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IN THE AEROSPACE GLOBAL VALUE CHAIN

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The Duke University Center on Globalization, Governance & Competitiveness undertakes client-sponsored research that addresses economic and social development issues for governments, foundations and international organizations. We do this principally by utilizing the global value chain (GVC) framework, created by Founding Director Gary Gereffi, and supplemented by other analytical tools. As a university-based research center, we address clients' real world questions with transparency and rigor.

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The Philippines in the Aerospace Global Value Chain

Executive Summary

FINAL DRAFT FOR REVIEW

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Executive Summary

This report uses the Duke CGGC Global Value Chain (GVC) framework to examine the role of the Philippines in the global aerospace industry and identify opportunities for the country to upgrade. The Philippines is a newcomer to the growing global aerospace manufacturing industry. Although the country has been host to a major flight controls manufacturer since 1985, the industry really only began to expand within the past five to ten years. During this recent period (2007-2014), the country has rapidly ramped up its aerospace manufacturing exports, reaching US$604 million in 2014 and more than tripling employment. The industry now employs 3,000 full time and 3,000 part time workers. Although still a very small player, accounting for less than 0.15% of the global industry, this incipient growth is promising. Both foreign firms and local suppliers that have established operations in the industry have already achieved some degree of upgrading within a short timeframe. These include expanding the product lines served, obtaining essential process certifications and upgrading beyond basic assembly operations to undertake additional manufacturing processes such as machining as well as initiating procurement and engineering functions in country.

The Aerospace Global Value Chain

The global aerospace industry is a multi-billion dollar industry, estimated to be worth over US$650 billion in 2014, with global trade over US$400 billion. The industry, which includes the development of aerospace systems for both the commercial and defense markets, is one of the largest producers of high-technology goods in the global economy. Key characteristics of the Aerospace GVC include:

- **The aerospace GVC is comprised of seven stages,** including research and development (R&D) and design, components manufacturing, sub-assembly, systems integration, post-sales services (e.g. parts supply, maintenance, repairs and overhauls (MRO)) and end-of-life activities. Sub-assemblies include airframes, propulsion engines, fuel systems, landing gears, avionics and flight control systems (flight, navigation and communication systems), electrical power supply, and interior fittings amongst others.
- **The civilian aerospace market is experiencing a period of strong growth** as a result of replacement of aging fleets, the surge in air traffic in developing countries and an ongoing shift towards more fuel-efficient planes. Boeing forecasts total commercial jet deliveries of 38,000 aircraft by 2035. Airlines in Asia are becoming important customers for new aircraft. Asia-Pacific accounted for one third of both Airbus and Boeing's 2015 deliveries. This strong global demand has resulted in aircraft manufacturers and their suppliers becoming increasingly focused on ramping up production, driving the need for additional manufacturing capacity in the industry. This has created opportunities for new actors to enter the industry.
- **The aerospace GVC is highly concentrated and is becoming more so as firms** consolidate in response to an increase in outsourcing by the leading integrators, Airbus and Boeing. This supplier-driven chain is heavily dependent on sophisticated and expensive technology platforms developed by a very small numbers of firms who

determine which other actors can participate in the value chain. Combined with low volumes, and high regulatory costs, these technological and financial barriers make the entry very difficult in manufacturing stages of the chain. This means location decisions for the industry are in the hands of a very small number of firms.

- **The industry has not globalized to the extent many initially predicted.** The manufacture of final aircraft is concentrated in a handful of countries home to major aircraft manufacturers: Brazil (Embraer), Canada (Bombardier), France, Germany (Airbus), and the US (Boeing) with China and India emerging as new players in final craft exports. Between 2007-2014, global trade in components and sub-assemblies has increased by approximately 25%;[1] yet, the sector remains consolidated with the top 20 supplier countries continuing to account for over 90% in most product categories and the top three countries concentrating almost 60% of the total industry. The only newcomers to enter the global top 20 during this period were India, Poland and Russia. The main players from the Global South that have emerged as participants in this industry are: China, India, Malaysia, Mexico, Poland, Singapore, South Africa, and South Korea.

The Philippines in the Aerospace Global Value Chain

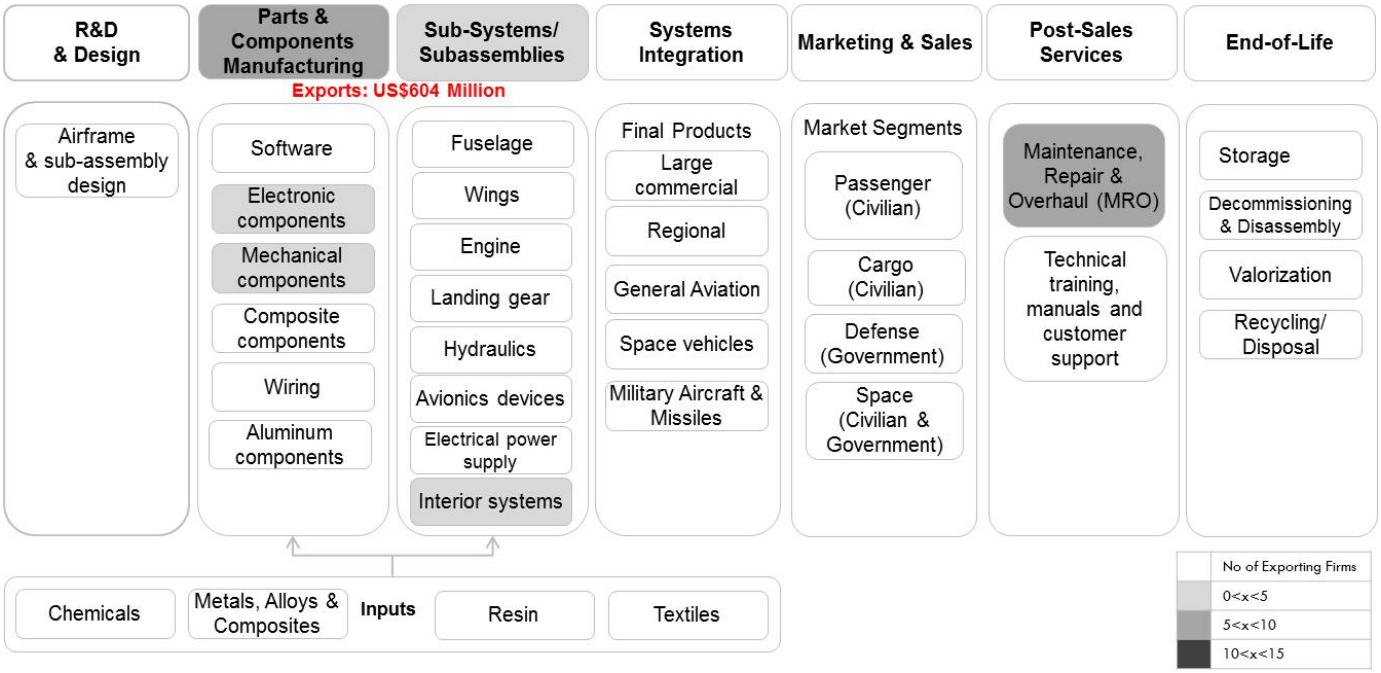
The Philippines is one of the newcomers to the aerospace GVC. Its incipient participation is concentrated in the manufacture and assembly of a small number of components and sub-assemblies in the interiors and flight controls systems, as well as some post-sales services such as MRO activities. Exports have accelerated in recent years, from almost negligible exports in 2010 to US$604 million in 2014, 1% of the country's total goods exports. Exports are destined for several major aerospace manufacturing hubs, including a growing share to the European Union and the United States. Most firms sell directly into the primary manufacturing sector (i.e. plane assembly), however, at least one firm has already begun to sell into the more lucrative aftermarket. This early upgrading has helped create a total of 6,000 semi-skilled and skilled jobs, particularly amongst electrical, mechanical and industrial engineers, who account for close to half of employees in the sector.

The total number of firms in the sector is low but growing. Ten firms registered exports over US$500,000 in 2014. Four Tier 1 firms are mainly production centers of global firms, which have engaged smaller local suppliers as they have sought to outsource more of their manufacturing operations. These foreign firms tend to be larger than their local counterparts – the largest two firms each have over 1,000 employees, and, although globally they attend more than one industry, they primarily serve the aerospace sector from their Philippines operations. Generally, local firms carry out machining and some finishing operations for components for these local Tier 1 firms, although they are beginning to develop some capabilities in direct exports. Geographically, these firms are dispersed; they are located mostly in EPZs in Luzon, to the North and South of Manila – in Baguio, Clark, Subic and the Batangas area.

[1] Excluding the US and UK components, which are reported together with final aircraft in trade statistics.

Figure E-1 highlights the Philippine entry into aerospace GVC to date. No shading indicates no participation in the sector. Grey shading indicates there is at least one or more firm operating in the industry.

Figure 1. Philippine Participation in the Aerospace Global Value Chain



Source: Authors.

The recent entry of the Philippines into the aerospace industry has been mainly organically driven, leveraging the country's large qualified, English-speaking human capital pool, competitive export processing zone (EPZ) incentives and the existing manufacturing capabilities developed while serving the regional and global automotive and electronics industries.

- **A large number of low-cost, qualified English-speaking engineers.** Local universities graduate approximately 60,000 engineers annually in mechanical, electrical & electronic, and chemical engineering, well suited to product manufacturing and there is growing interest in industry-specific skills development with aeronautical engineering and technical programs gaining popularity.
- **Experience in the automotive and electronics industry.** While significant upgrades are required to move from these industries into the aerospace sector, they provide two important baseline advantages: (1) personnel with experience working in MNCs driven by lean manufacturing principles, and (2) a supply base with CNC machining capabilities.

- **Improved policy environment for export-oriented firms.** The EPZs, overseen by the Philippines Export Zone Authority, are well-respected in the region and seen as an advantage by firms. This EPZ support has now been complemented by DTI-Board of Investments led efforts to coordinate public, private and academic stakeholders in the industry in preliminary steps to establish national objectives and incentives for the industry. Aerospace manufacturing is listed as a priority sector in the Investment Priority Plan 2014-2016.
- **Tariff-free Access to Key Markets.** Through the General Systems of Preferences in both the European Union (GSP+) and United States, the Philippines has tariff-free access to these key markets. India and the Philippines are the only GSP or GSP+ countries that operate in the aerospace sector in any significant way. Net imports in aerospace parts from Europe have surged in the past four years; from less than US$500 million to close to US$1.5 billion, as firms have brought the Philippines into their global production networks.

Certain efforts need to be made to overcome a number of key constraints to industry upgrading, including filling essential supply chain gaps, improving the regulatory environment for the aerospace sector – particularly with respect to bilateral and multilateral agreements on safety and export controls – and alleviating challenges in logistics and energy infrastructure and service.

- **Supply chain gaps**. Local suppliers only provide basic machining and processes. More high-end machining operations in multi-axis and precision machining are required. In particular, there are no firms yet providing NADCAP-certified processes in chemical or heat treatment for the industry or in working with composite materials. This means that products have to either be made in-house at Tier 1s or they have to be shipped to/from the US or other locations for painting, coating and other finishes, limiting further integration.
- **Lack of Key Regulatory Agreements** including Bilateral Aviation Safety Agreements (BASA) and membership in the Wassenaar Arrangement. The lack of existing BASAs in place with major aerospace manufacturing hubs places the Philippines at a disadvantage compared to its regional peers, Malaysia, Singapore and Vietnam. Firms must rely on agencies abroad to certify the airworthiness of their products, adding cost and delays. Export controls also do not yet comply with those outlined in the Wassenaar Arrangement and thus the country cannot manufacture components destined for the Defense sector. This also hinders access to dual-use technologies used for Civilian market products.
- **Logistics & Infrastructure:** Port congestion means that companies have to hold higher inventories of required raw materials and use more expensive shipping methods (e.g. air freight) in order to meet customer schedules. Although margins in the aerospace sector can allow for more expensive shipping options, these increase the cost to operations in the country and erode the advantages generated from labor arbitrage.
- **Energy Supply:** The cost and supply of energy is an economy-wide constraint to development. In this sector, it affects both the components manufacturing and assembly

stages in different ways. The components machining stage is a capital-intensive operation, with machines drawing considerable power. In the assembly stages, regulations require that operations be performed under specific and constant temperature conditions. In the tropical Philippines, this requires constant air-conditioning. With large production plants, energy quickly becomes the highest overhead costs and reliability is a key issue.

Upgrading in the industry in other countries has been heavily influenced by government policy and support, including tax incentives, proactive regulatory changes, training programs and a national strategy for growth. The few developing countries that have upgraded in the industry have followed a similar approach – beginning with components and assembly before expanding into production engineering, procurement and distribution. A similar strategy is proposed for the Philippines. Table E-1 details the upgrading trajectories identified for the Philippines to expand and upgrade its position within the aerospace GVC.

Table 1. The Philippines and the Aerospace GVC: Upgrading Trajectories

Time Frame	Potential Upgrading Trajectory	Key Benefits	Philippines Challenges
Short Term	**Process Upgrading: Deepening the Supply Chain to Strengthen Backward Linkages**	• Increase backward linkages and local value add in production • Expand number of products produced • Diversify market opportunities for automotive suppliers • Semi-skilled & skilled employment creation	• Lack of availability of qualified & experienced personnel • Weak access to finance for supplier firms • Information asymmetries regarding capabilities impede linkage formation • High energy costs
	Product upgrading in the Interiors and Flight Controls Systems*	• Higher returns per product, highly skilled employment and enhancement of knowledge capabilities • Build credibility as a location	• Supply chain gaps (e.g. processes) for manufacturing • Lack of human capital with relevant qualifications and experience • High energy costs
Short to Medium Term	**Product Upgrading: Entry into Electrical Systems**	• Leverage strong wire harness experience in automotive sector • Semi-skilled & skilled employment creation	• Low-cost competitor in Mexico close to final assembly sites • Poor transportation infrastructure • High energy costs
	Functional Upgrading into MRO Service Provision	• Enter into services operations • Employment generation	• Infrastructure in Manila airport is at capacity • Regional competition
Medium to Long Term	**Market Upgrading: Geographic**	• Increase reach of suppliers beyond the existing Tier 1s in the country – to serve other Tier 1s in the region	• Lack of business connections • Weak procurement and forecasting skills • High energy costs • Weak logistics skills
	Market Upgrading: Entry into After-market Segment	• Much higher returns for same products	• Logistics system unreliable from Manila • No local distributor of raw materials; suppliers must maintain stocks of costly inventory in-house

Source: Duke CGGC