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Integration of Cargo and Passenger Operations

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In this chapter we explore the problems, opportunities, and solutions consequent upon the fusion between Fast Air Carrier and Lan Chile. Fast Air was a successful cargo carrier, and Lan Chile was a typical medium-sized passenger flag carrier. The new company is the fastest-growing carrier in Latin America and has won various awards.

We also use the new Lan Chile as a case study to demonstrate how to blend a cargo operation with a passenger operation, and in so doing we touch on the following subject areas:

- Operations strategies in the global marketplace and operations as a competitive weapon
- Operations management as part of the corporate strategic plan
- Capacity issues, process issues, productivity issues

The History of Lan Chile

Lan Chile was the flag carrier of Chile. Founded in 1929, originally as a civil passenger and mail venture by the Chilean army, it is one of the oldest airlines in the world.

Lan Chile rapidly organized a full domestic route structure by 1932. From 1946 to the 1960s, Lan Chile gradually developed an international route structure that incorporated flights to most of the major cities of South America, as well as to the United States (owing to the strong trade between Latin America and the United States), and to Spain and Germany (owing to the Spanish or German origin of most Chileans). In addition, because of Chile's geography, Lan Chile was able to develop the first route connecting South America to Australia, with flights to Easter Island and

Tahiti. We have thus described the complete route structure of the airline as of 1999. Only the methods, volume, and frequencies have changed.

From its origins in 1929, as a flag carrier, financial success was not a primary goal. The airline existed primarily on government subsidies, as was typical for the flag air carriers from many other nations. In 1970, with the communist takeover of Chile under Allende, the company management had to pass control to its labor unions. Lan Chile's economic recovery during the subsequent Pinochet era was very slow and painful.

In 1989, as part of a major privatization effort in the country, the Chilean government sold the airline to a partnership of some Chilean investors with SAS Scandinavian Airlines. But SAS was unable to turn around the fortunes of Lan Chile, and in 1994 SAS sold Lan Chile at a major loss to other Chilean businessmen, the owners of Fast Air Carrier, for approximately U.S.$42 million.

In 1997 the company issued public stock and American Depository Receipts (ADRs), and during the stock offering the airline was assessed to be worth about U.S.$870 million. Apart from very good management, what multiplied the value of the airline by twenty times in only four years? *Mixing a cargo business and a passenger business.*

The History of Fast Air Carrier

In the 1970s a group of Chilean businessmen, headed by Juan Cueto, gradually built up a thriving fish export business. Initially, the business contracted out transportation. But over time the level of fish export reached a point where the company decided to begin contracting for complete cargo bellies of passenger aircraft. Finally, the level of belly utilization and needs reached a point where it appeared reasonable for the company to acquire an airplane. The labor union takeover of Lan Chile in 1970 had left some capable airline executives available, and some of these people were hired to create the airline Fast Air Carrier in 1978. The company acquired its first airplane, a Boeing 707 F (B-707F), making it possible for the carrier to haul 40 metric tonnes of cargo to Miami. Over the next eleven years, the fleet gradually grew to three B-707Fs. Unlike many other cargo operations, Fast Air was able to build up a business traveling both north and south. The cargo moving from the United States to Chile is not as dense, however, so often a B-707F did not carry more than 32 metric tonnes on the southbound return. In 1992 the company implemented a change to the Douglas Aircraft Company DC-8-71, an aircraft with the same payload limit as the B-707F—40 tonnes—but a much longer "tube" (fuselage). The greater volume meant that the DC8-71 could carry 40 tonnes southbound, as well. By the end of the year, the fleet consisted of two B-707s and two DC-8s.

Once the airline had more southbound capacity, and as the airline grew, a fundamental problem with the Chilean cargo business was noticed: there is more northbound air cargo than southbound. But instead of doing what most airlines do—flying one direction empty, or at least less than full—Fast Air tried a new tactic. Argentina and Brazil are much larger countries than Chile, and they import a lot of goods from the United States via air shipment. The company formed relationships with other cargo carriers in Mexico, Brazil, Uruguay, and Florida. All possible cargo capacity was used to carry cargo northbound from Chile. For the southbound journey, all flights were filled as full as possible with return cargo. Those planes that couldn't be filled with cargo for Chile were sent to Brazil and Argentina full and then if necessary ferried the short distance to Chile to be filled again and sent north.

By 1994 the company had three DC-8s and one B747-100-F and was ready for a new adventure. When the opportunity presented itself, the Cueto family in conjunction with the entrepreneurs Piñera, Hirmas, and Eblen raised the capital to buy first Lan Chile and then the next year Chile's second-largest passenger airline, Ladeco.

The Lan Chile Holding Company Today

Today Lan Chile Holdings is a U.S.$1.2 billion company. Revenue breaks down to approximately two-thirds passenger transportation and one-third air cargo. The total fleet consists of forty-eight Boeing aircraft. The company recently undertook a major fleet renewal effort; over the next six years virtually the entire passenger fleet will be replaced with Airbus aircraft.

The holding company today is made up of three operations: Lan Chile passenger operations, Ladeco passenger operations, and cargo operations.

The Lan Chile passenger operations fleet consists of thirteen Boeing 767-300ERs (B767-300ERs) and fifteen Boeing 737-200s (B737-200s). The B737-200 operate approximately seventy-five flights a day and the B767-30ER thirty-five flights a day—both to forty-seven destinations all together.

The Ladeco passenger operations fleet consists of eight Boeing 737-200s (B737-200s). This fleet operates approximately fifty flights a day to seventeen destinations.

The cargo operations fleet consists of two Boeing 767-300Fs (B767-300Fs), six DC-8-71-Fs, and four "wet-leased" Boeing 747-200Fs (B747-200Fs). (A "wet-lease" is a contractual agreement whereby the lessor provides at least an aircraft and a cockpit crew, and generally the maintenance and insurance as well, for an aircraft or several aircraft. Additionally, the lessor maintains operational control of the aircraft while operating for the commercial benefit of the lessee.) The cargo fleet operates to forty-five destinations on a regular basis and another forty-five destinations on an occasional basis.

By the end of the year 2000, the company will have cut back to only four DC-8s but will have acquired one more B767-300F for the cargo operation. It will also have begun a fleet replacement in its passenger operations by adding two Airbus A-340-300 and two Airbus A-320.

In addition, the airline has a financial interest in Lan Peru, which operates B-737 aircraft in domestic operations within Peru. The airline has business relationships with the cargo carriers Mas Air of Mexico, ABSA of Brazil, AUSA of Uruguay, and Florida West of Miami. Lan Chile also occupies the bellies of many Aerolíneas Argentinas and American Airlines flights in South America.

The Fundamental Differences Between Passenger and Cargo Operations

In the case of both cargo and passengers, the fundamental nature of the air transport business is to find a set of people who want to travel or who are willing to pay to haul a quantity of things that occupy a certain space and have a certain weight. The principal problems are that it is necessary that there be a certain steady demand for this service, and that the operational cost be below the average price charged for transporting passengers or shipping cargo. Beyond these considerations the two transport businesses are quite different. Lan Chile takes advantage of these differences to create an operation that is extremely complementary and synergistic.

Figure 18-1 Aircraft CC-CZZ, a Boeing 767-300F, Being Loaded with Cargo on the Upper Deck. The Aircraft Can Carry 55 Tonnes of Cargo from Santiago to Miami, an Eight-Hour Flight.

Figure 18-2 Aircraft CC-CDS, a DC-8-71F, Ready for Departure. The Old Cargo Fleet.

Directionality

The passenger business is fundamentally bidirectional, in terms of both passenger fares and passenger traffic. In general, passengers are flying round-trips, and the average fares are therefore similar in both directions, although some airlines apply point-of-sale restrictions that cause fares to be higher in one direction. The traffic generally remains at a similar volume in both directions, however.

In the cargo business, on the other hand, traffic can be completely unidirectional. Whereas people tend to go somewhere and then return to their point of origin, in the export/import trade, in terms of air shipments between two countries, the trade can vary significantly so that one of the destinations is more in demand than the other, and the transport of air cargo reflects these differences.

In some cases, as is the case in much of the air cargo traffic from Asia to Europe and the Americas, aircraft actually operate in one direction full and return empty. In other cases, as with Lan Chile, there is air cargo traffic in both directions on some routes, but not necessarily with the same seasonality, and always with extremely different volumetric densities and at dramatically different rates.

In the case of a pure cargo operation, the operational and financial implications of directionality are similar to those for a passenger charter operation, where the actual load-carrying portion of the charter may be only a portion of the entire operation. But the directionality of cargo has a considerable impact on a combi operation, as we'll see later in the chapter.

In Lan Chile's operation, the cargo traffic is extremely heavy in dense cargo heading northbound to Europe and the United States, the cargo generally consisting of fish. There is an even denser traffic to the United States in the months of March and April, consisting of one tonne per one cubic meter sacks of seed corn for the American corn planting season. (Most American seed corn comes from the south of Chile and Argentina.) Any cargo or combi flight northbound is generally weight-limited.

Southbound cargo traffic tends to consist of finished manufactured goods, often heavily packaged, such as computers or cell phones. This cargo is therefore low density (lighter per unit volume) and limits both combi and many cargo flights volumetrically instead of by weight.

Seasonality

All traffic, whether cargo or passenger, has an important seasonality factor, which an airline that mixes cargo and passengers can occasionally take advantage of.

In Lan Chile's operation, passenger traffic has high seasons, corresponding to the holiday vacation periods of the Northern and Southern Hemispheres (summer in each hemisphere), as well as the Christmas holiday season. Spring and fall tend to be low seasons. Cargo traffic for Lan Chile has high seasons that correspond to the low seasons of the passenger traffic.

When an airline is operating purely a cargo operation or a passenger operation, there is by necessity much idle capacity during the low seasons, reducing overall fleet operating efficiency and profit margins. Some airlines have countered this trend by buying "convertible" aircraft, which can be quickly modified to accommodate either all-cargo, a combination of both passenger and cargo (referred to as a "combi operation"), or all-passenger flights. An example is Martinair, which mixes cargo and passenger business. The penalty for a "convertible" operation is the extra cost of the aircraft, as well as the weight penalties incurred by such aircraft.

Another strategy is to operate cargo and passenger fleets of the same equipment type, consisting of aircraft in the same family of aircraft model, made by the same manufacturer. In this manner an airline can benefit from the ability to cross-utilize its crew and minimize maintenance costs associated with aircraft sitting idle owing to seasonality. But even with this strategy, the airline is affected by the "downtime" of some aircraft because of the effects of seasonality.

The most efficient response to cope with seasonality is the strategy that Lan Chile implemented. In order to optimize aircraft utilization, Lan Chile has chosen to operate combi aircraft on all long-haul routes. The key to an airline's making this operation work, and thereby improving aircraft utilization, is identifying (1) the "right" aircraft type to make up its fleet, and (2) an air cargo market in which cargo demand is complementary to passenger demand.

Tariffs

Tariffs applied to air cargo operations tend to reflect the same directionality as the operations themselves. But owing to the lower operating costs of cargo flights in general, a full cargo aircraft can be profitable even when it operates in the direction subject to lower demand.

At least in the case of Lan Chile, however, cargo tariffs are always considerably lower than passenger tariffs, when considering payload in terms of kilograms in the combi operation. One of the most important routes for Lan Chile is Santiago (SCL)–Miami (MIA)–SCL. The fare for a first-class passenger is approximately ten times the average tariff per kilogram of cargo transported from SCL to MIA. The average low-season economy passenger fare is still three times the tariff per kilogram of cargo transported on the same route. Although the average MIA–SCL cargo tariff is nearly double that of SCL–MIA, it is still less than the economy passenger fare. And the highest high-season SCL–MIA tariff in the past two years was still just barely equal to the economy fare for passengers on a per kilogram basis. Similar relationships apply on other routes.

The following explanation is an extreme simplification of the issue of cargo revenue (yield) management. In order to maximize revenue when dealing with a combi flight, we treat it as a pure passenger flight in the revenue (yield) management computer system, maximize passenger revenue as we normally would, and then maximize the additional potential revenue to be derived, by filling the remaining aircraft space/weight with cargo payload.

It is interesting to note that neither cargo tariffs nor passenger fares are based on the distance traveled if the journey from origin to destination involves a combination of multiple flight segments. In other words, the same type of revenue management philosophies and algorithms need to be applied to the origin & destination problem of multileg flights for both cargo and passengers in order to determine the overall mix that will maximize revenue.

Load Restrictions

Any aircraft type will have load restrictions that create a unique set of important interactions among the passenger load, cargo load, and stage length of any operation. All aircraft types have each of the limits or constraints that are discussed in this section. Such limits/constraints are defined and imposed during initial aircraft certification processes. A unique set of limits/constraints is created for each situation, based on the interplay among aircraft model, air cargo volume and density, stage length, and the operations of a specific airline.

Some of the key limits/constraints are

- *Operating Empty Weight (OEW).* The OEW is the weight of the aircraft structure, its engines, the furnishings of the cabin interior, including such items as galleys, seats, and overhead storage compartments, and other items of equipment that are considered to be integral parts of a particular airplane configuration, such as oxygen masks, evacuation slides, and other emergency equipment. The OEW also includes the weight of cockpit and cabin crew, determined by the number of crew required for a particular flight.
- *Maximum Zero Fuel Weight (MZFW).* The MZFW is the maximum weight allowed before fuel is loaded, as limited by strength and airworthiness requirements.
- *Maximum Takeoff Weight (MTOW).* An aircraft's takeoff weight (TOW) is the sum of the aircraft OEW, passenger payload weight, baggage weight, cargo payload, and fuel load less taxi fuel. The

MTOW is either the maximum design TOW as limited by aircraft strength and airworthiness requirements or the TOW limited by airport infrastructure constraints and operating conditions. Airport infrastructure and performance constraints are determined by actual runway length, the slope of the runway, the elevation of the airport, temperature, barometric pressure, prevailing wind conditions, runway contamination, and obstacles in the departure path. Prior to each takeoff, a TOW calculation is made, taking into consideration the current operating conditions. The maximum weight at the start of the takeoff run must conform to all constraints.

- *Maximum Taxi Weight (MTW).* The MTW is the maximum weight for ground maneuver as limited by aircraft strength and airworthiness requirements. This measure includes the MTOW plus taxi fuel and run-up fuel.
- *Maximum Landing Weight (MLW).* An aircraft's MLW is the sum of the aircraft OEW, passenger payload weight, baggage weight, cargo payload, and reserve fuel load that an airline is required, by regulation, to carry on a flight. The MLW of any flight is either the maximum designed landing weight as limited by aircraft strength and airworthiness requirements or the landing weight limited by airport infrastructure and aircraft performance.

Figure 18-3 delineates the characteristics and trade-offs inherent in aircraft design. Aircraft are designed to meet airline requirements, which are determined by an airline's market (passenger and cargo) and route structure. The distance or range of a particular aircraft type is a critically important variable that airline management must consider during initial fleet-planning efforts and prior to making a final purchasing decision. As demonstrated by Figure 18-4, there is a trade-off between maximum payload and maximum fuel load. If the maximum payload is carried, the range of the aircraft is limited. If additional range is desired, payload must be reduced accordingly to accommodate more fuel.

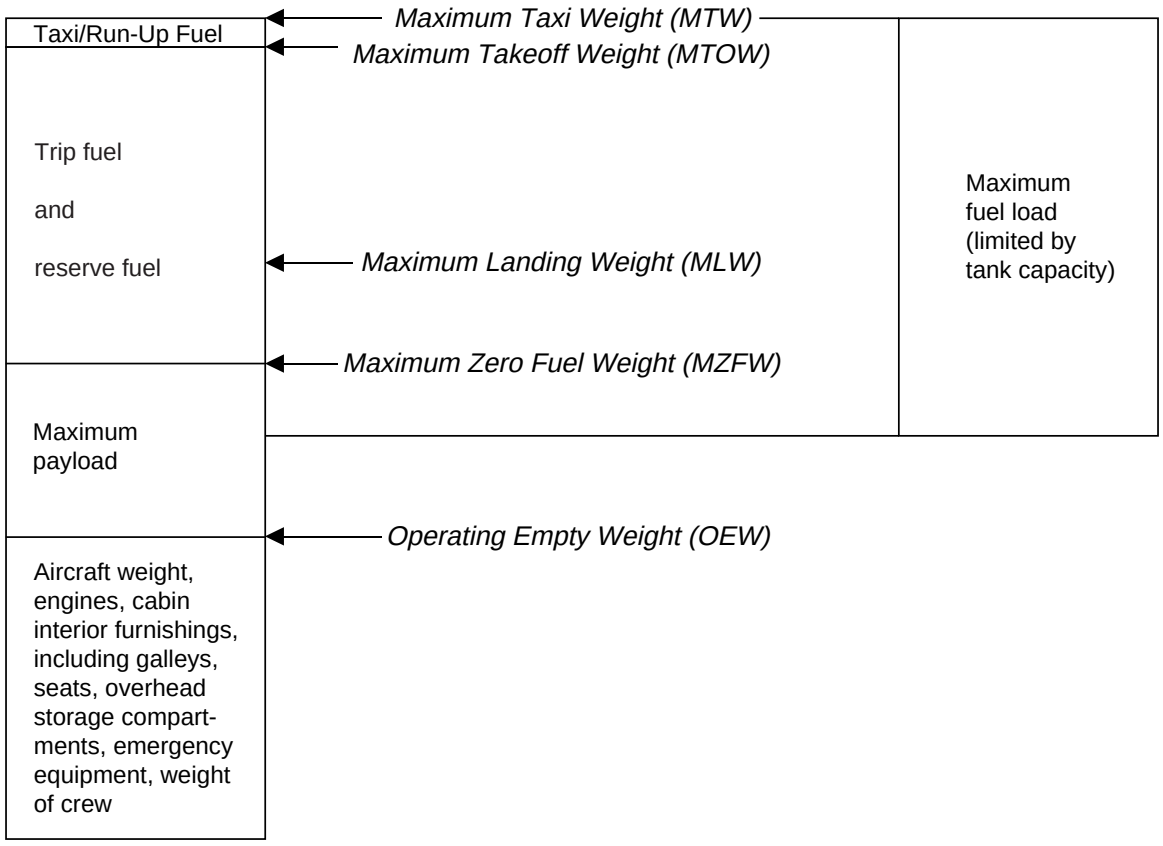

Figure 18-3 Key Aircraft Limitations and Constraints.

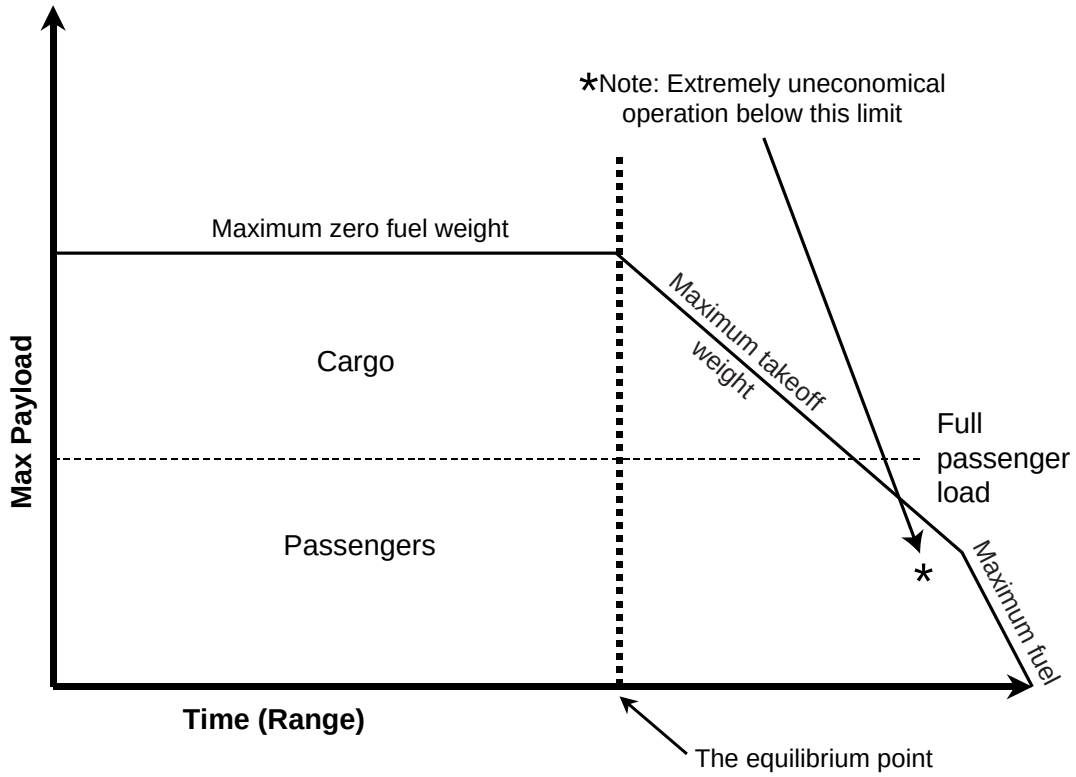

Figure 18-4 Payload versus Range: The Equilibrium Point of Maximum Efficiency.

In other words, there is a specific point at which maximum efficiency can be achieved. The equilibrium point of maximum efficiency is the point at which the range of an aircraft is no longer limited by maximum zero fuel weight (MZFW) but, rather, it becomes limited by maximum takeoff weight (MTOW). At this point the aircraft is carrying the maximum possible payload (cargo/passengers) and an amount of fuel that does not exceed that which is legally required. A shorter-range flight, although it may carry the same payload, forgoes the benefits of the aircraft's range capabilities. In contrast, a longer-range flight dictates the need to carry additional fuel and therefore limits the payload that can be carried. Table 18-1 provides a sample of Lan Chile aircraft specifications.

Table 18-1
Lan Chile Sample Aircraft Specifications

Aircraft Specifications		**B-767-300ER**		**B-767-300F**	**DC-8 Cargo**
REGISTRATION	*CC-CEY*	*CC-CRT*	*CC-CZW*	*CC-CZZ*	*CC-CDS*
Manufacture date	Mar, 1991	Dec, 1997	Apr, 1998	Sep, 1998	Sep, 1968
Passenger configuration	10F/24B/181Y	10F/28B/181Y	10F/28B/181Y	CARGO	CARGO
(Total passengers)	(215)	(219)	(219)	17 Pallets	18 Pallets
Maximum taxi weight (Kg)	185,519	185,519	187,333	187,333	150,139
Maximum takeoff weight (Kg)	184,612	185,065	186,880	186,880	148,753
Maximum landing weight (Kg)	145,149	145,149	145,149	147,871	117,007
Maximum zero fuel weight (Kg)	133,809	133,809	133,809	140,160	111,111
Operating empty weight (Kg)	86,525	86,435	85,858	82,046	66,658

The current Lan Chile passenger operation uses B767-300s, which have an MTOW restriction on flights in which the stage length exceeds approximately eight hours of flight time. As a result, for flights exceeding eight hours, less payload can be accommodated for each additional minute of flight time required over eight hours. A different aircraft type would have a different MTOW threshold. Another implication is that every aircraft type has an inherent stage length that is of greatest economic efficiency—the transition point where MZFW limits become MTOW limits. In the case of the B767-300, this threshold is reached at flights between seven and a half and eight and a half hours, as shown in Figure 18-4.

Other issues and constraints to be considered are

- *Passenger volume (seat count).* The number of seats in an aircraft determines the maximum passenger payload that can be accommodated. In effect, as Figure 18-4 illustrates, accommodating the maximum passenger payload results in a range limit for an aircraft that occurs well beyond the MZFW-MTOW equilibrium point. Beyond the equilibrium point, an aircraft becomes less of a combi operation and more of a pure passenger operation. As the "full passenger" stage length is exceeded, it is no longer possible to carry the maximum passenger payload, and the flight becomes significantly less profitable. For example, the B767-300 is able to fly for up to fourteen hours if there are no passengers being carried. Depending on the specific aircraft, it can fly a full passenger load for up to about 12 hours but with no cargo.
- *Cargo volume and hold issues.* Each aircraft has a hold volume limit, which effectively limits the cargo payload long before any of the MTOW/MLW/MZFW limits are reached, as long as the cargo lacks sufficient density. Therefore, unless a higher tariff is applied to cargo that is not dense but is lightweight and high volume, the operation's profitability will be affected.

  The issue of volume varies greatly from aircraft to aircraft. For instance, a Boeing 777-200 has a higher MTOW and maximum payload, yet less cargo hold volume than an Airbus 340-300. Different aircraft are optimized in their design for passengers or for a passenger/cargo mix. In the case of the Lan Chile operation, in the B767-300 combi operation the airline is weight limited on all northbound flights and volume limited on all southbound flights. Yet the same aircraft used in an all-cargo operation becomes weight limited instead of volume limited on many southbound flights, in spite of the fact that it has a 10-tonne greater payload capability. By removing the seats, galleys, catering, provisioning, and flight attendants from the cargo version of the aircraft, the OEW decreases by 10 tonnes, producing extra payload capacity.
- *Weight and balance issues.* An aircraft must also have its center of gravity (CG) optimized within the limits established by the manufacturer based on the design of the aircraft, in order for the airline to accommodate maximum payload. Optimizing CG requires balancing the cargo load fore and aft and generally placing some extra weight in the rear of the aircraft to give it a slightly aft center of gravity. Yet if the center of gravity is too far aft, the aircraft will burn excessive fuel. In the ideal situation, the operation should be set up to accommodate loading the aircraft to meet these considerations. In some aircraft it is more difficult to balance cargo fore and aft than in others. Many aircraft have only one large cargo door in the forward cargo hold, permitting the loading of heavy and dense pallets, and the rear cargo hold is limited, allowing only containers to be loaded. Because of the time pressures associated with a "turnaround operation," these containers are often filled with only passenger suitcases, not a particularly dense cargo. Therefore, during a rapid turnaround, most aircraft, with the notable exceptions of the Boeing 747 and the Airbus 340, impose a CG penalty and do not allow an airline to optimize the CG. In the case of the northbound Lan Chile operation, a container of suitcases is usually only 60 percent as dense as a container of cargo.

  Another important consideration for weight and balance, especially on long-haul flights, is the change of the center of gravity that occurs during flight. Since the wings are swept back, once the aircraft starts using the fuel carried in the tanks in the wings, the center of gravity of the aircraft will move forward. As a result, the plane flies less efficiently, and the chance for the lighter aircraft to fly more efficiently is lost. The solution to this problem is dynamic optimization of the CG. In the Boeing 747-400, the MD-11, and the Airbus 340, this can be accomplished by having more than three fuel tanks in the aircraft and providing the capability to pump fuel back and forth along the centerline of the aircraft. Apart from being one of the factors that increases the maximum range of the passenger operations of these aircraft, this type of dynamic optimization allows any mixed passenger/cargo flight to fly with the maximum cargo possible for the aircraft and stage length.
- *Summary of the key interactions.* Each aircraft is subject to the relationships among MTOW, MZFW, MLW, and cargo volume. These relationships inter-

act differently based on the stage length and the type of cargo carried on the route.

- Short-haul (especially narrow-body) aircraft are MLW limited. Airlines need to ensure that reserve fuel does not reduce payload.
- Medium-haul aircraft are MZFW limited. These aircraft cannot operate efficiently; an airline should consider substituting a different aircraft type on the route.
- Operations near equilibrium point. The stage length where an aircraft with dense cargo will fluctuate between one flight and the next being MZFW or MTOW limited. Such an aircraft has the potential to be most profitable operating at this point.
- Beyond equilibrium. These aircraft are optimal only for less dense cargo (depending on the aircraft) gradually decreasing cargo payload, always MTOW or Maximum Fuel Capacity limited.
- Aircraft with more than three fuel tanks. These aircraft are best for maximizing cargo on passenger flights, because of weight and balance issues.

Schedule Reliability

There is a significant difference between the importance of schedule reliability in passenger (or combi) and cargo flights. Passengers expect to leave on time and arrive on time. Even if the airplane is not full, a passenger flight must depart as scheduled for both commercial and legal reasons. A cargo flight, on the other hand, can occasionally wait for a reasonable period of time until it fills up.

The most efficient cargo operation is one that in effect operates like those that Americans call a "shuttle operation" and European carriers call an "air bridge." In this type of operation, the type of aircraft operated on a route is selected so that it can accommodate less than the typical cargo demand in the particular season. As aircraft are filled, they fly.

In the case of a combi operation, the passenger part of the aircraft must be profitable, because the timing requirements of the passenger part of the operation may cause the cargo holds not to be used at full capacity at various times during the year.

In the case of Lan Chile, the same philosophy that American Airlines used in the 1980s to revolutionize the North Atlantic corridor has been applied—frequency instead of size.

In the late 1970s and 1980s, as traffic increased on Lan's most critical route, Santiago–Miami, Lan first went from the Boeing 707 to the DC-10 and then for a short, three-month period to a 747-100. After experiencing demand/cost problems, Lan eventually settled on first the Boeing 767-200 and finally the larger -300ER. Today, in high seasons there are as many as three passenger flights a day on the Santiago–Miami route, and there are as many as four cargo flights a day, with as many as two 747-200-F flights and two DC-8-71 flights. As traffic falls off in either operation, the flights are cut back.

Routing

The routing is also critical in a passenger operation and nearly totally unimportant in the cargo operation. The trend in passenger operations is to change fleets in order to provide greater and greater stage lengths, providing nonstop flights to anywhere.

Assuming that the tariff is profitable given the operating costs of a particular aircraft, a cargo flight can make any number of stops to get to its destination as long as the flight arrives in a "reasonable" amount of time. Even more beneficial is the scenario wherein during these stops, bilateral agreements permit the air carrier to pick up additional cargo. In these cases, the airline can act like a tramp steamer, dropping off and picking up additional cargo along the way.

A further important issue is that passengers need to be routed to the airports nearest to dense population centers, especially on international flights. Unfortunately, these airports carry higher landing fees, as well as higher service costs for turnaround. But a cargo operation can pick and choose secondary airports, provided that the existing road/rail infrastructure allows for timely delivery of shipments to customers, even though such airports may be poorly located for people. The upside is that these airport may be underutilized and provide an opportunity for less expensive operations.

Operating Costs

The costs of operating a cargo flight are considerably lower than the costs associated with operating a passenger flight. A cargo flight has no need of flight attendants (although load masters and/or cargo attendants are sometimes needed), catering and provisioning are limited, ground personnel are generally fewer in number, and airport terminal/space fees and costs can be significantly less than the lease terms commonly applicable to passenger terminal space and gates, and so forth. But cargo tariffs may be considerably lower than passenger fares. Nevertheless, since the average load factor of a passenger flight is only around 70 percent, the passenger fares need to be more than 50 percent higher per weight unit to

cover the wasted space, as well as the additional operating costs.

This is where the combi operation becomes extremely attractive. If the passenger operation can cover all the costs, then the cargo operation becomes nearly totally profit, with operating margins of well over 80 percent, considering additional fuel and ground-handling costs. If the passenger operation can also be slightly profitable, then all cargo seasonality issues are taken care of. If the cargo operation can by itself be profitable in the hold of a passenger aircraft, then all passenger seasonality issues are also covered.

Infrastructure

A passenger operation needs an enormous operations infrastructure to support it. This infrastructure must be put in place prior to beginning the operation and must be maintained throughout the future use of the operation.

An important consideration is that although frequencies may change based on seasonality, it is not feasible to start and stop the operation to a given destination every few months. The only option is to contract out all services at a destination. Use of this strategy must be minimized, since it creates inconsistencies in the contact between representatives of the airline and the passengers. Such inconsistencies can damage the marketing image of the airline.

On the other hand, contracting out services in the cargo environment at any but the major hubs and destinations appears to be the rule, rather than the exception. This arrangement produces an operation that is extremely flexible. But this flexibility necessitates that the operations control organization ensure a dynamic, remote logistics capability. In other words, operations within the cargo environment operate in the same manner that is typical of the passenger charter environment.

Flight Operational Assets

In most passenger operations, the key elements of the airline flight operation, that is, aircraft, pilots, flight attendants, and so forth, are in most instances an integral part of the airline. Although the aircraft may be owned or leased, the airline must maintain the investment in personnel, training, and aircraft in order to respond to the maximum peak seasonal demand to the degree that is strategically necessary to survive and grow.

Therefore carriers in certain areas of the world have to maintain excess capacity to deal with the differences in peak seasons. In some cases, the excess assets can still be used productively and profitably through wet lease and charter operations. In East Asia, for instance, much of the excess capacity necessary for accommodating the Chinese New Year can be used just a short time later for charters and wet leases for Haj traffic to Saudi Arabia. By this means these airlines can extend the peak season use of assets for nearly five months.

In cargo operations, many believe that there is very little need for an airline to maintain a visible image on the flying assets. In fact, some cargo airlines even paint their aircraft plain white. If a cargo operation relies very heavily on wet-leased aircraft, it can be extremely flexible in how it applies its capacity, operating only when or where it is most profitable. Of course, the risk is missed opportunities if other carriers' demands for wet-lease aircraft preclude another carrier's ability to increase its capacity through wet-lease agreements. If implemented successfully, the air cargo operation can use wet-leased aircraft for the peaks of its operations; it can reserve its own aircraft, pilots, and other operational assets for the more mature and more consistent operations.

Evolution of the Combi Operation

What Is a Combi Operation?

How is a combi operation *usually* defined? Most often, this term refers to aircraft in which the passenger deck is split in order to provide extra cargo capacity, in addition to that offered by the lower cargo deck, such as that provided in the 747 Combis (-200 and -400). This type of aircraft is typically used more by European carriers than by aircraft operators in various other parts of the world.

In the case of the Lan Chile operation, however, we prefer to broaden this interpretation considerably. Most passenger airlines view cargo on passenger aircraft purely opportunistically, selling it and carrying it whenever they can. An example would be that an average carrier might view a Boeing 767 as a tool for carrying a payload consisting primarily of around 200 passengers, that is, 20 tonnes of people and their luggage. The aircraft may also carry perhaps 5–10 tonnes of cargo on an eight-hour flight.

At Lan Chile, an eight-hour flight is viewed as an opportunity to carry potentially 20 tonnes of people and 20 additional tonnes of cargo. In other words, by splitting the payload in this fashion, a combi operation takes on a very different definition. According to this definition, each deck is devoted to its own type of payload; passengers on top, cargo on the lower level of the aircraft.

In 1998 the *average* split between passengers and cargo weight on the Santiago–Miami route was approximately one-third passengers and two-thirds cargo. The Miami–Santiago route was split roughly evenly between passenger and cargo weight, reflecting the difference in payload densities attributable to directionality. The average number of passengers carried in each direction was equal.

The Combi Operation at Lan Chile

Given that in Chile a passenger carrier was acquired by a cargo carrier, it was quite natural for the carrier to view passenger aircraft as an opportunity to haul more cargo.

Today's cargo operation at Lan Chile is run with the objective of maximizing efficiency vis-à-vis operating costs. In effect, when a Boeing 737-300ER passenger aircraft is used in a combi operation, it has virtually no operating costs directly attributable to the cargo portion of the operation; the marginal fuel cost associated with carrying the cargo load is merely 10 percent of the cargo tariff in most cases. As a result, the carrier makes every effort to ensure that the combi operation carries all the cargo it is capable of carrying on a given route. Because of space limitations, Lan Chile allocates the densest cargo to the combi aircraft. But if there is sufficient remaining cargo demand on the route and if aircraft availability is not an issue, then the following all-cargo aircraft would generally be selected, listed in order of decreasing levels of profitability: 767-300F, 747-200F, and DC-8-71.

This operating philosophy has also governed the manner in which Lan Chile enters new markets. Typically, when a passenger carrier elsewhere in the world opens a new market, it expects to lose money for at least the first year or more of its operations. This is not the case for Lan Chile, because Lan Chile enters a market based on cargo demand, and initially it simply "buys bellies" to accommodate that cargo demand. Once the cargo demand becomes sufficient, as well as stable, Lan begins to operate its own passenger flights. It then grows the passenger business in the standard fashion, but without the major headache of worrying about losing money on the entire operation.

Figure 18-5 Aircraft CC-CZW, a Boeing 767-300ER, Ready for Departure. On the Same Santiago–Miami Flight, This "Combi" Aircraft Can Still Carry 20 Tonnes of Cargo When Carrying a Full 219 Passengers.

How the Combi Operation Functions

Both the cargo and the passenger operation have to deal with the issues of "no-shows" and "standbys." In the cargo operation, the available cargo to be transported will be known within a couple of tonnes several hours before a flight. In contrast, the passenger operation has to contend with no-shows and standbys, the number of which may not be known until the last half hour before a flight departs. Even on an aircraft such as the B-767, this scenario can cause a variance in the passenger payload of as much as two tonnes even with a no-show rate of only 10 percent.

The passenger operation is much more time-critical than the cargo operation. This factor, combined with the greater value derived from the passenger payload weight, explains why the passenger loading process takes precedence over the cargo loading process. In other words, the passenger closeout occurs before final decisions are made with regard to the loading of cargo. The following process description amplifies the issue.

The combi flight dispatch process proceeds as follows:

- Four to eight hours before the departure of a major combi flight, the load-planning group does an estimate of the passenger payload, based on no-show and go-show figures derived from the revenue management system. At approximately the same time, the cargo operations area does a similar estimate of available cargo and uses the information from passenger loads to determine how to palletize and/or containerize the cargo for the combi flights.
- During the time that remains until departure the load estimates are refined. The flight dispatch group prepares flight plans, giving fuel load information back to load planning, so that this group can work more with cargo operations to further refine the expected load.
- In addition, cargo operations prepares standby pallets or containers, which will be held at the side of the aircraft until after passenger closeout.
- At passenger closeout, any available space or payload capability is filled with the standby cargo.

Integration of the Cargo and Passenger Operations Functions

The integration of the passenger and cargo operations has not been without pain and problems for Lan Chile. One of the greatest initial problems that the company had to deal with was finding a way to convince the part of the company that was responsible for passenger handling and service that cargo is not just something that should be tacked onto the operation—that cargo is an integral and key part of the company's profit structure.

A further problem was that in the initial years after the merger of the companies, the passenger operation underwent a radical restructuring. Since the passenger operation was considerably larger than the cargo operation and the issues to be resolved were severe, the bulk of the restructuring on the passenger side was implemented before the passenger and cargo operations were integrated. A key part of the passenger operation restructuring involved the design, development, and reorganization that was necessary to implement a modern System Operations Control (SOC) Center. The SOC is the nerve center of the airline. It is responsible for the management of corporate resources necessary to support its daily global operations. These resources include such items as aircraft, pilots, and flight attendants. The SOC is also responsible for flight planning and flight following, as well as resolving problems resulting from irregularities due to inclement weather, delays, and maintenance/technical difficulties. This process is currently in its final stages of a two-year implementation.

An issue in both passenger and cargo operations has been that both were totally decentralized. The company adopted a policy of centralizing the control of the operation, including flight dispatch and load planning, and the process has been under way on the passenger side as part of the SOC project. As the centralization is completed, the Santiago cargo fleet will also be integrated into the SOC, for crew and aircraft dispatching and control.

The nerve center of the cargo operation is called the Cargo SOC. It controls the cargo operation (that is, cargo that is being loaded, as opposed to coordinating operation of the aircraft). This organization will continue to schedule all cargo activities dynamically. For flights originating outside Santiago, there will be separate aircraft operational control in Miami.

The Synergy between Passengers and Cargo

The fundamental goal of Lan Chile is to find a way to maximize payload profit on every flight. Passengers generate revenue for the airline, but the passenger operation is inherently more rigid and inflexible than the cargo operation. Passenger flights must always

keep to a fixed schedule and routing in order to satisfy both regulatory obligations and service quality goals and objectives. As a result, such flights sometimes suffer from lower load factor. Although cargo flights generate less revenue per kilogram of payload, they can often be delayed and rerouted so as to accommodate demand and maximize load factor.

Some cargo shipments merit greater priority, for example, high-yield and "repeat business." Therefore, passenger flights often carry the high-priority and dense cargo. Since the expenses incurred by passenger flights are paid for by the passenger traffic, the cargo carried usually generates a high profit margin.

As previously mentioned, an interesting phenomenon that occurs in Lan Chile's southbound operations is that even with residual or leftover air cargo, there may not be sufficient load to fill the cargo aircraft if it were to be flown directly to Chile. Therefore, Lan Chile has taken definitive actions to stimulate and develop its business to and from Brazil and Argentina, and to ensure a steady flow of full cargo planes on both north- and southbound flights.

Figure 18-6 shows the strategic cargo flow around which first the cargo airline was built, and which Lan Chile has integrated so well and synergistically into the passenger operation. Of course, there are many other destinations and many other flows—traffic to Europe, bidirectional traffic to other countries, more destinations in the United States, and so forth. But the flow depicted in Figure 18-6 has been and continues to be the engine that fuels the Lan Chile combined cargo and passenger operation.

Figure 18-6 The Strategic Cargo Flow. Heavy Northbound from Chile, Filling the Airplanes Coming Back South, All over the Continent.

Lan Chile's Corporate Strategy for Operations in the Global Marketplace

The approach that the Lan Chile holding company has used to expand in recent years is virtually risk-free compared to other airline growth strategies. Here is Lan Chile's modus operandi:

- an aircraft belly operation to build up business in a new market,
- cargo flights when the belly business is consistent, and
- passenger combi flights when the cargo flights become consistent.

The only other major growth has come from extending existing routes or adding destinations along routes. Lan Chile's approach in this regard is very similar to the gradual expansion of routes that Southwest has engaged in throughout its history, and very different from the bold moves that have resulted in the bankruptcy of many other carriers.

Lan Chile therefore treats the combined cargo/passenger operation as the key strategic tool for expansion and profitability. Because of this strategy the company has increased its valuation by a factor of twenty in less than five years.