narrative largely centers on the 1995 IAM strike, a downtime in the business cycle and with mass layoffs at

¹⁸⁰ Connie Kelliher Interview, May 2013.

¹⁸¹ Amanda Eckerson and Anthony, interview on employment with Boeing and relationship with union, May 2013.

¹⁸² Dana Cloud, *We Are the Union*, 3.

Boeing. Cloud tells of IAM's militant history, with leadership consistently making concessions unless the rank and file put up a resistance.¹⁸³

Conservative reaction to the NLRB complaint was boisterous. After the election of Barack Obama, the board increased the enforcement of labor law, not properly carried out for decades. Politicians then attacked the NLRB for hurting "job creation." Senator Lindsey Graham of South Carolina said "I can't think of a more damaging way to hurt job creation than for this complaint to be successful."¹⁸⁴ In 2011, twenty-five bills and amendments were introduced in to Congress related to the NLRB. State Representative Tom Price of Georgia said that cutting the agency "can save taxpayer dollars and help protect American job creators from an out-of-control agency."¹⁸⁵ This kind of continual rhetoric seems to be a standard conservative paradigm. But when we look at history, there is a correlation between GDP growth being the highest when union membership was at its peak post World War II.

The NLRB is an important counterweight to large corporations like Boeing. It is one of the few federal institutions responsible for protecting the interests of the workers. Prior to the New Deal in the late 19th century to the 1920s, we see the high levels of inequality existing without its hand enforcing fair labor practices. IAM 751 should have the ability to strike without retaliation and Boeing moving jobs out of state. This not only adheres to the law as written in NLRA section 8(a)3, I believe it is fundamental to sustaining fair wages, benefits, and a robust

¹⁸³ *Ibid.*, 12-14, 16-20.

¹⁸⁴ "GOP Presses NLRB to Drop Case against Boeing, as Dems Accuse Company of Flouting Law," *Fox News*, June 17, 2011, <http://www.foxnews.com/politics/2011/06/17/gop-presses-nlr-to-drop-union-complaint-against-boeing/>.

¹⁸⁵ Melanie Trottman "NLRB Defunding Fails But Agency Remains GOP Target," *The Washington Post*, February 17, 2011, <http://blogs.wsj.com/washwire/2011/02/17/nlr-defunding-fails-but-agency-remains-gop-target/>.

middle class. Political backlash against the NLRB, followed by IAM 751s forced compromise, set a precedent for further production outflow from the Puget Sound.

Worker's Lived Experiences

Boeing's shifting values may best be understood by looking into the lives of actual Boeing workers. I conducted four informal conversations with men and women representing each of Boeing's unions. They aren't all directly tied to the specific case study of the 787 Dreamliner, its production problems, and the conflict resulting from the assembly line opening in Charleston, South Carolina. Nonetheless, each in some form has been affected by Boeing's altered production practices. While a rigorous set of structured interviews may seem the most appropriate way to extrapolate facts of the case, I found this approach made potential interviewees disinclined to participate. To get around this obstacle, I simply asked "do you mind talking to me for a few minutes about your experience at Boeing". This tact produced better results.¹⁸⁶

The men and women represent workers from SPEEA Local 2001 and IAM District 751, Boeing's two major unions. The first is a retired Boeing engineer from SPEEA Local 2001. Two are District 751 machinists who work on the 767 assembly line in Everett, Washington. The final participant is a union representative from IAM 751. Both unions have been affected by production movement, loss of benefits, and job insecurity. The objective was to get their understanding of the politics of Boeing's changing production methods. What are the institutional apparatuses allowing Boeing to seek out states for un-unionized labor and lucrative tax incentives? Most importantly, I wanted to know their thoughts about the opening of the 787

¹⁸⁶ I conducted four unstructured interviews in May, 2013. I did a follow up with Walid Mseitif April, 2014. I based my line of questioning from interviews and reasoning found in Greenberg et al., *Turbulence*, 2010, and Dana Cloud, *We Are the Union*, 2011.

Dreamliner assembly plant in Charleston, South Carolina, and what they believed it meant for the future of Boeing commercial aircraft production in the Puget Sound. Their insider perspective helps showcase the levels of uncertainty workers are actually feeling, their faith the unions are working in their best interest, and faith that the remaining jobs will stay secure. Each conversation shined light on the research problem from different angles.

Walid Mseitif

Walid Mseitif's narrative demonstrates how the Boeing Company has attracted a diverse population to the Puget Sound region. Born in 1948, Walid was raised in Beirut, Lebanon with his mother, father, two brothers, and two sisters. Growing up, he was fascinated with mechanics and the sky. He enjoyed building rockets, carpentry, and experimenting with his chemical set. He told me of lifelong reoccurring dreams in which he is flying like a bird. I suppose it's no surprise then that he came to Seattle to take part in the process of engineering aeronautical birds. In the summers of his teenage years, he worked with his father at the world class Hotel St. George.¹⁸⁷ As cliché as it may sound, he grew up with the belief that the United States was indeed the land of opportunity, where he could work hard and make a better life for himself. After being issued a student visa in 1970, he came to Seattle, Washington to study engineering. Walid spent the first two years at Seattle Center Community College. He then went on to the University of Washington and earned a B.S. in Chemical Engineering, and later a B.S. and M.S. in Aeronautical Engineering. While many of his peers would go to other companies, Walid joined Puget Sound's largest employer of engineers, the Boeing Company.

¹⁸⁷Edgar O'Ballance, *Civil War in Lebanon, 1975-92* (London: Palgrave Macmillan, 1998), 27-37. Hotel Saint George was turned to ruins in the early years of the Lebanese Civil War

Walid, was the first in his family to come to the United States. He came just before the fifteen year Lebanese Civil War, which destroyed much of Beirut. The Hotel St. George was in ruins, as rocket and artillery fire took place between Christians, Leftist Muslims, and PLO fighters. Eventually, all his family would follow and settle in the Puget Sound. His father and mother were the last to come in 1981.

Walid spent his career in several different plants and offices, dependent on the projects Boeing had in development. He had the opportunity to work for both of Boeing's main divisions, Boeing Space&Defense and Boeing Commercial. His first plant was on Admiral Way in South Seattle, near the site where William Boeing built his first aircraft.¹⁸⁸ Other locations he worked included Kent, Renton, and Auburn. For the majority of his career and during the 1990s transition to lean manufacturing techniques, he was part of a Space&Defense group in manufacturing, research, and development (MR&D). Once Boeing began to adopt computer software and information technology, Walid underwent training which making the job more efficient. Growing disillusioned with the layoffs taking place as Boeing underwent its organization transition, he transferred out of Boeing Space& Defense and spent his last five years at Boeing Commercial.

While on the one hand Walid feels nostalgic for his early days at Boeing, feeling the effects of management's cost cutting measures in the 1990s tempered his love for the company and the workplace environment. A cultural shift created a divide between the engineers and management. Boeing took a particularly aggressive approach toward cutting costs in the late 1990s as Airbus overtook Boeing in the commercial aircraft market. Boeing's market share

¹⁸⁸ "History, The Beginnings: 1903-1926: 1903-1926", *The Boeing Co.*, Accessed May, 2014, <http://www.boeing.com/boeing/history/narrative/n003boe.page>.

dropped from 70% to 40% during the time period.¹⁸⁹ Meanwhile, Boeing had financially overextended itself in the 1997 merger with McDonnell Douglas. To add further challenges, the 2001 9/11 attacks devastated the industry. In order to meet the challenges, management set “economic profit goals.”¹⁹⁰ This meant implementing more efficient lean production techniques. Boeing significantly cut the number of engineers while ramping up outsourcing. Implementing lean production techniques, coupled with a desire to recover market share, were factors culminating in the development of the 787.¹⁹¹

Walid’s group in MR&D was directly affected by the financial challenges Boeing faced in the 1990s. He had seen layoffs in the past, but nothing rivaling what occurred in 1999 and 2000. “Thirty to 40% of my group were either laid off or fired. I had to justify any projects moving forward.”¹⁹² Watching his coworkers whom he had worked many years with walk out the door was unsettling. Fortunately for Walid, seniority meant his chances of being let go were minimal. The new office environment put a lot of pressure on Walid and his coworkers. He spent the time span before his transfer to Boeing Commercial constantly stressed.

The large cuts in Walid’s group align with empirical data showing 480 million dollars in cuts to R&D from 1997-2000.¹⁹³ These changes effected how engineers perceived Boeing.

¹⁸⁹ Woodruff, Imberman, “Why Engineers Strike: The Boeing Story”. *Business Horizons* 44, no. 6 (2001):37. Article gives SPEEAs history and militancy after affiliating with IFPTE and AFL-CIO. Details management miscalculation of engineer’s willingness to strike and cultural shift precipitating 2001 strike.

¹⁹⁰ *Ibid.*, 36.

¹⁹¹ Christopher Tang, and Joshua Zimmerman, “Supply Chain Risks: Boeing 787 Case,” 75.

¹⁹² Walid Mseitif Phone Interview, April 17, 2014. Was in group 4 (Metal, Composite, and Welding), of 5 in Boeing Manufacturing, Research, and Development, Grady Way, Renton WA.

¹⁹³ Woodruff Imberman, “Why Engineers Strike: The Boeing Story,” *Business Horizons* 44, no. 6 (2002): 37, <http://www.imbdef.com/wp-content/uploads/2011/09/Article-282-Why-Engineers-Strike-The-Boeing-Story.pdf>. 37. R&D funds were cut from \$1.92 billion in 1997 to \$ 1.44 billion in 2000.

“Upset by management’s financial emphasis, the engineering community perceived a loss of status, feeling that their contributions were not as greatly valued as in the past.”¹⁹⁴

SPEEA Local 2001 doesn’t have the rich tradition of strikes found in IAM District 751, but the production changes in the 1990s pivoted the union in a more militant direction. In Dana Cloud’s study on democratic unionism at Boeing, she sees militant action as the only way rank and file will keep unions thriving.¹⁹⁵ I talked with Walid about his first and only strike in 1999. This was the same year SPEEA workers voted to join AFL-CIO. Of crucial importance, was concern over management decisions and health insurance. The unprecedented strike lasted for forty days, going into the year 2001.

Walid expressed satisfaction with the outcome of the strike, and how it created a strong cohesion with his union brothers and sisters. It was unique in that it was rare for knowledge-based workers to strike in any industry. Boeing made concessions after 40 days of picketing; at a high cost to the company.¹⁹⁶

During the same period as the strike, Greenberg et al. says Boeing was shifting from the era of value creation to the era of shareholder value.¹⁹⁷ What had been a focus on engineering the highest quality products possible, now centered on ensured the greatest returns for investors. Walid saw many of his coworkers let go during this time, while also feeling the workplace culture move from a collective effort to highly competitive and cut throat. Maximization of profits at all costs, including sacrificing the quality of products being produced, became the normative. SPEEA’s Executive Director says

¹⁹⁴ Ibid.

¹⁹⁵ Dana Cloud, *We Are the Union*, 3.

¹⁹⁶ Ibid.

¹⁹⁷ Greenberg et al., *Turbulence*, 13.

Despite genuine efforts to repair and enhance the relationship following SPEEA's 40-day strike, another fundamental rift emerged around the business model for the airplane that eventually became the 787. Management ignored the concerns of the engineering and technical workforce and adopted an outsourcing business model that came close to bankrupting Boeing.¹⁹⁸

Walid witnessed many scale large changes during his time at Boeing, culminating in the development of the 787 Dreamliner. His hope along with all local workers is that Boeing will curtail further outsourcing of engineering and production.

Amanda Eckerson

Amanda, a Boeing machinist on the 767 assembly line, is a prime example of how Boeing jobs benefits those from various socio-economic backgrounds. She grew up in Kent, Washington, with her mom and younger brother. Her mom worked construction, and frequently had no work.

Life was not easy for the family. Amanda's mom was consumed with an addiction, leaving Amanda to care for her little brother, Jesse. These circumstances didn't afford her the opportunity to go past a high school education. At the time, Amanda was working low wage restaurant jobs near her home. Things became especially tough when she was in her early 20s. Amanda lost her mom to addiction. To better her circumstances, Amanda began searching out options for living wage employment.¹⁹⁹ Amanda was lucky to be near a company which provided living wage employment without the need higher education.

¹⁹⁸ Ray Goforth, "Putting negotiations in perspective," *SPEEA Local 2001 Puget Sound Prof and Tech Negotiations*, Accessed April 17, 2014, http://www.speea.org/Bargaining_Units/PS%202012/Article_Archive/Putting_negotiations_in_perspective.html.

¹⁹⁹ Amanda Eckerson Telephone Interview, May, 2013.

Amanda went to work for Boeing Commercial in 2007. The following year she took part in the 2008 IAM 751 strike. The strike was in response to the increase in outsourcing, concern over losing jobs, and benefits.²⁰⁰ A central issue for the machinists was Boeing's use of contracted work. In the past the work had been done by unionized workers.²⁰¹ Amanda described the striking as unsettling. Her concern was less on contract workers and more on her fears (real or imagined), the eight week strike may put her out of a job. She also worried over losing her pay during the strike. The strike eventually ended with Boeing agreeing to stop outsourcing disputed positions, preserve health benefits, and to a four year pay increase.²⁰² The workers were happy with the resolution and considered it a win.

Several of Amanda's extended family members work for, or had previously worked for Boeing. This included her grandma, aunts, and dad. Each had participated in past IAM strikes. Amanda went out on the picket lines with her Dad during the 2008 strike. Each member was employed at the Boeing Everett Plant, where the 747, 767, 777, and 787 Dreamliner are all built.

Amanda works on the 767 assembly line, of which the 787 was developed to eventually replace.²⁰³ With much of her family working for Boeing, she knew from a young age that it would likely be her best opportunity. Earning a middle class income with benefits, Amanda was able to change her living circumstances. When her younger brother ran in to trouble, Amanda was able to take him in and provide him food and shelter until he could get back on his feet. Having the United States largest exporting manufacturer in the region has been instrumental in sustaining economic security for Amanda's family and thousands of other families like hers.

²⁰⁰ Ibid.

²⁰¹ Eve Tahmincioglu, Union says Boeing strike is about contractors", *NBC News*, September 9, 2008, <http://www.nbcnews.com/id/26647110/#.U3J5UbVOXIU>.

²⁰² Darin Hoop, "Boeing strike ends in Union win, *The Socialist Worker*, November 4, 2008, <http://socialistworker.org/2008/11/04/boeing-strike-ends-in-win>.

²⁰³ "History of Boeing and the Everett site," Boeing Commercial Airplanes", accessed April 8, 2014, <http://www.boeing.com/boeing/commercial/facilities/index.page>.

Amanda and her coworkers on the shop floor have seen job security and benefits slowly eroding. Labor disputes between Boeing and IAM 751 are certainly nothing new, it's just the stakes are now higher. IAM 751 is known as a militant union. The 2011 contract dispute added a new dynamic. Central to the dispute was Boeing opening a 787 assembly in South Carolina. Boeing management said the company couldn't afford the "frequent IAM strikes."²⁰⁴

Boeing wanted to resolve the NLRB complaint taken up against Boeing for opening production in non-unionized South Carolina. To do so, they offered the machinists a generous signing bonus, pay increase, and assurances the 737 MAX would be built in Renton, WA. This proved to be a dilemma for machinists. Each decision had its tradeoffs. If they approved the contract, it legitimized Boeing's movement of production to the non-unionized South. The collective bargaining agreement entailed IAM 751 ask the NLRB to drop the complaint. If the workers didn't approve the contract, Boeing could withdraw bonuses, pay increase, and assurance the 737 Max would be built locally. On top of that, the NLRB litigation could take years to play out.

For Amanda, the politics of the issue were not at the forefront. It was in her self-interest to take the deal Boeing offered. Amanda said she felt she had the agency to prevent passage, while simultaneously unclear if union officials were acting in the workers best interest. Amanda and her coworkers conceded the loss to South Carolina, and in doing so, at least insured their future at Boeing and the building of the 737 MAX.

Anthony

²⁰⁴ "Boeing Complaint Background," *The National Labor Relations Board*, Accessed May 13, 2014, <http://www.nlr.gov/news-outreach/fact-sheets/fact-sheet-archives/boeing-complaint-fact-sheet/boeing-complaint>.

Anthony, a District 751 shop steward on the 767 assembly line, provides further insight into the attitudes and opinions of the machinists on the shop floor.²⁰⁵ As a democratically elected steward, it's his duty to act in the interest of the rank and file. He must know and articulate the details of collective bargaining agreements, especially important when the agreements are coming up for a vote. In addition, if workers have any grievances with Boeing, Anthony will act as an intermediary. Given his position, he's plugged in to management's actions, positions taken by union leadership, and details of the contracts. My inquiry was in to his perception on Boeing's 787 assembly plant opening in Charleston, and the contract extension which led the National Labor Relations Board to drop the case against Boeing.

Literature on the Charleston, South Carolina assembly plant present evidence it was a financial mistake.²⁰⁶ Other reports suggest Boeing knew it to be a risky decision.²⁰⁷ Furthermore, the NLRB complaint shows Boeing opened the plant simply as retaliation for past strikes.²⁰⁸ I wanted Anthony's assessment, why did he believe the decision was made, and does he believe the decision have negative implication for him and his coworkers?

Anthony takes the statements made by Boeing CEO Jim McNerney, and former Boeing Commercial CEO James Albaugh at face value. The pair both made statements to Seattle media about limiting the impact of strikes. He concurs with the NLRB opinion that these statements

²⁰⁵ Anthony, telephone interview, May 2013. Discussed duties as shop steward, 787 assembly plant opening in Charleston, South Carolina, and NLRB complaint .

²⁰⁶ Denning, Stephen, "Boeing's Offshoring Woes: Seven Lessons every CEO Must Learn," *Strategy and Leadership* 41, no. 3 (2013): 29.

Daniel Ferry. "Will the 787 Dreamliner Be Profitable at Last?", *The Motley Fool*, October 24, 2013. <http://www.fool.com/investing/general/2013/10/24/will-the-787-dreamliner-be-profitable-at-last-for.aspx>.

²⁰⁷ "Documents show Boeing saw Charleston as riskiest option for 787", IAM 751. November, 2011. <http://www.iam751.org/pages/news/9262011.html>.

²⁰⁸ "National Labor Relations Board Complaint and Notice of Hearing", NLRB Region 19. April 20, 2011. http://www.nlr.gov/sites/default/files/attachments/basic-page/node-3310/cpt_19-ca-032431_boeing__4-20-2011_complaint_and_not_hrg.pdf. The complaint includes the direct quotes by Boeing CEO made to the Seattle Times which led the IAM 751 to file with the NLRB.

violated the National Labor Relations Act. In other words, Anthony believed the move was illegal. At the same time, he indicated making a yes vote on the contract which dropped the complaint.²⁰⁹ The contract, which provided a signing bonus, secured the 737 Max, and other incentives. For Anthony, this held greater weight than the potential for the second 787 line to be forced back to Seattle. Anthony and Amanda both are in agreement, that while it's unsettling to see manufacturing move out of state, it was in their best interest to secure the contract. Working in the bustling hub of the Everett factory, it's hard for them to envision aerospace manufacturing completely disappearing.

Connie Kelliher

In spring of 2013 I had the opportunity to talk with Connie Kelliher, IAM 751's communication director and editor of the "Aero Mechanic Newspaper." She is often quoted in the local media, addressing the interests of the union pertaining to conflicts against Boeing. These conflicts include issues that can range to collective bargaining disagreements, strikes, and Boeing's production decisions.²¹⁰

My objective for engaging Connie Kelliher was to understand what led to IAM 751's decision to endorse the ratification of the 2011 contract extension. With the approval of a four-year contract extension, the union agreed to withdraw allegations that Boeing built a nonunionized assembly plant in South Carolina as retaliation for past strikes.²¹¹ As found in the NLRB complaint, it's clear that Lafe Solomon agreed with the machinists and the likely outcome

²⁰⁹ "Machinists approve four-year extension with Boeing", Northwest Labor Press Org. December 8, 2011, <http://nwlaborpress.org/2011/12/iam-4/>.

²¹⁰ Connie Kelliher telephone interview, May 2013.

²¹¹ Sam Hananel, "NLRB withdraws Boeing complaint," *The Seattle Times*, December 9, 2011, http://seattletimes.com/html/business/technology/2016975346_nlr10.html.

would be the second assembly line would return to Everett. The return of the assembly line to Washington State would be an economic boost to the region and to the union. So why did the union's position change?

Connie told me the union's number one concern is jobs. The 2011 contract extension provided assurance of the new 737 Max being assembled locally. The Boeing Company has sold more 737s than any other aircraft. They had a tradeoff to make. The possibility of waiting years for a resolution and risk losing more jobs, or concede the new plant opening and secure jobs for years to come. Connie told me it was a tough decision, but politically more practical.

Although Local 751 conceded on the opening of a second 787 line in Charleston, Connie stated that the move was illegal retaliation. Furthermore, she calls it an extension of the failed policies that put the project billions over budget and three years behind schedule.²¹² In 2011, Boeing admitted decisions on the 787 line were flawed. At a Seattle University speech, Boeing Commercial CEO James Albaugh said "We spent a lot more money in trying to recover than we ever would have spent if we'd tried to keep the key technologies closer to home."²¹³ While the machinists must feel some vindication in Mr. Albaugh's acknowledgement, Boeing isn't curtailing further spending out of state. In 2013, Boeing announced an additional billion dollar expansion to the Charleston plant.²¹⁴

Jim Albaugh's statements make it appear the company initially thought its South Carolina strategy would be successful. However documents obtained by IAM 751 reveal Boeing

²¹² Connie Kelliher Interview May 2011. For a quantitative example of the costs associated with move see Dominic Gates, "Boeing celebrates 787 delivery as program's costs top \$32 billion," *The Seattle Times*, September 24, 2011, http://seattletimes.com/html/business/technology/2016310102_boeing25.html.

²¹³ Seattle Times Business Staff, "A 'prescient' warning to Boeing on 787 trouble," *The Seattle Times*, February 5, 2011, http://seattletimes.com/html/sundaybuzz/2014125414_sundaybuzz06.html.

²¹⁴ Bruce Smith, "Boeing Plans 1 Billion Dollar Expansion in South Carolina," *USA Today*, April 9, 2013. <http://www.usatoday.com/story/money/business/2013/04/09/boeing-expansion-south-carolina/2066469/>.

was aware that opening a 787 plant in South Carolina was a high risk option and likely to have negative consequences for the company.²¹⁵ The report states that the Charleston plant's cost of 1.5-2 billion would be significantly more than the cost of staying in Everett. It goes on to say the non-unionized workers would not be as productive as local machinists, and the project would suffer "skill dilution" from workers and management being spread across two sites.²¹⁶

The documents came as no surprise to Connie. "The Project Gemini documents prove what we've suspected all along – that Boeing moved to Charleston to punish our members for exercising their union rights."²¹⁷ Boeing's decision to move production away from the Puget Sound confirms its willingness to take initial losses in order to weaken union strength. Taking a loss at the time of initial investment may be a way for the company to reap greater profits in the future, avoiding strikes and costs of union wages. It sets a precedent: create work stoppages with strikes and we will take production elsewhere.

The decision to open the second 787 line in Charleston reflects the current culture at Boeing and America's corporate culture in general. Creating shareholder value is the main objective, while providing the workforce with job security, wages, and benefits is but a secondary concern.²¹⁸ Greenberg et al. believe this is due to structural forces at work in the economy. The only remedy is the federal government stepping in to protect and sustain workers.²¹⁹

²¹⁵ "Documents show Boeing saw Charleston as riskiest option for 787". *IAM 751*. November, 2011, <http://www.iam751.org/pages/news/9262011.html>

²¹⁶ *Ibid.*

²¹⁷ *Ibid.*

²¹⁸ Greenberg et al., *Turbulence: Boeing and the State of American Workers and Managers*, 13.

²¹⁹ *Ibid.*, 17.

As of 2014, the federal government isn't doing a lot to prevent Boeing's movement away from unionized labor. In 2013, Boeing pitted states against each other for the building of the 777X. Twenty-two states submitted contracts offering millions in tax breaks and other incentives.²²⁰ Governor Jay Inslee has been lobbying to keep Boeing in the region, and was instrumental in helping an 8.7 billion dollar package pass through the Washington legislature.²²¹ Yet despite the state offering Boeing generous incentives, Boeing still asked the machinists to ratify a contract which would end pensions for new hires.²²²

With Governor Inslee asking the machinists to ratify the contracts, the union was once again faced with a difficult decision. Voting yes would have financial consequences for the next generation of workers, while voting no opened the potential for the 777X to be built elsewhere. This predicament illustrates the ways in which a corporate friendly free market is pressuring the Puget Sound region and its workers. Kelliher called forcing the contract on workers under threat of moving the 777X "corporate extortion."²²³

Because Boeing executives had already shown the willingness to move commercial aircraft production out of state on the 787 Dreamliner, the union was divided over passing the contract. Local union leaders called for his resignation of IAM President Tom Wroblewski, after

²²⁰ Bachman, Justin, "Six Lessons from Boeing's Big Contract Victory," *Bloomberg Business Week*, January 9, 2014, <http://www.businessweek.com/articles/2014-01-09/boeings-victory-in-labor-fight-hurts-pensions-helps-the-777x>.

²²¹ "The Washington Aerospace Industry Strategy", *Governor's Office of Aerospace*, May 2013, http://www.governor.wa.gov/issues/economy/aerospace/Industry_Strategy.pdf.

Salerno, Christina, "UPDATED: Washington Legislature approves two Boeing-related bills on third day of special session", *The Capitol Record*, November 9, 2013. <http://capitolrecord.tvw.org/2013/11/washington-state-senate-approves-two-boeing-related-bills-on-third-day-of-special-session/#.U0zO7bVOXIV>.

²²² Bachman, Justin, "Six Lessons From Boeing's Big Contract Victory", January 9, 2014.

²²³ Doug Cunningham, "Extremely Upset IAM District 751 Workers File NLRB Charges, Demand Re-Vote On Boeing 'Corporate Extortion Plan'", *Workers Independent Radio*, January 7, 2014, <http://laborradio.org/2014/01/-extortion-plan/>.

he urged a yes vote.²²⁴The end result was a slim majority of 51% of the machinists voting to pass the bill. “When the result was announced inside the Seattle union hall filled with militant Machinists who opposed the contract, some men and women wiped away tears and a few cried openly.”²²⁵ Many machinists found it hard to accept its passage, especially after working so hard to preserve pensions during the 2005 and 2008 strikes. Dana Cloud argues that rank and file opposition to union leadership is crucial to restoring the power of unions, what she calls “loyal opposition.”²²⁶ In the case of the 2014 contract, IAM leadership defeated union democracy by voting at a strategic time. Kelliher contested the results, stating 25% of the members were unable to vote due to being away on holiday vacation.²²⁷ Asking Connie how she felt about the relationship between Boeing and the union, she said “we can’t ever let our guards down.”²²⁸

CONCLUSION

Issues are still unfolding with the 787 Dreamliner, and so considerable time is still needed to assess the full effects of Boeing’s production decisions. History shows that production problems and cost overruns have happened to previous projects, including the 747 and 777. However none of the caliber we’ve seen so far on the 787. Certainly no past issues equate to the malfunctions and public danger of the 787s already in service have presented.

²²⁴ Dominic Gates, “777X vote shows bitter rift in Machinists leadership”, *The Seattle Times*. November 16, 2013, http://seattletimes.com/html/business/technology/2022276110_boeingmachinistproposalxml.html.

²²⁵ Dominic Gates, “Machinists say yes, secure 777X for Everett.” *The Seattle Times*, January 3, 2014, http://seattletimes.com/html/business/technology/2022593956_machinistsunionvotexml.html.

²²⁶ Dana Cloud, *We Are the Union: Democratic Unionism and Dissent at Boeing*. Chicago: University of Illinois Press, 2011, 3.

²²⁷ Doug Cunningham, “IAM District 751 Workers File NLRB Charges, Demand Re-Vote On Boeing ‘Corporate Extortion Plan’”, *Workers Independent Radio*, January 7, 2014.

²²⁸ Connie Kelliher interview, May 2013.

Despite the setbacks, cost overruns, and delays, the aircraft will likely lead to significant profits for Boeing in ten years time. The real question is, was it worth the costs to the Puget Sound and its workforce? Undoubtedly, my position and many other locals is no. The evidence I've presented shows that what Boeing undertook was unprecedented, untested, and with management fully aware of risks. This allows me to draw the conclusion that the strategy was to weaken reliance on Puget Sound workers and unions. The union contracts post-South Carolina assembly backs this up, including higher health premiums, loss of jobs, pensions, and legitimizing move to S.C. for striking. Whereas in the past workers were guaranteed that Boeing would manufacture its aircrafts locally, now Washington must fight tooth and nail for every inch of every contract.

Despite these factors, it would be wrong to make a blanket statement against Boeing. When I set out on this research, I wanted my findings to be painted in black and white. The fact is, it's not... Boeing and the cluster of local aerospace firms still provide great economic activity for the region; jobs, multiplier effects, tax revenue, and infrastructure development. Boeing employment opportunities are some of the best the state has to offer, with a special focus on hiring women and minorities. Workers like my friend Amanda, and many other friends and acquaintances, have access to living wage jobs that can support a family, provide a high standard of living, all without the opportunity costs of receiving a college education.

But it's these same reasons why when we see Boeing moving production away from the region, we should be fighting to make sure it remains local for generations to come. As Puget Sound residents, we should never take what we have locally for granted, lest we become Detroit, Baltimore or any other great American city hit by industry outflow and economic depression. This is why I believe in the Washington Aerospace Partnership, a nonprofit uniting labor,

industry, and government. Working together is the best approach toward preservation, not conflict but compromise. Governor Jay Inslee, who partnered with the Aerospace Industry Strategy, is also a shining example of the kind of leadership we need. He's a true pragmatist, willing to take losses in order to make gains and keep a robust aerospace economy. Given the nature of the global economy, technological change, developing economies, and the proliferation of information communication technology, trade-offs are a necessity in preventing Boeing's further outflow from region.

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Figure 1.1 Changes to Boeing's Supply Chain²²⁹

