



Case 80

Cargo by Airship

This article introduces airships as one of the 100 innovations that shape "The Blue Economy". This article is part of a broad effort to stimulate entrepreneurship, competitiveness and employment.

The Market for Cargo

The world market for air cargo represented in 2011 an estimated \$57 billion industry ranging from planes dedicated to transport fresh flowers to Formule One cars to the next race. The air cargo business measured in revenue per ton kilometers (RTK) represents \$167 billion, compared to \$60 trillion RTK for maritime cargo. The trade value of the goods shipped reaches \$2.7 trillion. The last decade, the military has an increasing need to quickly send more and larger quantities of relief supplies, tanks, even food and fuel into areas that have inadequate - if any - infrastructure. This is not part of the turnover, but according to some insiders this could easily run up to \$20 billion annually, if not more with long missions in Afghanistan and Iraq. Scheduled services provide 4.5 million tons of weekly cargo capacity which are available at over 3,400 airports in 220 countries, while charter and express companies provide additional capacity.

The world air cargo traffic is expected to triple over the next 20 years, starting from 2009 the worst year in a decade. This implies an average annual growth rate of 5.9 percent. The intra-Asia market is expanding 7.9 percent per year, and the domestic Chinese segment is growing at 9.2 percent. The number of airplanes in the freighter fleet will increase by more than two thirds over the same period from 1,755 planes in 2009 to 2,967 by 2029. Cargo revenues represent on average 15 percent of the airlines income, with exceptions gaining as much as 50 percent.

One ton of cargo per ship costs a commercial transporter between six and ten cents per one ton one mile (Ton Mile). A ship will take two to three weeks to get from China to the West Coast of the United States. A 747 air freighter can get the cargo around the world in less than a day, but the cost is fifty to sixty cents per ton mile, at least ten times more than per boat. Within the air cargo, the international express shipments expanded from 4.1 percent of total international cargo traffic in 1992 to 12.8 percent in 2008, with the average size per shipment of approximately 5 kilograms. Express handlers offer door to door services integrating the traditional airline-forwarder-handler coalition that was inspired by the traditional core business core competence logic. Since each actor needs to maximize its own operations, no one optimizes the whole system. This has permitted these small packs delivered through an integrated service package to ad up. FedEx is now the world's largest airfreight carrier with 692 planes, followed by UPS, Korean Air and Emirates. Lufthansa, the first European carrier, ranks number 12 worldwide. Five Chinese airlines outpace the German flagship.

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The Innovation

The issue of fuel has been raised in the maritime shipment industry (Case 72). Jet fuel is very clean compared to ship fuel, however more is consumed per ton mile shipped. The first goal is to reduce fuel consumption by shifting to more efficient planes. Airlines spent in 2010 \$139 billion on fuel, a rise of \$14 billion over 2009. This improves the performance of those who can afford the capital investment. But, since those planes will not be taken out of the world fleet, inefficient consumption will be shifted to less competitive players. FedEx aspires that biofuels will represent 30 percent of the firm's jet fuel by 2030. In the mean time, the new Cologne Bonn Airport sorting center features solar panels on the roof that generate 800 MWh per year. The key challenge remains that global cargo transportation, by air or by ship, continues to require massive infrastructure that depends on mortar and fossil fuels for decades to come.

Alex Hall grew up in the UK dreaming of becoming an astronaut. Unfortunately, genetics were not on her side when she learned that she was too short to even learn to become a commercial pilot. She lived nearby the Cardington Airship Hangars in Bedford. These huge sheds inspired her fascination with oversized aircraft and airship history, particularly the trans-global flights of Graf Zeppelin. She graduated as an astrophysicist from the University of Leicester and built up a career in space related visitor centers - first six years at the British National Space Centre in Leicester, and later she became the Executive Director of the Chabot Space and Science Center in Oakland, California. When her fiancé Brian flew in July 2006 the new Zeppelin produced in Germany by ZLT (Zeppelin Luftschifftechnik) he joined forces with Alex who jointly worked out the strategy and wrote the business plan to bring the Zeppelin airship back to the USA for the first time since 1937. An agreement to purchase the airship was reached with the German manufacturer in February 2007 through their newly established company Airship Ventures.

The first order of business was to secure a base for the Zeppelin. Fortunately, three of the original 13 airship hangars in the United States are located in California. Esther Dyson, a former Wall Street technology analyst signed on as the first angel investor and by March 2008 the company was fully funded. The main challenge was to get the airship laws in America rewritten since these were approved for advertising blimps, not for passenger or cargo carrying Zeppelins. The first passengers boarded in the Fall of 2008, marking an amazingly fast turn-around of an initiative that many considered if not impossible, at least slow and complex. Alex and her team proved them wrong.

The First Cash Flow

The first cash flow was generated by selling "flightseeing" tours above San Francisco Bay, Silicon Valley, San Diego and Los Angeles. The airship is also rented out for scientific research to NASA, Woods Hole Institute and TV stations who wish to use it as a camera platform for the Golden Globes, PGA Golf and the Rose Bowl. The income generated advances according to plan and Airship Ventures plans to expand with additional airships on

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the East Coast. A second revenue stream is expected from flight training and education, the set-up of a professional airship flight school and undertaking research and development with airships. Alex may not have succeeded to become an astronaut but she deployed her visionary, creative and entrepreneurial talent to make an idea happen. She was given the opportunity in July 2011 to move on to become the Senior Director of the Google Lunar X-Prize hoping that one day she could still get to the Moon.

The Opportunity

Now that Alex and Brian had proven their business model in airships, several other initiatives emerged. Aviation Capital was started by the venture capitalist Kirk Purdy in Calgary, Alberta (Canada) in 2009. He signed an agreement with Lockheed Martin to commercialize their cargo airships manufactured at Palmdale, California. By 2013, Aviation Capital could take one hundred tons of freight per flight to the remote North of Canada with an airship of the size of one football field with hardly any requirement for landing infrastructure. Dr. Bob Boyd, the hybrid program manager at Lockheed Martin is confident that by 2016 an airship of the length of three football fields will be capable to carry 450 tons of cargo in one trip. While Lockheed Martin reserves the right to all military applications which is larger than the civil one, Aviation Capital has an exclusive lock on the cargo market. The present airship technology can deliver cargo at 25 cents per ton mile, which is the cost of airfreight, yet double or triple the cost of maritime shipments.

However, if one calculates the total cost, especially the infrastructure, then we realize that airships are the least capital intensive, the most versatile and the most fuel efficient system of transport today. The airship does not need a runway, nor deep sea docks. Eliminating these invasive, polluting and often noisy concentrations of transport infrastructure makes the airship a very competitive transport medium. Since airships take off and land like a helicopter, there is only a need for a mooring truck (mobile) or pole, and a mooring circle dependent on the size of the airship. Earlier airship experiences by Paolo Lugari (Case 15) at Las Gaviotas (Colombia) with his dirigibles for fire controls, or the airship used by De Beers for mine exploration in Botswana demonstrated the wide range of possible applications beyond cargo. A novel form of transportation for people and cargo, that requires no major infrastructure, is fuel efficient and competitive while changing the rules of the game fulfills the conditions of the Blue Economy.

GUNTER PAULI

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Further information on the 100 innovations at www.blueeconomy.de.

Order Gunter Paulis book at www.blueeconomy.de: **Zen and the Art of Blue**

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