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In search of sustainable strategies for low-cost long-haul airlines

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ABSTRACT

This paper explores whether some guiding principles exist to make the low-cost long-haul airline model work (LCLH). Few airlines using the LCLH model have survived, raising questions about the transferability of the low-cost model to long-haul operations. The article contributes by bringing together strategic thinking and various characteristics of past LCLH attempts. The findings suggest that LCLH airlines should seek cost advantages through optimum stage lengths by employing a hub strategy; to facilitate self-connections of relevant customer segments by reducing passengers' perceived connection risk; to operate efficient single-type aircraft on underserved routes at fares that stimulate the "*Southwest Effect*"; and to optimize productivity through flexible operations. Achieving and maintaining a fragile cost model like LCLH requires innovation, clear trade-off decisions to sustain fit, managed growth, and a competent workforce that cements the high fit needed.

1. Introduction

The low-cost carriers (LCC) have expanded markets wherever they have gained a foothold. Although the low-cost business model is not an easy beast to tame, with high failure rates across the board (Budd et al., 2014; Gudmundsson, 1998a, 1998b, 1999, 2004), there are success stories[1] that indicate there are sustainable strategies. Most LCC entrepreneurs refer to the Southwest model in one way or another but often claim to "break the rules" or "adjust" the model to exceptional circumstances, moving the model along the continuum between LC and full service, resembling a hybrid model. History tells us that for entrepreneurs to make the right trade-off decisions and maintain a high fit in activities is one of the most challenging aspects of managing firms (Porter, 1996).

With time, LCCs focus on creating new revenue streams through unbundling and add-on services to raise revenue. This drift from the "pure" LC model means that LCCs are increasingly adopting the service features of network carriers (NC). At the same time, NCs are unbundling their services, resembling more the unbundling culture of the LCCs. Whereas unbundling services is not the critical problem for the LCC model, adding revenue streams by adding service features is, as it constitutes hybridization. Such a trend signifies a break away from generic strategy principles that hold that the best-performing firms are strategic opposites rather than hybrids (Porter, 1980), *i.e.,* the firms should create a unique position in the market.

Setting the differentiators aside and focusing on the drift of LCCs to the hybrid model, brings us straight to the notion of operational simplicity, *i.e.,* avoiding complexity as the key factor underlying the LC model. In other words, can LCCs keep to the low-cost model yet offer valuable service features and generate ancillary revenue without adding costly activities and increasing complexity? Incidentally, some added service features have a low cost yet add substantial value for which customers are willing to pay, 1) priority boarding; 2) more leg space in the emergency exit seat rows; 3) advance seat selection; 4) baggage; and 5) gift items, food, and beverages on board. These constitute features, or service activities, that fit well with the basic activities of an LCC. However, there is another set of features that have a poorer fit and more significant cost implications, 1) online connections; 2) frequent flyer programs; 3) business class/premium services; 3) alliances; 4) hub operation; 5) serving primary airports; and 6) long-haul flights. We can argue that the latter set of activities defines the difference between an LCC and a hybrid carrier. In other words, the low-cost long-haul carrier (LCLH), on the continuum between low-cost and differentiation, moves a carrier towards the hybrid model. Yet, we will argue in this article that LCLH is a unique business model that is not a pure extension of the low-cost short-haul model (LCSH).

To seek some guiding principles about the LCLH, we explore past cases, the academic literature, and use established strategy frameworks. The paper is structured as follows after this introduction: defining LCLH types, the evolution of the LCLH, the need for feed and the Southwest Effect, the LCLH network structure and strategic sustainability, do sustainable strategies exist for LCLH, and conclusion and future developments.

[1] Southwest Airlines in the USA, Ryanair and easyjet in the EU, Air Asia in Malaysia, and JetStar in Australia.

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Table 1
Typology of LCLH airlines.

- Entrepreneurial no-frills LCLH (**E-LCLH**) started from scratch by new airline entrepreneurs (Norse Atlantic, Play, WOW air*, Zoom*, Laker*, Oasis*)
- Domestic low-cost offshoot - LCLH (**LC-LCLH**) started from existing LCSH operators as a separate unit (Air Asia X; Indonesia Air Asia X*; Norwegian LH*; Thai-Air Asia X);
- NC offshoot LCLH (**NC-LCLH**) started from existing network carriers (Jetstar, Level*, NokScoot*, Scoot);
- LC long-haul extension (**LC-LHE**) started as a network extension of existing short-haul airlines Southwest Airlines [Sacramento – Honolulu; Baltimore - Oakland]; JetBlue [Fort Lauderdale - Lima; New York - Guayaquil; Boston – San Francisco; London, etc.]).
- NC premium hybrid offshoot LH (**NC-HYLH**) started by network carrier (Open Skies*)
- Entrepreneurial premium hybrid LH (**E-HYLH**) started from scratch by new airline entrepreneurs (EOS*, MaxJet*, L'Avion*, MGM Grand Air*, Silverjet*)
- Two-tier charter LCLH (**C-LCLH**) starts as scheduled long-haul operations of an existing charter airline that retains the charter operations (LTU* and TUIfly).

* Defunct, acquired, stopped scheduled operations.

Table 2
Asian low-cost airlines' frequencies over flight duration.

Airline	< 4hrs	4–5 hrs	6-7hrs	8-10hrs	>10hrs	Type
Air Asia X	2%	42%	38%	20%	0	**LCLH**
Thai Air Asia X	0	100%	0	0	0	LCSH
Jetstar Airways	90%	4%	4%	1%	1%	LCSH
Jetstar Asia	83%	17%	0	0	0	LCSH
Tigerair	80%	20%	0	0	0	LCSH
Scoot	40%	35%	15%	10%	0	**LCLH**

Source: Calculation based on OAG, 2014.

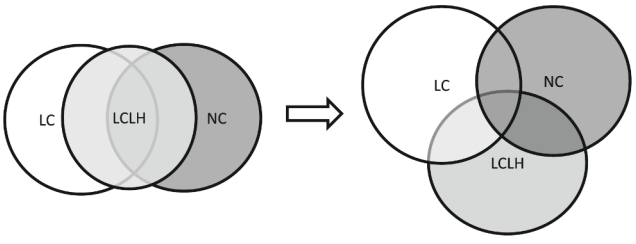

Fig. 1. Finding sustainable LCLH strategies through innovation.

2. Defining LCLH types

Before going further, it is vital to recognize five distinct groups of LCLH carriers and two related hybrid models. We understand from airline history that the LCLH carriers' origin influences the survival of carriers. In Table 1, we observe different typologies of LCLH carriers.

The list shows that E-LCLH lacks sustainable success, despite fast growth in some cases, e.g., WOW air.[2] Quoted reasons vary, ranging from inadequate funding during the teething years (usually counted as the first three years) to embracing hyper-growth that outstrips resources and creates vulnerability in market downturns (Spero, 2019). However, offshoot LCLH airlines are not as readily bankrupted in the early years, showing greater staying power regardless of losses.

An essential aspect of defining LCLH airlines is the average distance flown. LC-LHE carriers might offer only a few long-haul routes that have relatively little overall impact on the operation or profitability of the carrier. Others have an LCSH base like Norwegian and Air Asia X but start a separate long-haul unit that is either integrated or semi- to fully separated (e.g., Air Asia X has a separate financial report for the LCLH, but Norwegian merges the LH and SH operations in a single financial report).

To appreciate the different operating configurations of the LCLH, Table 2 shows the distribution of flights for several airlines. From the table, it is apparent that in Asia, there is only one airline that is a true LCLH, namely Air Asia X (58% of flights > 6 hrs.), and one that is close, namely Scoot (25% of flights > 6 hrs.). Other airlines like Jetstar Airways are predominantly short-haul but offer few long-haul routes (6% of flights > 6 hrs.). In other words, when analyzing LCLH, it is paramount to consider the proportion of long-haul flights to draw lessons about the business model's performance.

Research has identified aspects of the LC business model that are transferrable to LCLH operations and those aspects that do not transfer so readily (Moreira, O'Connell, and Williams, 2011). However, this body of work has not offered clear-cut answers and greatly expanded the number of questions surrounding this intriguing strategic problem. Should we define the LCC model based on activities performed or other global criteria? In fact, with the unbundling of fares and additional "low-cost" activities aimed at revenue maximization, as well as recent attempts at creating LCLH airlines, the definition of a *low-cost long-haul airline* needs some rethinking.

Focusing on the LCLH business model, Fig. 1 suggests that part of the problem is that the model is seen as a combination of the NC and LC business models (Fig. 1(a)), a hybrid, rather than having its particularities (Fig. 1(b)). Traditional low-cost strategies, based on short-haul operations, are not transferable in all aspects to LCLH, requiring new unique strategies and business model components.

To arrive at a definition of LCLH that is more general than merely what activities are performed or not performed, we must revert to basic strategy principles and, in particular, the underlying differences between the generic strategies and how the activities of the firm play a role in performance (Porter, 1980, 1996). The primary strategy tenant behind low-cost airlines is simple, to eliminate all low value activities that are not essential to the core product and ensure a high fit among all the remaining activities. The core product is a seat from A to B, and to deliver this product, we need aircraft and airports that meet complex laws and regulations surrounding air transport. Offering only a seat between two airports keeps costs low, and the customer's primary need is satisfied. However, the need for more services increases with flight duration, so the LC model, according to many, is unlikely to work in its pure form on long-haul routes.

We know that a segment of the market, being highly cost-conscious, would be fully satisfied with only a seat. Logically we can infer that this segment becomes smaller and smaller as flight duration increases. In other words, more and more sophisticated wants must be satisfied with increased flight duration. The problem is that every service feature requires people, processes, programming, staff interaction, and problem-solving. Therefore, separating a service feature's direct- and indirect costs is necessary to assess the total cost impact. A direct cost is a dollar spent on putting the service feature in place and operating it. In contrast, indirect cost, in this context, is associated with increased complexity stemming from the interaction of one more service process with other aspects of operations, a far more challenging aspect to measure and, therefore, less well understood.

According to Porter's (1996) arguments, the fundamental aspect of any strategy is to ensure that all activities performed, and added over time, have fit with the generic strategy. Thus, the manager's role is to make the right trade-off decisions and decide what to do and what not to do, *i.e.,* what activities to perform and what activities not to perform, for the very purpose of maintaining the fit of the activities and hence a superior strategic position through high perceived value by target customers.

Airline history tells us that sustainable LC airlines (e.g., Ryanair, Air Asia, Norwegian, and Southwest Airlines) seek empty market spaces to generate new traffic, enlarge the "pie," and avoid direct competition as much as possible. In this way, the strategy revolves around serving secondary markets, operating monopoly (exclusive) routes without charging monopoly prices, *i.e.,* serving markets that competitors do not see as attractive. Consequently, LCCs enlarge the pie and overlap less with the

[2] Play started operations on 21st of June 2021.

existing customer markets of the NCs. It is not until such niche markets are mature that boundaries need rethinking, and longer-haul routes enter the decision process for existing LCCs (*i.e.*, Norwegian and Air Asia), sometimes causing a reaction from the NCs in the form of LC subsidiaries (*i.e.,* Singapore Airlines => scoot and NokScoot; SAS => Snowflake).

3. The evolution of low-cost long-haul airlines

LCLH airlines have a long history that originated well before the definition of the LCLH as a business model on its own. One of the earliest ventures that resemble LCLH was Loftleidir-Icelandic (1944–1979) which offered flights between Europe and the USA through Iceland (using ICAO 6th Freedom[3] rights), undercutting the prevailing IATA fares offered by other airlines in the 1960 s. Loftleidir was the first carrier to use the concept of low fares on the North-Atlantic route to the USA and the first carrier to introduce a "low-cost aircraft" in 1964, a Canadair CL-44 turboprop stretched by 29 seats (to 189 seats) 15 seats larger than the B707-320 jet at the time (Ludviksson, 1991).[4] The airline's slogan was "we're slower, but we're lower" (Asgeirsson, 1984) due to its use of turboprop aircraft and the low fares. It also became known as the "hippie airline" due to many young people traveling between the US and Europe, taking advantage of the low fares.

The second remarkable carrier was Laker Airways (1966–1982), an international UK operator that offered low fares on the North Atlantic after winning one battle after another with the British Government and the United States for landing rights to open up routes and offer low fares. The competitors, Pan American, Trans World Airlines, and other *trans*-Atlantic carriers, reacted quickly and slashed their fares, as competitors do. While economic conditions remained stable, Laker survived, but in 1979, jet fuel prices rose dramatically, and the British pound devalued. In this adverse environment, Laker went ahead with significant fleet enlargement, eventually causing its demise (Banks, 1982).

The third airline was PeoplExpress (1981–1987), a US-based domestic LCC that offered long-haul low-fare flights starting in 1983, between NY and London and Brussels, using Boeing 747 aircraft. As a hub for long-haul flights, Newark acted as a feeding hub to fill its Boeing 747 aircraft. Due to this, the airline is considered the first airline to extend the traditional domestic low-cost model to long-haul routes, while Qantas was the first to extend the traditional network model in 2006 under its LC brand Jetstar (NC-LCLH).

Although Laker and PeopleExpress operated a form of LCLH, Laker focused entirely on the North Atlantic (E-LCLH), while PeoplExpress had a large US domestic base with proportionally limited international operations (LC-LHE). All these services were a success in terms of growth. However, the last two mentioned airlines over-expanded, juxtaposing profitability for hyper-growth, eventually contributing to their demise.

The early new airline entrepreneurs starting long-haul operations used mainly two distinctive business models, the no-frills low-cost or the all-business class premium service. Whereas Laker (1966–1982), PeoplExpress (1981–1987), Zoom (2002–2008) were examples of the former, MGM Grand Air (1987–1995), eos (2004–2008), Maxjet (2003–2007), Silverjet (2006–2008), and L'Avion (2006–2009) fall into the latter category.

Hybrid models, blending low-cost and full-service on long-haul routes, tended to reflect the strategic drift of carriers from the LC or the premium/network model. MGM Grand Air (premium carrier) is a case in point. Due to the unprofitability of the B727s 33 luxury seat configuration with a one-way fare, set at $1,400 in the beginning, MGM-Grand Air acquired the larger DC-8 62 s in 1990 and changed the seat configuration to 35 Grand Class First and 40 Grand Class Coach seats at $600 for the single one-way fare (Svetkey, 2015). In other words, the airline, in an attempt to turn a profit, drifted towards hybridization.

LCLH and HYLH airlines, started from scratch by entrepreneurs, had a particularly dismal performance record. As we mentioned before, failed attempts include WOW air, Oasis Hong Kong Airlines, Zoom Airlines, eos, Maxjet, and Silverjet, to name but a few. WOW, Oasis and Zoom were LC operations, while eos, Maxjet, and Silverjet were full-service type hybrid carriers offering lower fares for premium service, competing with NC business and first class seats and private jets to some extent.

Thus, all-business-class HYLH airlines have had no sustainable success to talk of so far. What seems clear is that offering high service levels at comparably low fares depends on a low-cost structure to be profitable. How to achieve this balance has not been discovered. In other words, historically, an all-business class start-up trying to attract the more price-conscious segment of the NCs premium customers by offering more service at lower fares does not appear to be a sustainable business model, as neither sufficient overall value nor low enough costs to sustain the operations seem to be achievable in the target customer segments. Some explanations are that business travelers generally look for FFP, network scope, frequency, and flexibility, and premium service carriers cannot compete effectively with the NCs on these factors. Furthermore, the activities that sustain high comparable value for customers are not readily performed differently at a lower cost.

Another type of carrier is the one started by an existing LC airline. For example, Norwegian Long Haul[5] and Air Asia X had a solid short-haul[6] base. Norwegian Air Shuttle started operations in 1993 and expanded to long-haul operations from 2013 to 2020 when this service was closed down. The long-haul flights operated from distributed crew bases (Bangkok, New York, and Fort Lauderdale). Norwegian was profitable for seven years until 2014, when losses amounted to NOK 1,050 million (CAPA, 2015b), coinciding with the increase in long-haul flights and associated problems with aircraft deliveries (Boeing 787 s). Following the closing down of Norwegian long-haul operations a new carrier, Norse Atlantic, was formed a group of investors that took over the leasing agreements of the B787 aircraft of Norwegian and other assets.

Most LC ventures enjoy great success measured in growth, making some entrepreneurs overconfident and overly optimistic, causing large risk tolerance in the drive to keep the growth momentum going. Controlled growth is one aspect most airline entrepreneurs do not take to heart when copying the Southwest business model. Although activities performed and not performed are the usual blueprint for understanding fit in the Southwest business model (Porter, 1996), such a list commonly omits the cement that keeps the fit in place, namely controlled growth (Gudmundsson, 1998a) and a carefully orchestrated employee culture (Gudmundsson, 1998a; Hallowell, 1996; Quick, 1992).

Fig. 2 shows the growth index rate for the three LCLH carriers presented above (*see* financial and traffic data in Appendix A, Tables A1, A2

[3] A 6th Freedom right constitutes the combination of the 3rd and 4th Freedom rights through the country of origin (AC registry). This means that KLM for instance can haul passengers from China to New York, through Amsterdam.

[4] To their benefit, in the early years of the jet age, there was a significant fuel efficiency gap between large turboprop aircraft like the Canadair CL-44/DC-7, Loftleidir used, and first-generation passenger jets like the Boeing 707/DC-8. This difference and comparably low financing costs of the CL-44 aircraft helped Loftleidir-Icelandic maintain a lower cost structure than the leading competitors. Even after adjusting for the slower speed of the CL44J-Stretched, it was still 46% more fuel efficient than the Boeing 707-320B. Although reducing over the years, this gap existed until the DC-8–60/70 entered service in 1982, which was incidentally the next series of aircraft operated by Loftleidir.

[5] Norwegian Long Haul AS and Norwegian Air International Limited operate Boeing 787 the former is registered in Norway and managed by Norwegian Air Shuttle ASA, while Norwegian Air International is registered in Ireland and has its own head office in Dublin. The two companies have separate Norwegian air operator's certificates. In February 2014, the Irish subsidiary received an operating licence and an Air Operator Certificate in Ireland.

[6] For sake of simplicity, in the remainder of this article, we use short-haul for traditional LC airlines although some have average stage lengths exceeding 2 h flying time; medium-haul airline is one with 2–5 h average flying time, and long-haul airline one with>5 h average flying time.

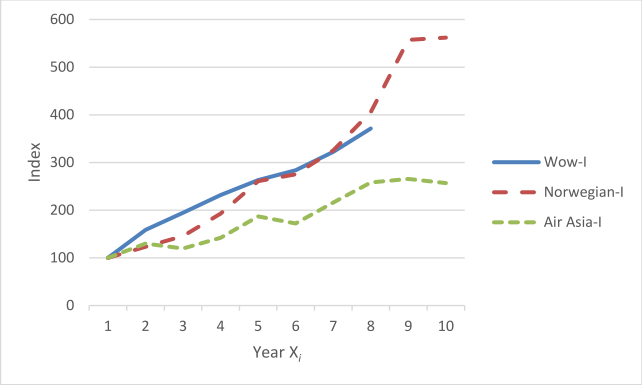

Fig. 2. Growth rate Index E-LCLH.

and A3). It shows that Norwegian had the fastest growth,[7] followed by Wow air and Air Asia X. Only Air Asia X is still operating in 2022, with Wow air declaring bankruptcy and Norwegian closing down its long-haul operations in 2020. Growth in low-cost airlines is generally considered a success factor, even though almost all airlines chasing hypergrowth failed. Southwest, the only low-cost airline that has survived since the first wave of entry in the US domestic market, set realistic growth targets that were modest compared to most other low-cost airlines at the time (Gudmundsson, 1998a). One of the reasons for this tendency of managers to chase growth is the assumption that airlines enjoy economies to firm scale, for which little evidence exists (Levine, 1987; Oum and Zhang, 1997) despite the existence of clear scope and density economies and variable-cost reductions in specific situations following M&A (Gudmundsson et al., 2020).

4. Need for feed and the *Southwest Effect*

Studies have still not sufficiently examined the price elasticities of demand for LCLH services on secondary routes to answer if a *Southwest Effect* (Mertens and Vowles, 2012) accelerates demand similarly for LCLH as for LCSH. The Southwest Effect holds that when fares go below a certain point, an upward kink in the demand curve occurs, representing a leap in demand. Despite the lack of research in this area for LCLH, there is some case-based evidence, e.g., when Air Asia X attempted to increase fares in late 2014, load factors dropped from 85.8% in the 1st quarter of 2014 to 73.6% in 1st quarter of 2015 (CAPA, 2015c).

One crucial debate regarding LCLH is whether such carriers should serve primary or secondary airports, a hallmark of the LCSH model. The history of LCSH would point to the latter. However, secondary airports are less likely to generate a sufficient feed to serve long-haul routes with widebody aircraft, raising the question if such operations are more sustainable using an efficient long-range narrow-body aircraft on shorter flight segments over an intermediary hub airport. Services by low-cost airlines through secondary airports have grown exponentially over time, and passengers are increasingly ready to self-connect at the same time that booking sites have emerged that facilitate the virtual combination of flights over airports. Thus, if LCLH carriers can take out the passengers' perceived risk of self-connecting (fear of missed connections) and airport service providers provide sufficient ease of transfers (take out the hassle of collecting bags and check-in again), it stimulates LCLH services.

Germany's Cologne-Bonn Airport offered a self-service transfer system as an airport service, not an alliance or code-share between airlines. The airport introduced such a transfer system between LCCs and even operated a flight search website to help customers find and connect suitable flights (CAPA, 2015a); however, the service terminated after Germanwings withdrew from the airport. In 2019 the project was reinstated in collaboration with a booking website (KIWI.com)[8] to facilitate passenger self-connections again. LCLH carriers need to stimulate self-connections, without the extra costs of online[9] connections and alliances (code-sharing), through "missed connection" insurance and airport-driven connecting services. There are two objectives: to enable LCLH to operate in medium-sized secondary airports near large cities to avoid direct competition with the NCs and to capture both originating and connecting passengers in airports dominated by LC airlines.

Instead of internalizing the costs associated with alliances and code-sharing, LCLH operations would be better reinforced through airport-centered connecting services to reinforce network effects because an alliance between one or two carriers connecting over an airport is not sufficient to maximize potential connections over a small hub and meet at the same time customers' low total fare objective. To maximize the total potential connections and enable the customer to select any suitable flights that fit together conveniently and minimize the total fare, an independent service provider such as the airport or a specialized booking site would be optimal.

LCLH services help low-cost airports to enhance and facilitate self-connections to grow the airport. In contrast, NCs provide care in case of delays and problems. Thus, reducing the perceived risk for passengers using LCLH when things go wrong is paramount without internalizing such costs in the LCLH business model. Taking this perceived risk out of the equation, at a reasonable cost, for the passenger is an integral part of making the LCLH model sustainable.

5. The LCLH network structure and strategic sustainability

If asked why there have been so few success stories and few attempts to start LCLH airlines? The answer is that all the cost savings we can transfer from the LCSH to the LCLH model add up to a lower cost difference between NCs and LCLH than the LCSH. Moreover, if the LCLH operates from a major airport in direct competition with the NCs, only a significant cost difference would sustain direct competition. History tells us that such a position is almost unattainable for LCSH carriers; therefore, LCLH is no different. Hence, sustainable LCCs create unassailable fortress positions in secondary markets to avoid direct head-on competition with NCs in major airports.

The cost difference between the LCLH and the NCs is more negligible than LCSH because the start-up costs are higher, necessitating a more substantial initial financial base. In addition, some advantages of the LCSH model disappear when serving long-haul routes, such as shorter AC turnaround times, higher aircraft utilization, and greater seat density. Even cost disadvantages are associated with LCLH, such as fixed airport costs divided on fewer frequencies, and if the feed is secured through alliances, it can be costly and strategically constrain the LCLH carrier (*i.e.,* GOL). In other words, innovation is needed to reduce costs in the LCLH model to avoid cloning the setup of a "traditional" NC (*see* Fig. 1).

[7] The growth rates for Norwegian include the short-haul operations.

[8] "Besides being able to book two flights from a single source, Kiwi.com users also enjoy additional benefits: Kiwi.com ensures sufficient transfer time when flights are combined. If, however, the first flight should be delayed and the connecting flight missed, the Kiwi.com guarantee applies: the online travel agency will take care of replacement flights, financial reimbursements or, if applicable, hotel accommodation. Kiwi.com's priority is the passenger, and this service significantly improves the overall airport experience." https://www.cologne-bonn-airport.com/en/press/press-releases/2-flights-2-airlines-but-only-one-booking.html.

[9] *Online* connections are connections between flights on the same airline, organized by the respective airline. Whereas, *self-connections* are connections made by the passenger, and not organized by the airlines.

Table 3
LCSH model features difficult to transfer to LCLH.

A) **Turnarounds** (short turnarounds lead to better aircraft utilization, lower crew costs, and fewer aircraft needed to serve the network; on LH flights turnaround time increases linearly with sector length and aircraft size).
LCLH tenant 1*: flexible scheduling (flights leave and arrive at different times to the same destination).*

B) **Aircraft utilization** (longer sector distances cause lower direct cost advantages over legacies)
LCLH tenant 2*: operate mini-hubs that cut longer distances in half enabled by favorable geographical location, i.e., Play airlines, by forging a combination of shorter sectors through intermediary hubs, using medium-sized extra range smaller aircraft (i.e., B737Max, A320Neo), and a single AC type fleet. This approach has regulatory hurdles for airlines in geographically disadvantaged places that may require subsidiaries in various countries, i.e., similar models as Air Asia X and Norwegian.*

C) **Airport charges** (LCLH carriers tend to operate in similar airports as the network carriers and incur higher costs because of lower frequencies)
LCLH tenant 3: *operate from secondary airports with lower airport charges and faster turnarounds due to less congestion than in large hub-airports.*

D) **Connections and alliances** (LCLH network is highly dependent on feeding to secure high load factors, especially if operating from secondary airports, so they tend to forge costly alliances)
LCLH tenant 4: *operate from secondary airports but forge "virtual" connection services through the airport as well as internet booking services (i.e., Cologne model) and "connection insurance."*

E) **Seat density** (on longer flights, passengers are more concerned about leg space causing the LCLH to offer either more space at the outset (e.g., WOW air and Play) or more space later in response to customer demands without offsetting reduction in revenue.
LCLH tenant 5: *use the MAERSK model* and sell variable seat pitches and cabin locations in different pricing categories. The Key is to keep the price increments reasonable and charge a variable premium for as many seats as possible in the plane.*

F) **Simplified fleet** (LCLH network will inevitably operate variable stage lengths, making it challenging to operate only one AC type)
LCLH tenant 6: *operate a mini-hub (or a system of mini-hubs) to optimize aircraft size around one flexible type.*

G) **Frequencies** (it is easier to offer high frequencies on short haul than long haul because of lower start-up costs and route demand risk, thus, LCLH will lack comparable frequency as network carriers, attracting less premium traffic that seeks flexibility and network coverage)
LCLH tenant 7: *operate mini-hubs that enable density and scope economics and therefore more frequencies and higher load factors with smaller aircraft.*

H) **Premium service** (LCLH usually seek premium traffic because of difficulties making the LC model work. Offering premium service and large sleeper seats has costs associated that may be proportionally larger than the extra revenue generated compared to the network carriers, causing lower margins for the LCLH)
LCLH tenant 8: *unbundle by focusing on the primary value, the seat pitch, avoid services associated with NC business class like lounges, and sleeper seats. Unbundle ticket flexibility from seat pitch as some passengers will pay for ticket flexibility but not more seat pitch, and vice versa.*

* MAERSK (1969–2005) offered variable seat pitch in several price increments. The configuration was as follows for B737-700: 1) Small 27,5 in – 72 seats; Medium 31,5 in – 40 seats; Large 35 in – 12 seats; X-Large (business class seats) 35 in – 8 seats. Upgrade was DK 200 from small to medium and DK 200 from medium to large, or DK 400 from small to large.

When distinguishing between LCSH and LCLH, some inherent differences affect the cost base and erode the cost advantage of the traditional low-cost model. One can name higher crew and security requirements, longer turnaround times, more expensive airport facilities, less seat density, need for feed, similar aircraft utilization, lower comparable frequencies, and a tendency to offer costly business or premium class services at low fares.

Thus, the cost advantage of a short-haul LC airline, with a high degree of fit among business model activities, is not easily transferrable to LCLH (Morrell, 2008). The main problem is maintaining the high productivity advantage that the short-haul LC airlines enjoy over the NCs and stimulating enough demand to distribute operating costs over as many seats as possible. Here lies the paradox: LCLH carriers need to get costs very low to offer low enough fares to stimulate "new" demand[10] in secondary markets, yet the level of demand in such markets is unlikely to support widebody aircraft with low costs per seat.

Moving to the revenue side, the LCLH has two methods to vary fares to suit different customer segments. One is through the traditional yield management system (discriminatory pricing), and the second is through unbundling services (customer propensity to buy extra services). Thus, the base fare is complemented with ancillary revenue from priority boarding, hold baggage, seat selection, inflight merchandise, food, and beverages. Unbundling has helped low-cost airlines elevate the fare for some customers to a comparable level to the NCs, while other customers can enjoy a competitive fare if avoiding all the extras. Unbundling helps the airlines to benefit from a customer decision bias based on the tendency to focus on the price of each item and not the total trip cost.

Unbundling used to be the domain of low-cost airlines. However, most NCs have taken it up, offering competitive fares for the core product and then unbundle similarly as the LCs, yet offer on top of this features that are important to business and connecting passengers such as frequent flyer programs, airport lounges, baggage transfer, and seamless connections worldwide. Thus, the unbundling approach no longer provides an advantage for the LCCs unless the operating cost differential is high, something that is more difficult to achieve on long-haul routes by the LCLH carriers.

Strategically, we can say that neither group of airlines, LCCs or NCs, is moving to a stronger strategic position, as the strategy differences, low cost on the one hand and differentiation on the other, become increasingly blurred. Thus, the unbundling trend is causing deterioration in the strategic position of both the LCCs and the NCs. One consequence is the reduced ability of the NCs to charge a price premium; at the same time, with more service features offered, the simplicity of the LCC model erodes, pushing up unit costs. LCLH carriers that achieve high perceived value in the customer's mind can do so only based on a high perceived price differential on service features compared to the network rivals. Taking the unbundling model too far in this context by losing sight of total fare can be detrimental to the ability of the LCLH to stimulate demand in secondary markets. In other words, the lesson learned from Southwest must always be that the LCC is not competing with other air carriers but rather the opportunity cost of not using the service (e.g., instead of air travel to do something else, sit in front of the television, to go to the local theme park, or to take a driving holiday).

Hub and spoke networks work as a natural deterrent to entry of LCLH, providing the NCs with advantages from hub congestion, scope and density economies, and economies to aircraft size. Density economies allow the NCs to gather traffic from many connecting city pairs through one central airport and operate larger aircraft with higher load factors. Business passengers seek flexibility and seek a global network reinforced by branded alliances. Passengers that frequently travel within the same network on behalf of their employers receive personal benefits through their frequent flier programs. LCLH carriers lacking such a program and offering few network points and not members of the branded alliances are at a disadvantage. This unique position of the NCs provides a full positional advantage that creates a critical competition barrier for LCLH.

When LC airlines started exploiting the liberty of deregulated markets, there were two types of new airlines: the "warriors" that competed head-on with the network airlines and the "hedgehogs" that avoided direct contact. The former group soon faced innovative competition tools that neutralized the threat of the low-cost carriers (Gudmundsson, 1998a), while the latter type, e.g., Southwest Airlines, fared better. The new competition tools invented at the dawn of deregulation were yield management systems, frequent flyer programs, computer reservations systems (now GDS), and hub and spoke operations (Borenstein, 1992; Smith et al., 1992).[11] All of which strengthened the ability of incumbent airlines to mount effective competition with lower cost rivals.

What later followed was code-sharing and alliances aimed at maximizing economies of density and scope, *i.e.,* to enhance network effects.

[10] To invoke the Southwest Effect.

[11] Most of these tools were initiated by American Airlines.

In this environment, a "warrior" would instigate head-on competition with the NC, offering much lower fares than prevailed before entry. Thanks to yield management systems, the NCs could respond by offering the same fare on a portion of the available seats on each flight, thus, matching the LC airline's capacity in a city-pair market and still earning high average revenue per flight. This ability still poses a problem on long-haul routes, as it is almost impossible for an LCLH airline to match the frequencies of NCs and branded alliances in major hub airports around the globe.

Contrariwise, the "hedgehog" approach exemplified by Southwest was to avoid direct competition, focusing instead on markets that no NC was interested in entering. Kim and Mauborgne (2005) coined this as the Blue Ocean strategy, *i.e.*, to seek untapped markets. No low-cost airline in the United States that embarked on direct competition (Red Oceans) survived for a long. However, those that entered new market spaces and avoided the competition (Blue Ocean) seemed to fare better, with one survivor remaining since the first wave of entry to interstate markets (1978–1987), Southwest Airlines (Gudmundsson, 1998a). The lesson learned was that sustainable hedgehog strategies of low-cost players generate new markets that are not attractive to mainstream airlines; thus, LCCs mostly enlarged the pie in the beginning.

Over time the LCs, with sustainable strategies, grow out of their niche in secondary markets, usually detected by mature growth curves, a significant increase in average stage lengths, operations into major airports, and operating more routes with more competitors (serving more primary routes) (Gudmundsson, 1998a). The NCs have four options to respond if LC competition intensifies: 1) reinforce the network model, 2) start a price war, 3) start an LC subsidiary, or 4) do nothing.

However, basic strategy principles tell us that NCs should focus on differentiating themselves from the LCs, reinforcing the network model, and not replicating them. Starting a price or capacity war through an LC subsidiary will not work in the network carriers' favor, as history has shown through the high failure rates of such carriers.

Research has shown that offshoots generally deviate from the LC model in subtle ways, keeping them well above the cost levels of competing LCs. Such carriers usually lack full autonomy and separation from the parent and often create a brand conflict with the parent brand in the customer's mind (*i.e.,* Ted - United and Continental Lite - Continental). For example, scheduling decisions may be constrained to prevent cannibalization of the parent's network (*see* Morrell, 2005), and in some cases, inefficient hand-down aircraft are used (e.g., Buzz-operated offloaded BAe 146 aircraft from KLM).

6. Do sustainable strategies exist for LCLH?

A question arises if the LC model can traverse the mobility barrier between short- and long-haul operations. The history of PeoplExpress, Norwegian, and Air Asia X all underscore that there is a mobility barrier between short- and long-haul operations, difficult to overcome, and maintain profitable operations. Just as Southwest Airlines' business model emerged from constraints, the same innovation must occur for LCLH. The crucial question is how sustainable competitive advantage, as demonstrated by Ryanair and Southwest Airlines for LCSH, can be achieved for LCLH.

One thing is clear the LCLH airlines need to keep fares so low that they open new markets by attracting passengers that are indifferent to frequent flier programs of the alliance groupings (infrequent fliers) such as price-conscious business travelers from small to medium-sized companies (SMEs) and leisure passengers that would otherwise not have flown. The challenge is performing a sufficient number of activities in the business model differently to attain major cost savings compared to the NCs.

In this context, one major dilemma is how to achieve sufficient network scope expected by some segments of the market, a formidable barrier due to the cohesive alliance networks of the competitors. In other words, the cost of expanding the network scope of LCLH airlines poses a particular challenge: the higher the scope, the higher the costs because of the more significant administrative burden, marketing costs, distribution costs, and fleet costs associated with each new destination. Whereas more frequencies per destination lower station costs, LCLH is unlikely to achieve such cost advantages apart from the home base due to inherently lower frequencies than the NCs.

Cost advantages in the airlines come from two primary sources: high internal fit of activities performed and scale economies. Economies to firm size are not strong in the airlines (Caves et al., 1984; Keeler and Formby, 1994; Gudmundsson et al., 2017; Oum and Zhang, 1997; Levine, 1987). However, economies of scope and density came into effect through the hub and spoke operations, where each spoke is seen as a separate product producing scope economies, while the centrality of the network when joining together all the spokes, produces density economies (Levine, 1987). It is through such configuration that airlines attain *economies to aircraft size*, assuming that operating one large aircraft with many seats is less costly than operating two smaller aircraft with the same number of seats (Nicol, 1978). However, as argued earlier in this article, LCLH is more about sustaining high load factors and growing frequencies using highly efficient single-aisle aircraft to maximize scope and density economies through secondary hubs.

Considering economies of density, many previous attempts at the LCLH model point to the difficulties encountered by inadequate feed. In other words, low fares on long-haul routes depend on seat density and large fuel-efficient aircraft to reduce costs per seat (Nicol, 1978). However, hub-to-hub routes expose LCLH carriers to head-on competition with the network carriers in their virtually unassailable fortresses if we use the terminology from the Art of War by Tzu (2008). One way to address the problem is to establish secondary hubs, *i.e.,* the WOW air and Play's approach[12], located about halfway between major markets, where flight distances are optimized for fuel burn and aircraft turnarounds (around 3000 miles) (Filippone, 2008; Park and O'Kelly, 2014). This way, savings are made by carrying less fuel and operating more fuel-efficient middle-sized aircraft over shorter distances for better utilization.

For long-haul, such intermediary hubs entail a convenient geographic location for sixth freedom[13] traffic, exemplified by the Middle-East hubs (Dubai, Abu-Dhabi, Qatar), and on the perimeter of Europe, Istanbul (Turkey), Keflavik (Iceland), Athens (Greece) and Helsinki (Finland). The objective must be to gradually expand the sphere of coverage while operating the lowest-cost aircraft with the lowest total trip cost in the network and benefit from density and scope economies.[14] However, such a setup is complicated if the airline is geographically disadvantaged due to restrictive air service agreements (Haanappel, 1979). Hence, carriers like Air Asia X (established in Malaysia), Indonesia AirAsia X[15], Thai AirAsia X), and Norwegian[16] (Ireland-based Norwegian Air International and United Kingdom-based Norwegian Air UK) tried to circumvent the problem somewhat by establishing subsidiaries in various countries.

In addition to "low cost" 6th freedom hubs, LCLH airlines need to

[12] We could argue that both Emirates and Etihad are pure examples of this strategy that over time has made Dubai a major hub and allowed Abu Dhabi to follow the same trajectory.

[13] The 6th Freedom is an unofficial freedom realized through the combination of the 3rd and 4th Freedoms through the home country A. Thus, allowing the transport of passengers from country B to country C normally not allowed in ASAs involving carriers from country A.

[14] Density economics entails the ability of an airline to bring many flights through a central airport where passengers can change planes. The idea is that few passengers from many points of origin (including local origin) can fill one large plane out of the central airport.

[15] Ceased scheduled operations in January 2019.

[16] Norwegian's long-haul flights are vested in several wholly owned subsidiaries with their own air operator's certificate (AOC) but common branding.

maximize exclusive (monopoly) routes[17] and gain first mover advantages on routes that connect major (secondary airports in major cities) and secondary markets (medium-sized cities), where network airlines are unlikely to follow. This way, the LCLH network gains from segment length optimization, density economics, and unassailable monopoly routes in the spirit of *Blue Oceans* (*see* Kim and Mauborgne, 2005), a strategy popularized by sustainable LC carriers like Southwest, Ryanair, and JetBlue.[18]

The question is if some guiding tenets exist for the LCLH model to work (*see* Table 3). Designing the LCLH business model is about the interactions of the business activities as much as the individual activities performed, coined as fit by Porter (1996). The service features and operational characteristics, often listed as part of the LCSH model, can be "broken" in the LCLH model so far as *fit* is safeguarded. For example, LC carriers sell more space at emergency exits to create a revenue stream and a service feature using a regulatory-required aircraft configuration.

Similarly, creating revenue streams from selling food and merchandise on board does not threaten *fit* as much as offering online[19] connecting flights, and selling priority boarding does not threaten fit as much as forming alliances with other airlines. Online connections and alliances cause suboptimal timetables due to the need to coordinate flights in the network or between networks instead of maximizing AC utilization. Thus, strategic constraints are introduced in decision-making to maintain trust and create mutual value with partners, adding extra costs due to more services for stranded passengers when connecting flights are late or canceled when baggage is lost in transfer, and when accounting for connections that depend on different time-belts and other operating constraints. Such service features and associated activities cause deterioration in fit, operational complexity, and a reduction in aircraft utilization, which should be the mantra for the LCSH and LCLH business models.

Unbundling service features that involve little choreography of resources gives passengers personalized choices, upping the perceived value while creating extra revenues. Such a setup does not fundamentally threaten the cost structure. In other words, to maintain very high productivity and operational simplicity (fundamental to low costs), as mentioned before, LC airline managers need to make careful trade-off decisions when it comes to adding extra service features that require extra resources (workforce, integration, financial). Otherwise, complexity increases, fit decreases, and the airline drifts toward a higher cost structure.

Setting limits and boundaries does matter to keep the low-cost business model intact over time, a model that needs constant and conscious control at all levels. To maintain the LCLH model intact, it is not only necessary for senior management to possess a deep understanding of its principles, but hiring procedures of staff at all levels should favor the ability of the workforce to make decisions that reinforce fit in the model to avoid complexity introduced through unnecessary customer focus activities. A value-generating activity focuses on reinforcing low costs; the rest constitutes complexity and escalating costs. In other words, the low-cost firm should not focus on being everything to everyone (Porter, 1996).

Interestingly, in the beginning, Southwest's business model was influenced by various limitations and an exclusive but restrictive market position: initial operations were only allowed in the Texas intra-state market, and the airline was in a unique position to operate from Dallas Love Field Airport[20] (the competitors could not use it) (Allen, 1990), thus, becoming an unassailable fortress for Southwest. Another Southwest uniqueness was the fast turnarounds that came about early because of a breakdown of one aircraft out of four, prompting the airline to operate the same schedule with only three aircraft.[21] In other words, the LC model emerged through constraints and trial and error that eventually became a well-understood concept of a cohesive well-fitting bundle of activities, forging low cost per output unit.

Going back to the LCLH, seeking a similar analogy between innovation and constraints, we ought to examine the business model innovations at Air Asia X. For example, the airline uses flexible schedules (network carriers use fixed schedules) to maximize aircraft utilization. Similarly, Norwegian LH does not keep aircraft on the ground to serve business passengers (overnight flights) but maximizes aircraft utilization over 24 h. Just as the business model of Norwegian cannot sustain poor aircraft utilization, the business model of network carriers cannot sustain inconvenient departure times for high-yield business travelers. High productivity matters in the LC model, and flexible scheduling, unacceptable to network carriers, may fit perfectly with the LCLH business model to keep fares low.

Thus, extracting even a slightly better aircraft utilization is an essential source of cost advantage over the competition and a high priority in LCLH. Another innovation is removing the traditional seat-back entertainment system that was extra weight and costly; instead, passengers use their own devices and inflight WIFI. For LCLH, reducing the aircraft's total weight is vital to gain even small fuel-saving advantages over the network carriers. Operating medium-sized aircraft like the A320/321NEOs, and B737MAX can make a difference in this regard. We can state that what is paramount to the LCLH airline is minimizing fuel burn and operating a homogenous fleet in terms of aircraft type and operating procedures. We know that aircraft turnaround time increases with the number of seats and distance, and the total trip cost increases linearly with distance (Swan and Adler, 2006; Swan, 2003).

Table 3 shows a list of the critical problem areas underlying the difficulty of the LCLH in gaining cost advantage based on the traditional LC model, as well as possible solutions to the problems.

When operating long-haul flights, any strategy to lighten the aircraft matters, whether it is to eliminate in-seat screens, choose lighter seats, create disincentives for heavy baggage, minimize in-flight merchandise, eliminate inflight magazines, and reduce inflight inventory (make passengers pre-select as much as possible before flight).

The greater the flight distance, the higher the total operating costs. However, most LCLH airlines have been closer to medium-haul, on average, rather than long-haul, e.g., Air Asia X has about 5300 km average stage length (CAPA, 2013). As discussed before, it is possible to reduce fuel consumption substantially by dividing long-haul flights into shorter segments through hub-and-spoke operations, using optimized medium-haul aircraft, perhaps one of the buttresses of making the LCLH business model work. Using this approach, the LCLH airline can reach up to 9% lower fuel burn (Torenbeek, 2013) (on top of the est. 15 – 20%

[17] Without charging monopoly prices.

[18] Carriers using this model include: Icelandair, WOW Air, Turkish Airlines, Etihad, Emirates, Qatar Airways, etc.

[19] *Online* connection means passenger connections between flights on the same carrier. Code-shares and alliances operate similarly to online connections in computer booking systems and subject to schedule harmonization to some extent within an alliance. Connecting over two different carriers that are not in an alliance is termed as *interlining*.

[20] The Wright Amendment prevented major airlines operating from Love Field airport in Texas by restricting aircraft sizes and stage lengths, effectively freeing Southwest from competition in short-haul markets. Other airlines showed interest in starting short-haul flights such as Muse air (1982–1985) and Continental Airlines that embarked on a long legal battle to start operations in the airport. The chief outcome of that battle was a USDOT ruling that the Wright Amendment prohibiting connecting flights through Love Field did not prohibit self-connecting by travelers on their own account so far as each flight leg was bought on a separate ticket. Thus, Love Field remained effectively a fortress airport for Southwest Airlines which reinforced their position in Texas market as a convenient quick option for short haul flights in the Houston market (Allen, 1990).

[21] *See* Herb Kelleher: Managing in Good Times and Bad. Stanford Graduate School of Business. Interview available: https://www.youtube.com/watch?v=wxyC3Ywb9yc.

cost advantage of efficient new aircraft), at the same time that turn-around times can be reduced, and total trip costs lowered (crew can return to base). In addition, the airline can benefit from density economies through an intermediary low-cost mini hub if in a position to do so.[22] The success of Emirates airlines and Turkish Airlines tells us that most passengers do not consider an intermediate stop an obstacle in exchange for an attractive fare.

7. Conclusion and future developments

LCLH is not purely an extension of the LC model but a business model in its own right with unique characteristics that are not all part of the LCSH model or the network model. Thus, to get the LCLH model right needs innovation and adjustment through trial and error, as was the case with the original Southwest Airlines LCSH model. Entrepreneurs and analysts list service features and operational characteristics airlines should and should not have. However, detailed underlying tactics to make the LCLH business model sustainable remain unclear and call for innovation by entrepreneurs to understand what works and does not. WOW Air is a case in point, a carrier that had great success in growth, a common failure factor of LC airlines, causing complexity and unnecessary costs. The fit among activities is the one general principle of sustainable competitive advantage among low-cost airlines.

LCLH airlines have different origins that play a significant role in their sustainability. Operators like Air Asia X, Norwegian, Scoot, and Jetstar were owned by LC airlines or NCs, thus, not entirely independent entrepreneurial ventures. Even if most of the entrepreneurial LCLH airlines failed in 2007, 2008, and 2019, it does not necessarily mean that the cost advantage such airlines gain over the network carriers is too low to provide a sustainable competitive advantage. Instead, it is a problem of governance to keep overconfidence and optimism bias (Gudmundsson and Lechner, 2013) in check and avoid trade-off decisions that cause deterioration in fit. A solid governance structure is a guiding force in the LCLH that keeps the executive team's potential overconfidence and optimism bias in check, especially during streaks of success.

Opinions tend to differ in crucial uncertainty areas: 1) whether LCLH should operate between primary or secondary airports. In this article, we argued for the latter to avoid direct competition and focus on lower costs to invoke the so-called *Southwest Effect*, *i.e.,* fare levels that stimulate new demand, and 2) whether LCLH carriers should operate on long-haul or remain closer to medium-haul average stage lengths.

Earlier in this article, we argued that segment lengths were crucial for LCLH, necessitating strategic intermediary hubs. In other words, direct ultra-long-haul flights (12 h or more) would be detrimental to the cost advantage LCLH airlines need over the network carriers. The LCLH customer segments are more likely to accept the inconvenience of an intermediary stop in exchange for low fares, contributing to a unique market position of an LCLH carrier, as WOW air's hub-and-spoke strategy showed.

We emphasized in the article that LC carriers of all types must seek and maintain a high fit among activities performed, requiring managers to make the right trade-off decisions scrupulously, *i.e.,* to understand *what to do* and *what not to do* (Porter, 1996). The LC model, whether short- or long-haul, is about little cost gains in many places that add up to a big difference. We argued that in some cases, there are similarities in how the LCSH and LCLH extract cost gains compared to the network carriers. However, for LCLH to work, managers must go further and find new innovative sources of cost reduction unique to the LCLH model. Although some unique cost innovations have emerged, the LCLH model is still in its infancy, as frequent failures show.

Managers of LCLH airlines must consider the two crucial heterogeneous demand generators in the airlines: 1) hub-and-spoke (e.g., network carriers) generating economies of aircraft scale, scope, and density; and 2) the Southwest effect (e.g., low-cost carriers) based on low enough fares to generate new demand. Unlike the LCSH, LCLH airlines must instigate both to forge a sustainable position in the long-haul market.

In the end, achieving and maintaining a fragile cost model like LCLH requires a clear understanding of the business model boundaries, how to maintain the fit of activities, how to make the correct trade-off decisions, how to control growth, and how to attract and keep a competent workforce that cements together the high fit required in the business model.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Table A1
Air Asia X Financials and Traffic.

RM (million)	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Op. Revenue	4233	4571	4579	3901	3151	2937	2308	1967	1862	1289
Op. Expenses	4395	4783	4517	3850	3217	3304	2297	1925	1937	1321
Op. Profit	(348)	(204)	113	107	30	(212)	31	49	(60)	7
Net Profit	(650)	(301)	99	45	(245)	(519)	(88)	34	(97)	147
Pax	6071	6167	5838	4688	3614	4231	3161	2581	2526	1920
Load-factor	81	81	82	79	75	82	82	84	80	77
ASK	34,880	36,046	35,054	29,343	23,388	25,374	19,309	16,231	17,648	13,573
Avg. stage length	4672	4729	4901	4944	4761	4927	5002	5306	5664	5518
Growth rate (ASK)	−3,2%	2,8%	19,5%	25,5%	−7,8%	31,4%	19,0%	−8,0%	30,0%	

Source: Investor Relations Air Asia Group (https://www.airasiax.com).
* Year 1.1.2020 to 30.6.2021.
** Provision for termination RM 25,163,344.

[22] Air services agreements limit such possibilities, but Air Asia's approach to form subsidiaries in various countries is one way to get around this limitation and create mini-hubs in critical geographical locations.

Table A2
Norwegian Air Shuttle Financials and Traffic.

NK (million)	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Op. Rev.	43,522	40,266	30,948	26,054	22,491	19,540	15,580	12,859	10,532	8598
Op. Exp.	36,209	38,095	26,999	20,097	18,797	18,357	12,796	11,037	8993	7422
Op. Profit	856	(3851)	(2002)	1820	348	(1411)	970	789	710	210
Net Profit	(1688)	(1454)	(1794)	1135	246	(1050)	322	457	122	189
Pax	36,200	37,340	33,150	29,300	25,750	23,980	20,710	17,690	15,700	13,030
LF	87	86	88	88	86	81	78	79	79	77
ASK	100,031	99,220	72,341	57,910	49,028	46,479	34,318	25,920	21,958	17,802
Avg. stage length	1876	1843	1607	1473	1407	1338	1160	1048		
Growth rate (ASK)	0,8%	37,2%	24,9%	18,1%	5,5%	35,4%	32,4%	18,0%	23,3%	

Source: Norwegian Air Shuttle Financial reports (https://www.norwegian.com).
Notes: Highlighted columns show years that include long-haul operations (starting May 2013).

Table A3
WOW air Financials and traffic.

ISK (million)	2018**	2017	2016	2015	2014	2013	2012
Revenues	71400*	52,000	36,700	17,000	10,700	9000	2500
Net profit/(loss)	(4800)*	(2400)	4300	1500	(560)	(330)	(794)
Pax	3,300,000	2,403,033	1,668,773	740,000	500,000	412,583	112,223
LF	87	88	93	88	84	82	63
Seat capacity	3,800,000	2,730,000	1,800,000	840,000	595,000	506,236	178,096
Stage length	NA	NA	NA	NA	NA	NA	NA
Growth rate seat capacity	15.2	13.6	7.9	13.5	19.0	22.7	58.7

Source: Gudmundsson (2019), company reports, and news articles.
Notes: *Estimate. ** Closed down in March 2019.

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