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# Creating architectural advantage in the airline industry: Strategic options for airlines to migrate value

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## ABSTRACT

Despite their central role in the industry, airlines have been consistently unable to earn their capital costs. The academic literature has noted the airlines' limited success in capturing value, offered plausible explanations for it, but has been remarkably silent regarding strategic options for airlines to change their situation. The present paper addresses this gap by analysing the vertical embeddedness of airlines into the industry structure and focusing on the dynamics of the interfaces with adjacent industry segments. Using secondary data from industry reports and primary data from semi-structured interviews with industry experts, our analysis aims at identifying the main drivers and strategic options for value migration. The interfaces between airlines and distribution partners as well as airports show the highest potential for value migration, primarily for well-positioned low-cost carriers or larger multi-airline groups. To obtain that advantage, however, airlines need to extend their offering beyond the flight segment and reduce their replaceability by leveraging customer data along the entire travel chain, e.g., by sharing customer insights between segments and, thus, accessing additional revenue potential. For smaller, independent airlines, leveraging their -if present- dedicated niche strategy, will be the only lever to survive in the long-run. With its systemic perspective, this paper complements the currently fragmented literature on airline vertical strategies and suggests four generic strategic options for value migration to the airline segment.

## 1. Introduction

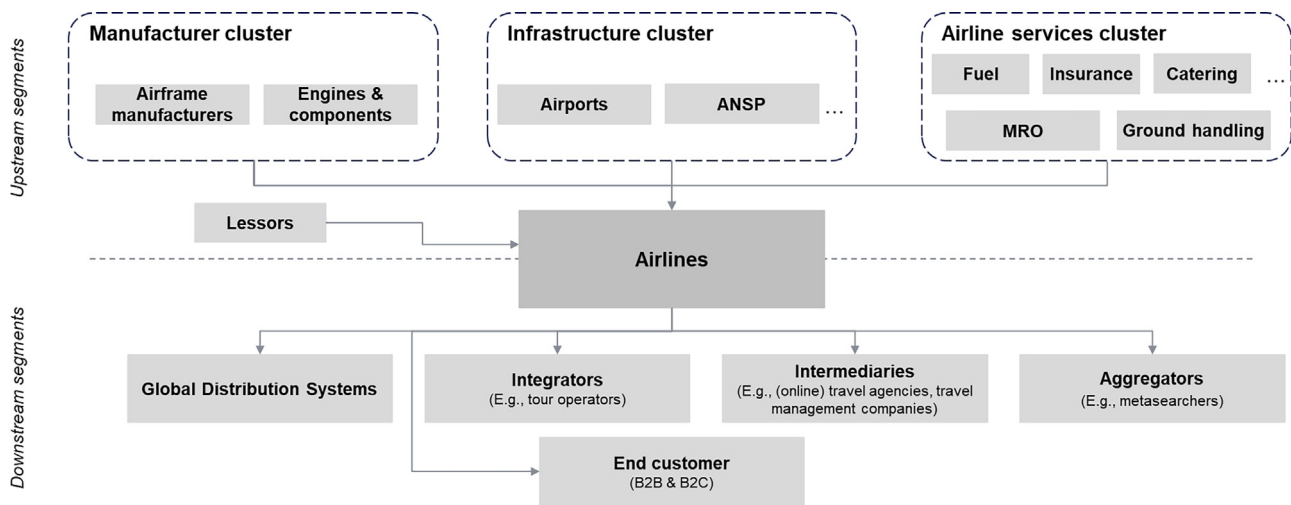
Within their industry, the airlines take a central integrator role (Bieger & Wittmer, 2011), connecting upstream segments such as airframe manufacturers and infrastructure providers with the downstream segments of distribution and the end-customer. Despite this central role, airlines are frequently referred to as the industry's weakest link (Button, 2003; IATA, 2016; Tretheway & Markhvida, 2014), consistently struggling to earn their capital costs and maintain long-term profitability. Academic literature has identified excess competition and resulting overcapacities as the main reasons for the airline profitability problem and discusses the existence of an 'empty core' within the airline segment (Button, 2003; Button et al., 2011). The literature provides reasons for this problem by analysing how the industry is structured (Bieger & Wittmer, 2011; Tretheway & Markhvida, 2014), how it has evolved over time (Fu et al., 2011; Hüschelrath & Müller, 2012), and how profitability is allocated between segments (Tretheway & Markhvida, 2014). However, even though initial policy recommendations towards increasing the airlines' financial sustainability have been formulated (Tretheway

& Markhvida, 2014), a systematic and theoretically founded assessment leading to the explication of strategic options for airlines to escape from their structurally weak position is still lacking. One factor contributing to this disturbing lack is the limited availability of studies focusing on the vertical embedding of airlines within the industry structure.

The absence of such studies is a concern because it limits our understanding of industry- or context-related factors that structurally influence airlines' performance, and hence potential levers that allow it to be improved. Given the high degree of interdependence and interrelatedness between the industry segments (Bieger & Wittmer, 2011), taking the vertical industry structure into consideration while developing strategic options can help airlines to migrate value from other segments. Such a systemic perspective adds a new angle to our understanding of the airlines' profitability problem and can provide recommendations to change the situation for the better. To establish a systematic assessment of the airlines' vertical interfaces, we leverage the concept of industry architecture (IA) (Jacobides et al., 2006; Jacobides & Tae, 2015) in our analysis, as it provides a systemic framework focusing on industry structure and value creation. It therefore reaches beyond traditional dyadic

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**Fig. 1.** Aviation industry structure. *Note:* Simplified illustration. Solid lines show only direct interfaces between airline and respective segments. Sources: Basic structure by Tretheway and Markhvida (2014); visualisation adjusted and supplemented by the authors with input from Bieger and Wittmer (2011), Buhalis (2004), Buhalis and Licata (2002), Alamdari and Mason (2006), Skift Research (2014), Skift Research (2018), and input from industry expert interviews. Own visualization.

and linear conceptualisations of relationships between industry participants. Instead, IA focuses attention on the nature of the interfaces between industry segments and emphasises measures that individual players or segments can take to manipulate the IA to their benefit (Cacciatori & Jacobides, 2005; Jacobides, 2005; Jacobides & Billinger, 2006). The IA concept has been applied in other industries but has so far received only limited attention in the airline industry. Initial airline-related studies mainly focused on individual domains or interfaces, such as the transformation of airline distribution (Daft et al., 2021; Albers et al., forthcoming). This paper aims to enhance our understanding of the airlines' position within the industry structure and to identify practical implications for airlines to improve their profitability situation by adjusting factors of their vertical embeddedness within it. By analysing the industry structure with the IA concept, we identify four generic strategic options for airlines to manoeuvre within the vertical industry structure and, possibly, migrate value to their segment.

The remaining part of the paper is structured as follows: After providing an overview about the literature on the aviation industry structure and the airlines' position in it, we introduce the core explanatory mechanisms of IA in explaining value creation and value capture in an industry. This allows us to develop a conceptual framework for the analysis of the airlines' vertical embeddedness into the industry structure. We then apply the framework to the core interfaces of the airline with adjacent industry segments, assess the airlines' current position and map strategic options for value migration based on adaptations of the airlines' vertical strategies.

## 2. Literature review: understanding the airlines' profitability problem

Air transport is provided by the interplay of specialised and inter-linked actor groups (Bieger & Wittmer, 2011). Within these groups, airlines take the central integrator role, providing the basis for business in up- and downstream industry segments (Bieger & Wittmer, 2011; Tretheway & Markhvida, 2014), as they deliver the industry's core product; that is, flight transportation. Fig. 1 provides a simplified overview of the airline industry structure.

Despite their central role within this industry structure, airlines consistently struggle to earn their capital costs (IATA, 2016). As a result, the value created in the aviation industry is mainly appropriated by customers and adjacent industry segments (IATA, 2011). IATA (2011) emphasised that the lack of profitability is partly 'driven by poor industry structure'. In the academic literature, only a few studies have focused

on the aviation industry structure as a whole (Bieger & Wittmer, 2011; Tretheway & Markhvida, 2014). While there is an awareness of the highly interdependent nature of the industry, studies addressing the airline profitability problem in a segment-overarching, systemic approach appear to be limited. The explanations that have been provided are related to (a) the industry structure at large, (b) the dynamics within the airline segment, and (c) adjacent industry segments (Table 1).

The industry structure at large shows a low degree of vertical integration (Lafferty & van Fossen, 2001; Tretheway & Markhvida, 2014), limiting the airlines' ability to benefit from returns generated in adjacent segments and increasing the pressure to operate profitably within their own segment. While there was a tendency towards vertical integration in the past (Lafferty & van Fossen, 2001), the degree of integration has mostly been reduced, either because of changing regulation - such as at the Global Distribution System (GDS) interface (Alamdari & Mason, 2006; Riordan, 2005) - or restructuring attempts along contemporary management theories and consultant approaches that favour 'focus' of various kinds to increase financial and operational performance (Rieple & Helm, 2008). Within the airline segment, the interfaces between airlines are highly standardized (Tretheway & Markhvida, 2014). This is necessary to promote safety and interoperability; for example, in terms of code-sharing. While standardisation facilitates intra-segment cooperation, it reduces the airlines' technological ability for differentiation e.g., through the development of own ecosystems. It furthermore stresses the carriers' weak profitability position and exacerbates the optimization of legacy cost structures. Among each other, the carriers face intense competition (Fu et al., 2011). The external driving factor for the development of such hypercompetitive structures (D'Aveni & Gunther, 2007) has been the liberalisation of large air transport markets, such as the U.S. and the E.U. (Fu et al., 2011). Liberalisation has enabled freer competition and new operating models for existing airlines, such as the hub-and-spoke system, with corresponding increases to efficiency and industry welfare (Fu et al., 2011). Additionally, easing regulation has cleared the way for new business models of (long-haul) (ultra) low-cost-carriers (LCCs) (Albers et al., 2020; Hüscherlath & Müller, 2012; Westerveld et al., 2023). This has triggered horizontal competition between airlines, led to decreasing shares of monopoly markets, and pressurised airlines' pricing power.

Internally, the airlines' specific high fixed cost structures (Rubin & Joy, 2005) trigger strong competitive pressure, as an airline relies on high asset utilisation and scale effects to cover these costs, leading to cut-throat price-based competition and overcapacities in the market (Button, 2003). This unhealthy excess competition potentially creates an

**Table 1**  
Selected previous studies on the aviation industry structure.

Category	Author(s)	Year	Study focus	Main findings
Industry structure at large	Bieger and Wittmer (2011)	2011	Aviation value chain (VC) and major sub-industries incl. expansion into value systems	Collaboration among VC characterised by 'push and pull effects'; value system introduced as an approach to model industry instead of linear chain, because of high degree of value chain interdependences
	Malighetti et al. (2011)	2011	Airport and airline value determinants	Airports' valuation on average higher than airlines'; airline valuation higher for low-cost carriers (LCC) than full-service network carriers (FSNC)
	Tretheway and Markhvida (2014)	2014	Returns in supply chain and policy recommendations to improve financial long-term factor sustainability	Airlines identified as central VC link with lowest profitability and Return on Investment; Global Distribution Systems, travel agents, freight forwarders exercise highest market power; Policy adjustments improving airlines' long-term financial stability recommended
Dynamics within the airline segment	Button (2003)	2003	Potential intrinsic features that make airline business financially unsustainable by application of the 'theory of the core'	Major airline markets not financially sustainable; External shocks, e.g., 9/11, might have an impact, but central problem located in deregulated market structures and excess competition
	Fu et al. (2011)	2010	Impact of liberalisation on economic growth, traffic volume and traffic flows	Liberalisation drove economic development, traffic growth, and network optimisation; liberalisation increased welfare (e.g., emergence of hub-spoke-systems as major benefit); deregulation led to market cleansing and LCC emergence
	Hüschelrath and Müller (2012)	2012	Evolution of low-cost industry including corresponding effects on competitive dynamics and incumbents	LCCs are driving force for competition in U.S. airline industry
	Westerveld et al. (2023)	2023	Strategic value of operating business model portfolios for value creation	Business model portfolios evolve as strategic tool for value creation; airline industry as use case; high complexity between individual value propositions needs careful management to allow synergies
	(Riordan, 2005)	2005	Competitive effects of vertical integration	Global Distribution Systems (GDS) (after deregulation in 2004) as one of three case studies to analyse competitive effects of vertical integration for policy recommendations; each GDS found to have monopoly power against airlines resulting from possibility of preferential display of fares
Adjacent industry segments	Ben-Yosef (2007)	2007	Co-evolution between aircraft manufacturing and airline industry	Dynamic effects between innovation and competition trigger co-evolution between airline and manufacturer
	Fu et al. (2011)	2011	Forms and effects of vertical relationships between airlines and airports	Study focus: North America and Europe; five core relationships identified Potential benefits for airlines: Strengthened hub status and increased market power by preferential treatment
	Olienyk and Carbaugh (2011)	2011	Impact of World Trade Organisation rulings regarding subsidies on Airbus and Boeing	Airbus and Boeing dominate commercial aircraft markets; high entry barriers to market of aircraft manufacturers; protection weakens with new entrants, with potential to change current competitive situation
	Knieps (2014)	2014	Liberalisation of market power within value chain and remaining role of government policy	Application of 'monopolistic bottlenecks' theory for localisation of network-specific market power; e.g., on infrastructure side
	D'alfonso and Nastasi (2014)	2014	Impact of airline deregulation and airport privatisation on incentives for airline-airport vertical interaction	Airline-airport cooperation can have negative and positive impacts on welfare and competition; three core issues identified: Incomplete contracts and asymmetric information structure, upstream horizontal complementaries and airports astwo-sided platforms
	Yang et al. (2015)	2015	Investigation of determinants and mechanisms of airport-airline vertical arrangements	Vertical arrangements between airlines and airports can create benefits for both parties, however, require careful regulatory attention; Nash bargaining model used to analyse the potential of revenue sharing between airports and airlines
	Gillen and Lall (2018)	2018	Changes in general market structure and competitive effects of entrance and growth of LCCs and ultra LCCs (ULCC)	Deregulation enabled emergence of new ULCC business models; changing nature of price competition pressurises incumbent airlines; convergence between LCC and legacy carriers noticeable

'empty core' at the airline segment (Button, 2003; Button et al., 2011). The above development also forms the rationale for a series of bankruptcies, and continuous industry consolidation, leading to the emergence of large airline groups (Brueckner & Pels, 2005; Fu et al., 2011). Studies have shown that this consolidation can improve the financial performance of airline groups (Brueckner & Pels, 2005; Manuela Jr et al., 2016) but cannot yet fully compensate the effects of 'hypercompetition' (D'Aveni et al., 2010; D'Aveni & Gunther, 2007). Analysing the distribution of profits within the industry, the airline segment requires the highest capital investment but generates the lowest returns on the invested capital (IATA, 2016; Tretheway & Markhvida, 2014). Customers and supplier segments seem to be able to appropriate value to their seg-

ments, away from the airlines (IATA, 2011). Looking at the interfaces with these vertical industry segments, it is noticeable that the carriers are embedded into an industry with powerful, mainly consolidated adjacent segments (IATA, 2011). This applies to both, downstream segments - such as GDS - (Tretheway & Markhvida, 2014; Riordan; Albers et al., forthcoming), as well as upstream segments, such as aircraft manufacturers with the strong dominance of Airbus and Boeing (IATA, 2011; Olienyk & Carbaugh, 2011), or airports, which in some locations even represent monopolistic bottlenecks (IATA, 2011; Knieps, 2014; Yang et al., 2015). Their consolidated nature results in the significantly higher bargaining power of suppliers over the airlines (IATA, 2011) and, on the financial end, leads to higher financial evaluation of adjacent in-

dustry segments, such as airports (Malighetti et al., 2011), compared to airlines. There are, however, examples of successful vertical cooperation between airlines and airports, resulting in operational and strategic benefits for both segments (Fu et al., 2011).

This interaction of a highly competitive airline segment, with mainly oligopolistic industry partner segments, emphasises the structural deficiency of the airlines' industry position. In parallel, advancing technology also has an impact on the industry structure and interfaces between the segments (Alamdari & Mason, 2006). Advancing aircraft technology has led to a certain degree of co-evolution between manufacturers and airlines and created specific lock-in effects in current industry structures (Ben-Yosef, 2007; Olienyk & Carbaugh, 2011). Dominant aircraft designs have been established, and incremental optimisation as well as technical approximation of frequently acquired aircraft types, have enabled the highly efficient, volume-driven low-cost business, at the same time as reducing the potential for airline differentiation (Ben-Yosef, 2007). Technological advancement was not limited to the manufacturer; it has touched virtually every segment of the industry (Gillen & Lall, 2018; Rubin & Joy, 2005). Emerging Internet technologies and downstream innovation have led to advancements and new distribution business models (Alamdari & Mason, 2006; Buhalis, 2004; Gillen & Lall, 2018). Especially technology-enabled distribution businesses, such as metasearchers, have increased price transparency and comparability for customers (Rubin & Joy, 2005), which in turn have increased price pressure on airlines. The aforementioned studies provide a summary of the most relevant contributions on the overall industry-structural perspective, which this paper applies. Additionally, significant contributions have been made to analyse the dynamics at individual interfaces, for example in the distribution area (see, for example, Merkert and Hakim (2022), Sismanidou et al. (2008, 2009), Albers et al. (forthcoming)) or the widely applied outsourcing policies of airlines (Erdoğan, 2022; McFadden & Worrells, 2012; Rieple & Helm, 2008; Rutner & Brown, 1999). Furthermore, in a similar systemic perspective, the co-dependency between airline- and destination development, has been studied (Debbage & Alkaabi, 2016). In summary, the literature acknowledges the weak position of airlines in the industry: Airlines are trapped in a position with high bargaining power at both customers' and suppliers' ends, which executes constant pressure on their profitability situation. To develop strategic options for airlines to improve their weak structural position and, thus, increase their long-term profitability, it is essential to analyse the nature of the vertical interfaces between the airlines and adjacent segments and identify ways for airlines to migrate value to their segment.

### 3. Analysing airline value migration potential

The industry architecture (IA) concept (Jacobides et al., 2006) helps to describe, understand, and evaluate the evolution of industry structures and interfaces between industry segments. It goes beyond the classic understanding of industries as linear chains. IA defines industries as 'permeable, shifting set(s) of firms' (Jacobides et al., 2006) that are not static but evolve over time (Jacobides & Billinger, 2006; Jacobides & MacDuffie, 2013). Individual players in an industry can pursue strategies to manipulate the industry structure to their benefit and migrate value to their segment (Jacobides & MacDuffie, 2013). Thus, IA qualifies as a valuable structural approach to be leveraged in our analysis of the aviation industry structure and the development of strategic options for value migration to the airline segment.

#### 3.1. Background on industry architecture

Coined by Jacobides et al. (2006), IA describes how labour and profits are distributed in an industry by focusing on 'value creation' and 'value appropriation' (Jacobides & Billinger, 2006). While value creation describes the division of labour within the industry ('Who does what?'), value appropriation outlines the profit distribution ('Who gets

what?'). These templates can be either designed (for example, by regulation) or emergent (for example, though historical development of vertical relationships) (Jacobides & Billinger, 2006). The concept characterises industries not as a series of dyads with bilateral dependencies but rather as segment-overarching 'networks of relationships' (Jacobides & Billinger, 2006). Within these networks, co-specialisation develops between firms, leading to a 'well-defined distribution of roles' (Jacobides & Billinger, 2006). Firms attempt to reshape this co-specialisation to their advantage to obtain architectural advantage and migrate value to their segment (Jacobides & MacDuffie, 2013). Some firms even aim to become the bottleneck of their industry, deriving superior returns from a superior, less replaceable structural position (Jacobides & Tae, 2015).

IA has been leveraged primarily in research on innovation and value capture (Teece, 1986), as well as industry structure and platforms (Fixson & Park, 2008; Jacobides & Billinger, 2006; Kenney & Pon, 2011; Tee & Gawer, 2009). In the airline industry, however, IA's analytical and explanatory potential has so far not been tapped (with the exception of initial applications related to airline distribution (Albers et al., forthcoming)). Within the IA, the core adjustment screws for a firm are *complementarity* - that is, the combination of two or more assets leading to superior returns (affecting the 'size of value' created) - and *mobility* - that is, the number of assets to enter a combination with at negligible switching cost (affecting the actors' 'bargaining power') (Jacobides et al., 2006). If - at the interface of two industry participants - one supplier can bring particular, specialised competences into the business relationship (high complementarity) and the customer does not have many alternative suppliers to choose from (low mobility), the supplier is in a structurally superior position. Thus, the combination of complementarity and mobility at the interfaces determines the degree of bilateral dependence between two segments. Consequently, a firm's interest is to increase mobility in adjacent segments while restricting entry into the own segment and maintaining a high degree of complementarity. As the ultimate objective of one firm is to develop '*convenient rules of the game*' (Jacobides & Billinger, 2006), it attempts to develop a setup in which the maximum-possible value is migrated to its own segment.

The literature suggests four major value drivers for firms (Jacobides & MacDuffie, 2013): By achieving a position of the least replaceable actor, a firm can increase its complementarity at interfaces ('*Replaceability*'). When becoming the actor that customers associate most with quality, a firm can maximize its price-setting ability and reduce customers' mobility ('*Quality*'). Firms can aim to maximize their ability to anticipate changes in customer needs and types can adapt to changing 'changing rules of the game' faster ('*Customer*'), and, by carefully managing standardisation and collaboration in growth phases, firms can protect the standards they operate in to shape them to their benefit ('*Growth*'). If a firm can set up these value drivers intelligently, it can migrate value to its own segment, as the IA literature suggests (Jacobides & MacDuffie, 2013). The IA literature bases these value drivers on several factors, determining the menu of options that companies have to migrate value to their segments. In our research approach, we have used the four generic value drivers and the literature-suggested supporting aspects as point of departure in the development of an assessment model for the interfaces of the airlines with adjacent industry segments.

#### 3.2. Research approach towards an evaluation of the airlines' vertical embeddedness in the industry structure

For our analysis, we derived a set of 15 analysis factors (see Table 2) from the relevant IA literature to evaluate the value migration potential along the four drivers outlined above.

The resulting structural framework was used to qualitatively assess the airlines' value migration potential. Our assessment is based on secondary data from scholarly sources and industry reports, combined with primary data from ten semi-structured industry expert interviews (see Appendix A). Primary selection criteria for the interview partners were *professional seniority*, i.e., practical industry experience of at least ten



**Table 2**

Structural framework for assessment of airline (AL) value migration potential. Allocation of value migration factors (lines) to value migration drivers (columns)

Replaceability	Quality	Customer	Growth
Degree of vertical integration at interface	Assignment of ‘Guarantor of Quality’ role	Ability to anticipate changes in customer types	Degree of standardisation at interface
Factor mobility from AL perspective	Assignment of legal liability	Ability to anticipate changes in customer needs	Modularity of goods/services exchanged
Complementarity from AL perspective			Stability of interface design
Symmetry of dependence between segments			Contractual variety at interface
Direction of dependence between segments			
Assignment of platform/ecosystem control			
Presence of ‘thin edge of the wedge’ at AL			

Note: Value migration factors derived from Jacobides (2005), Cacciatori and Jacobides (2005), Jacobides et al. (2006), Teece (1986), Jacobides and MacDuffie (2013). Allocation to value drivers conducted by the authors.

Value drivers	... Manufacturer cluster		... Infrastructure cluster		... Airline services cluster		... Distribution cluster	
	Airlines’ current position	Airline value migration potential	Airlines’ current position	Airline value migration potential	Airlines’ current position	Airline value migration potential	Airlines’ current position	Airline value migration potential
<b>Replaceability</b>	Rather weak	Rather weak	Medium	Rather weak	Rather strong	Rather weak	Rather weak	Rather strong
<b>Quality</b>	Medium	Rather weak	Medium	Rather strong	Rather strong	Medium	Medium	Rather strong
<b>Customer</b>	n/a	n/a	Rather strong	Strong	Medium	Rather strong	Rather strong	Medium
<b>Growth</b>	Weak	Weak	Rather weak	Rather weak	Medium	Rather weak	Medium	Rather strong

**Fig. 2.** Airline (AL) value migration potential analysis. Note: High-level aggregation. Comprehensive, detailed analysis including evaluation of individual segments can be obtained from the authors upon request. Own visualisation.

years, and *industry segment variety*, i.e., ensuring that expertise in a variety of segments as well as from a variety of perspectives, such as airline professionals, research institutes and policy makers is represented. The analysis focuses on assessing the airlines’ current position at the respective interface, followed by evaluating the potential to migrate value along the four value drivers. The evaluation of the airlines’ position within the industry structure describes the status quo of the dynamics at the interface from a value migration perspective, while the assessment of value migration potential indicates, whether we have identified opportunities for the airline to manipulate this interface for the purpose of value migration.

We conducted our analysis on a simplified industry structure (see Fig. 1) for the interfaces between the airline segment and ten adjacent industry segments<sup>1</sup>, while always taking the perspective of the airline segment. Each interface was evaluated along all four value drivers<sup>2</sup> and a strong-, medium-, weak-scale is applied for the evaluation. Table 3 provides an exemplary excerpt from the analysis to assess the ‘*Replaceability*’ driver at the airline-manufacturer interface. Following the same logic, the analysis was conducted for all 40 driver-interface combinations. Table 4 shows an aggregated summary of the evaluation at the individual interfaces. For the presentation and further discussion of the findings, the industry segments were summarized into the four groups of manufacturers, infrastructure, airline services, and distribution.

Our findings are shown in Fig. 2, visualising the evaluation of the airlines’ value migration potential. The high density of ‘medium’ and ‘rather weak’ and ‘weak’ evaluations emphasises the challenging position of the airline segment within the industry structure. The airlines’ current position is rated medium to weak at most interfaces, except for the airline-to-airline services interface, where the current position is

mostly rated as strong. The value migration potential is rated stronger at the interfaces between the airline and infrastructure, service providers, and distribution clusters than at the manufacturer cluster. This latter interface seems to be characterised by a weak current position and limited airline value migration potential. The most promising value drivers appear to be ‘*Replaceability*’, primarily via platform control; ‘*Quality*’, by clearly positioning themselves as the ‘*Guarantor of Quality*’ as per respective brand promise; and ‘*Customer*’, primarily expressed as access to the customer and customer data. In the sense of balancing global connectivity with the development and protection of own technological ecosystems, the ‘*Growth*’ factor only yields medium to weak value migration potential.

#### 4. Evaluation of value migration potential for airlines

Our analysis illustrates that the structural manipulability of the vertical interfaces appears to be challenging for the airlines. We made four observations limiting the airline value migration potential, which we elaborate on in the following section, before deriving strategic options for value migration.

##### 4.1. Industry structural limitations to value migration

First, expressed in IA terminology, *several interfaces of the airline are largely ‘designed’* (Jacobides et al., 2006) by regulators, such as ICAO, or associations, such as IATA. This protects the current industry structure, limiting the ability of individual players to break out of the system. Additionally, several industry segments, for example, infrastructure or aircraft manufacturing, and in some regions also airlines, are highly politicised and subject to governmental interference (Olienyk & Carbaugh, 2011). Hence, architecture manipulation for individual airlines remains difficult.

Second, the *commodity-like nature of the airlines’ basic service* (Rothkopf & Wald, 2011) and *infrequent consumption pattern* for several customer segments reduce the value migration potential. Therefore, the carriers are in a target conflict, whether to invest in selling experiences, requiring identifying and addressing differentiation factors that the customer perceives as relevant to trigger a higher willingness to pay, or to

<sup>1</sup> I.e., Airframe manufacturers, engine manufacturers, airport, air navigation service providers, maintenance, ground handling, catering, GDS, integrators, and eMediaries. Lessor interface was excluded to maintain comparability.

<sup>2</sup> After discussion with several interview partners, the driver ‘Customer’ is not evaluated at the interface to the manufacturer cluster. Airlines’ ability to identify changes in end-customers’ types and needs has little or no impact on value migration potential at the airline-manufacturer interface.

**Table 3**  
Exemplary value migration potential analysis: Replaceability & Airline-Manufacturer interface.

Value driver	Replaceability			Value migration potential		
	Airlines' current position					
Interface to cluster	Rating	Main rating drivers	Reference	Rating	Main rating drivers	Reference
Manufacturer	Rather Weak			Rather Weak		
Airframe	Rather Weak	Mobility higher for airlines (general option to move to alternative supplier); airframe manufacturer market highly consolidated and politicised (e.g., Airbus and Boeing); Original Equipment Manufacturers' (OEM) consolidation reduced alternatives; Airbus' takeover of Bombardier's C-Series has expanded duopoly into regional jet market; aircraft (a/c) development projects in China and Russia underway, potentially threatening current market structure only in mid-to-long-term; OEM as driver for innovation and performance increase	(Ben-Yosef, 2007; FlightGlobal, 2019; IATA, 2011; Olienyk & Carbaugh, 2011) Expert interviews	Rather Weak	Mid-to-long-term lock-in effects in existing technology and orders; Bargaining power (and price discounts) increases with size of order; larger airlines have higher bargaining power; current new a/c development projects might increase mobility for airlines; no short-term impact expected; airlines carry market risk of a/c orders, given business volatility	(Ben-Yosef, 2007; IATA, 2011; Olienyk & Carbaugh, 2011; Onishi, 2016)
Engine	Rather Weak	High complementarity on manufacturer side (performance increase of a/c innovation mainly driven by engines); market dominated by oligopoly of a few major players: reduced mobility for airlines	(FlightGlobal, 2019)	Rather Weak	Technical expertise, innovation power, and intellectual property resides with engine manufacturer and not airline, which exacerbates for airlines to migrate value, except price cuts in large orders. Protectionist OEM-behaviour limits mobility for airlines in after-sales business; success probability of engine manufacturers in China and Russia currently not foreseeable; no short-term impact on airline bargaining power expected	(FlightGlobal, 2019) Expert interviews

*Note:* Exemplary extract from value migration analysis, which has been conducted by the authors for all sub-segment-driver combinations in the airline industry architecture. Comprehensive, detailed analysis including evaluation of sub-segments can be obtained from the authors upon request.

focus on optimising the price for the pure transportation service. Additionally, unlike business travellers, the more leisure and VFR<sup>3</sup>-oriented segments consume air transport services infrequently and have no regular touchpoints with the airline brand. This consumption infrequency problem further complicates it for the airline to differentiate and create valuable offers to also keep these low-frequency customers in their ecosystems.

Third, outsourcing is a heavily applied managerial approach in the airline industry (Erdoğan, 2022; Rutner & Brown, 1999) and, thus, *carriers are in a customer role*. Correspondingly, the value migration potential with outsourcing partners is driven by volume-enabled price negotiations instead of structural interface manipulation. Leveraging volume and size effects empowers airlines with a certain complementarity at these interfaces. However, the respective adjacent segments are often massively consolidated and operate in oligopolistic structures (for example, airframe and engine manufacturers (FlightGlobal, 2019; Olienyk & Carbaugh, 2011)), or form local monopolies, such as airports at attractive locations (Franke, 2007). Such structures limit the bargaining power of airlines vis-a-vis their suppliers. This explains why the airlines' position at these interfaces is rated as strong, but the value migration potential is medium to weak, primarily centred around the price.

Fourth, while airlines still incorporate the *'Guarantor of Quality'* (Jacobides et al., 2006) role for the flight experience, it has *shifted for the searching and booking process*. When asked, which industry segment takes this role, interviewees mostly differentiated between the quality

of the flight experience and the quality of the search-and-booking experience. The first is assigned to the airline. When it comes to price as an indicator of quality, LCC brands are associated with the *'Guarantor of Quality'* role, while full-service network carriers seem to have lost this role to distribution partners, especially the GDS or metasearch companies (Skift Research, 2014). However, it is still the airline brand that has the highest physical presence at the customer throughout the journey (Ringle et al., 2011), so that airlines can address the *'Quality'* driver to a certain extent.

Taking these general observations as a baseline, the following section identifies and discusses potential strategic options for airline value migration.

#### 4.2. Possible airline value migration strategies

Based on our analysis and the configuration of the value drivers for the respective interfaces, four strategic directions for airline value migration could be identified (Table 5).

The developed strategies are presented in the subsequent section, following a similar structure for each option: After a brief description of the strategy, the targeted segments and primary value drivers are examined before the applicability to certain airline business models and real-life examples are presented and discussed.

##### *Attack the integrator*

Global standardisation has promoted safety, reliability, and interoperability between carriers. However, it has also supported global price

<sup>3</sup> Visiting Friends and Relatives.

**Table 4**  
Aggregated summary of analysis on airline value migration potential at individual interfaces.

Interfaces: Airline to...	Replaceability			Quality			Customer			Growth		
	Rating current position	Rating value migration potential	Rating current position	Rating value migration potential	Rating current position	Rating value migration potential	Rating current position	Rating value migration potential	Rating current position	Rating value migration potential		
... Manufacturer (mean)	2 (Rather weak)	2 (Rather weak)	3 (Medium)	2 (Rather weak)	n/a	n/a	1 (Weak)	n/a	1 (Weak)	1 (Weak)		
Airframe Manufacturer	2	2	3	2	n/a	n/a	1	n/a	1	1		
Engine Manufacturer	2	2	3	2	n/a	n/a	1	n/a	1	1		
... Infrastructure (mean)	2,5 (Medium)	2 (Rather weak)	3 (Medium)	3,5 (Rather strong)	4 (Rather strong)	5 (Strong)	1,5 (Rather weak)	5 (Strong)	2 (Rather weak)	2 (Rather weak)		
Airport	3	2	3	4	4	5	2	5	3	3		
Air Navigation Service Providers	2	2	3	3	n/a	n/a	1	n/a	1	1		
... Airline Services (mean)	4 (Rather strong)	2,3 (Rather weak)	3,7 (Rather strong)	2,7 (Medium)	3 (Medium)	4 (Rather strong)	2,7 (Medium)	4 (Rather strong)	2 (Rather weak)	2 (Rather weak)		
MRO	4	3	3	2	n/a	n/a	2	n/a	2	2		
Ground Handling	4	2	4	3	n/a	n/a	3	n/a	3	2		
Catering	4	2	4	3	3	4	3	4	2	2		
... Distribution (mean)	2,3 (Rather weak)	3,7 (Rather strong)	2,7 (Medium)	3,7 (Rather strong)	4 (Rather strong)	2,5 (Medium)	2,5 (Medium)	2,5 (Medium)	3,5 (Rather strong)	3,5 (Rather strong)		
GDS	2	3	2	3	4	2	2	2	3	3		
Integrators (e.g., tour operators)	3	4	3	4	4	n/a	n/a	n/a	n/a	n/a		
eMediators	2	4	3	4	4	3	3	3	4	4		

Note: Evaluation scale: 1 = weak / 2 = Rather weak / 3 = Medium / 4 = Rather strong / 5 = Strong Detailed assessment incl. references to literature, industry reports, and expert interviews can be obtained from the authors.

transparency in the GDS display and, thus, reduced the airlines' differentiation potential (Skift Research, 2018). The commercial integrator role seems to have shifted to the GDS. By providing customer incentives to directly enter and stay within the airlines' ecosystem, the GDS could, at least partly, be bypassed. This provides the airlines with unique customer data, reduces their dependency on GDS, and, finally, reduces their replaceability. Depending on the business model, modern, direct-connect technology, or new data standards, such as the New Distribution Capability (NDC) (Skift Research, 2018) can equip airlines with the technology necessary to fully leverage an attack strategy, for example, via branded fares, flexible bundling, and ancillaries (Daft et al., 2021; Skift Research, 2018). Additionally, deciding which channels to steer NDC content through, increases mobility and complementarity - and, thus, bargaining power - for the airline against the GDS, as they aim to offer full content to their users.

Consequently, for airlines to win back their structural relevance, one strategy (which airlines have actually started to adopt already Albers et al. (forthcoming)) is to attack or bypass the GDS and metasearch companies, and to reduce their replaceability by fostering own ecosystems.

One of the core levers for an airline to reduce replaceability is ecosystem- or platform-control (Jacobides & MacDuffie, 2013). The primary levers to be used in developing such a strategy are the 'Replaceability', 'Quality' and 'Customer' drivers.

As an industry example, Lufthansa Group has started an attempt to reduce GDS-dependency and cost in 2015, by introducing a GDS-surcharge (CAPA Centre for Aviation, 2015). This move - while not intended to fully replace GDS - helped to incentivize own alternative distribution channels and was followed by other airlines later. In a similar attempt, EgyptAir recently announced the introduction of an NDC-platform to better and directly communicate with corporate customers (Casey, 2023).

When developing 'attack strategies', the architectural setup of LCCs can, at least in parts, be an orientation. The clear, price-focused, brand promise supports them to take the role as 'Guarantor of Quality' (Jacobides et al., 2006) for customers seeking cheap flights. They also yield a higher potential to build close-looped technological ecosystems, as they are - thanks to their high-to-exclusive share of direct distribution via their own channels (Mason & Morrison, 2008) - less dependent on distribution partners, and on airline partners to enter interlining or code-sharing agreements. For example, Ryanair, Southwest and WizzAir all operate without any codeshare agreements<sup>4</sup>. It is also noticeable that LCC brands typically have a strong brand presence across various markets. For instance, Ryanair stands for cheap flights across Europe and can therefore leverage this brand on a European scale to channel traffic to its website. However, due to the low differentiation potential on point-to-point routes, LCCs have to consistently protect their position by offering low fares.

The basis for all airline business models to build own commercial ecosystems are customer data and the ability to derive conclusions about current and potential future buying decisions (Rohn et al., 2021). However, leveraging their high complementarity of global accessibility (Skift Research, 2018) and limited mobility for the airlines, the GDS are a powerful segment within the industry structure. Attacking them includes significant risks for airlines:

First, there is a high information symmetry between the GDS and airlines, as both have access to the same Passenger Name Record. Consequently, the airline per se does not have superior insights compared to the GDS. Within the industry structure, the intermediaries, especially Online Travel Agencies (OTA), typically obtain a more detailed picture about the customer, as these segments also have transparency about other booked trip segments, such as hotels, rental cars, etc.

Second, building up a robust, wide-coverage ecosystem requires high-frequency consumption to be perceived as relevant by customers

<sup>4</sup> As per CAPA- Center for Aviation, last update on May 7, 2023.

**Table 5**  
Summary of strategic options for airline value migration.

	Attack the integrator	Leverage new value streams	Become the feared disruptor	Strengthen the strengths
<b>Description</b>	Develop into eCommerce platform and win back the integrator role.	Exploit new value streams by commercializing customer data with system partners.	Shift architectural position from aircraft operator to orchestrator of networks.	Optimize current IA positioning as far as possible, following current 'rules of the game'.
<b>Targeted segments</b>	Distribution; primarily GDS and Metasearch	Infrastructure; primarily airports	Other airlines	All; especially in outsourced settings
<b>Value drivers</b>	Replaceability (platform control) Quality Customer	Customer Growth	Replaceability (platform control) Customer Growth	Replaceability
<b>Applicability to airline business models</b>	All; primarily full-service network carriers (FSNC) & Low Cost Carriers (LCC)	All; primarily FSNC & LCC	Primarily FSNC	All; primarily FSNC & LCC

and to create the critical mass needed for the ecosystem to work (Rohn et al., 2021). Hence, especially leisure-oriented airlines need to overcome the aforementioned infrequency problem of travel. Additionally, customers need to see value in sharing their information for free; for example, by getting specific pain points solved (Rohn et al., 2021). While loyalty programs might be a good start, additional levers might reside in partnering - with credit card companies, for example - providing additional or offering connected offers along the travel journey, such as public transport services. Such steps allow early anticipation of changes in customer behaviour and potential monetisation of the data in the above-mentioned platform role. Air Asia's approach towards developing the 'Super App', allowing to offer expanded travel services (CAPA Centre for Aviation, 2021), might be considered as a first step into the direction of this strategy.

Third, the technological distribution competence lies within the downstream segments. Therefore, airlines would need to make significant investments into technology to develop into a platform-controlling integrator. These investments represent a significant move away from the airline's core and are likely to deteriorate the short-term financial returns. At the same time, the importance of customer data is not unknown to distribution companies as well. For instance, Sabre and Google have entered a strategic partnership to develop an artificial intelligence technology to create personalised travel offers (Sabre Corporation, 2020). This example underlines that the pressure on airlines within the commercial setup is likely to increase further.

Our analysis supports the usefulness of strategies which individual LCCs have already initiated, as Ryanair's 'Amazon of Travel' (CAPA Centre for Aviation, 2018) initiative illustrates. Such strategies allow exploiting additional revenue potential and generating customer data going beyond the classic transactional ticket data provided in airline distribution and combine them to traveller profiles across the entire travel chain. For larger airline groups, the higher share of business travellers with increased travel frequency facilitates the reach of own ecosystems and allows those carriers to spread investments across multiple business units.

Overall, any move to appropriate value from the powerful distribution segment, will be challenging for airlines, and requires them to invest massively into technology and capabilities. Although factor mobility in the GDS segment has been increasing via new alternatives such as NDC, direct connect or virtual interlining, the structural asymmetry - effective co-specialised legacy structures among a large number of airlines and a very small number of suppliers - persists and hinders adaptation.

#### *Leverage new value streams*

Inter-segment data sharing along the travel chain, enables new business models and revenue streams. Airlines can commercialize existing customer data, for example, on purchasing preferences, or arrival time, to enable other segments to offer relevant, customized products and services to a particular passenger. Revenue generation through third-party ancillaries is an already existing, but yet expandable strategy for airlines to pursue (Shaw et al., 2021).

Our analysis reveals that the interface to the infrastructure segment, especially airports, yields potential for airline value migration by applying this strategy (D'Alfonso & Nastasi, 2014; D'Alfonso and Nastasi, 2012). Currently, the airport does not have such customer information, providing the airline - unlike as at the GDS-interface - with superior knowledge. Consequently, the airline could use the high complementarity of this information for the airport and turn it into an architectural advantage by expanding commission-based fee-models from generated sales transactions. One example would be personalised offers in duty-free shops.

At the airline-airport interface, this can be enabled by addressing the value migration drivers 'Customer' and 'Growth' through the commercialization of customer data.

Within the airline industry, LCCs have already found efficient ways to benefit from the higher returns in adjacent segments, by developing additional revenue streams, such as a commission for non-aeronautical revenues (Fu et al., 2011).

On the other hand, engaging in such strategies might be especially relevant for hub carriers with a high density of passengers at specific airports. On a more extreme end, joint infrastructure development, such the joint venture between Lufthansa (LH) and Munich airport for an LH-exclusive operation of the new Terminal 2 (Albers et al., 2005; Fu et al., 2011), might facilitate the execution of such value migration strategies, while at the same time reducing the airline's replaceability at the respective airport. At its primary Frankfurt-hub, Lufthansa has set-up a joint-venture with the airport operator *Fraport* to improve, amongst others, 'business development, operations and customer experience [...]' (CAPA Centre for Aviation, 2022).

However, while pursuing such a strategy might be a more collaborative game than attacking commercial integrator segments, it also requires upfront investment into technology and data-processing capabilities. Additionally, the airport needs to understand the business case of such a setup and, thus, develop a willingness to pay for customer information. Finally, the customer needs to accept the processing of his personal data to a third-party, to make such an approach compliant with data protection regulation.

#### *Become the feared disruptor*

There is a certain anxiety in the industry that silicon-valley players might disrupt the airline business, primarily in distribution functions (Skift Research, 2018). It might, however, be worthwhile for airlines to consider shifting their architectural position from being aircraft operators along a route network towards being orchestrators of mobility networks operated by other companies, and, thus, becoming the feared disruptor themselves. Such a move would empower the network orchestrator with a significantly improved complementarity against both, infrastructure, and distribution segments. It would represent a major transformation of the organisation and require the respective brand reach, relevance, technology, and partnerships with other mobility companies. For other airlines and mobility companies to join such a platform, the respective orchestrator would need to provide sufficient incentives



and create win-wins for all players, such as cost saving resulting from the outsourcing of the network planning and other commercial functions, higher yields from improved network synchronization or higher customer reach. The targeted set-up of *Condor* and the airline-start-up *Marabu* (both controlled by the same investor) represents a basic application of this strategy. While *Marabu* will operate the flights under a dedicated brand, *Condor* is acting as general sales partner and is responsible for the distribution of the flights (Casey, 2023). While the previous strategies targeted interfaces between the airlines and adjacent industry segments, the last value migration strategy focuses on the dynamics within the airline segment. It focuses on the value drivers of 'Replaceability', 'Customer', and 'Growth'.

Today, one of the primary customer values that large FSNCs offer, is their network of multiple connections. However, the capability of network design and provision of connectivity is not exclusive anymore to airlines. Virtual interlining companies, such as *Dohop* or *Kiwi.com* could, with improving technology and product quality, develop into integrator roles without operating aircraft themselves (CAPA Centre for Aviation, 2018; Meire & Derudder, 2021). They bundle unconnected tickets and sell them to the end customer. If their products reach mass market penetration, they might increase the replaceability of the airlines further by reducing their structural relevance into sole capacity providers and attacking the economics of the hub-and-spoke systems. On the other hand, they could be valuable distribution partners, as the cooperation between *Kiwi.com* and *Spirit Airlines* emphasizes, which displays its NDC content through *Kiwi.com*'s channels (CAPA Centre for Aviation, 2022).

#### Strengthen the strengths

The first strategy is for carriers to strengthen their strengths and leverage the benefits of their respective business scope within the current industry position. The size and volume propel the value migration potential an airline generates in terms of passengers, reach, and customer relevance, as well as technology. As the core airline service suffers from low differentiation potential (Rothkopf & Wald, 2011), carriers can primarily leverage these volume effects to navigate into an architecturally superior position, especially in the setup of interfaces to providers and system partners, such as airports.

However, as beforementioned, the leeway for structural value migration within the existing IA setup is limited and primarily centred around the 'Replaceability' driver.

Since, aspects of production volume and replaceability are the core value migration levers in this strategy, it is primarily applicable to larger LCCs and airline groups. As an example, LCCs have shown that there is a certain potential to create 'convenient rules of the game' (Jacobides & Billinger, 2006) by exploiting their current industry structural position. The large but standardised fleets provide them with substantial bargaining power over suppliers, such as OEMs and MRO providers (Brüggen & Klose, 2010). While an LCC's mobility to change to another partner is high, it promises a high degree of complementarity for the outsourcing partner, resulting in a stronger architectural position.

At the airport interface, large LCCs, such as *Ryanair*, have proven that they can leverage their complementarity, particularly against smaller, regional airports by exploiting their asymmetric bargaining power and the airports' lower mobility to obtain financial incentives for generated passenger volumes (Barbot, 2006). While, from a political point-of-view, this causes the question of indirect subsidization for the airlines (Barbot, 2009), it allows the carriers to exploit a higher complementarity against the airports. The airport-interface also yields value migration potential for airline groups, as they can leverage their size to create bottlenecks with airports (Knieps, 2014) by controlling the access of other carriers to their hubs.

Operating and optimizing a portfolio of brands with differentiated customer promises enables larger airline groups to independently address specific customer value propositions. For instance, they can address price-sensitive customer groups, which associate a low price with quality, as well as business travellers, with their specific needs. Con-

sequently, airline groups can minimize replaceability by exploiting different customer needs at the front-end while benefiting from scale effects, harmonisation, and increased bargaining power at the back end. To maximise the benefits of their size, full-service network carriers (FSNC) also need to consider cooperative strategies within their hypercompetitive segment. Leveraging the power of alliances or joint ventures, for instance, can increase airlines' bargaining power and complementarity against adjacent segments. However, synchronizing collective action between carriers has proven as a difficult endeavour in the past. Additionally, antitrust concerns need to be regarded (Bilotkach, 2019). For smaller, independent FSNC, such as *Hawaiian Airlines*, *Finnair* or *TAP Air Portugal*, strengthening the strengths remains challenging. From a value migration perspective, their limited size and reach prevents them from achieving the effects that enable the two aforementioned airline categories to reduce replaceability as well as to improve their complementarity and mobility against suppliers.

Nevertheless, these players still have their strength in a particular customer relevance within their local markets, or address specific customer value propositions in niches, which are too small or complex for larger airlines to operate in (CAPA Centre for Aviation (2017)). Thus, they might be able to leverage the 'Quality' driver. However, structural manipulation of vertical interfaces remains out of reach. They are under constant pressure to protect their market in order to not end up at the receiving end of market consolidation.

## 5. Discussion and conclusion

Our paper complements the currently fragmented literature on airline vertical strategies. By focusing on the airlines' vertical interfaces to adjacent industry segments and developing a structural framework to assess a carrier's current position, we take a systemic view on the industry structure, enabling the identification of value migration potential and derivation of potential strategic options. While some of the proposed triggers appear to be known in literature, such as the dynamics at individual interfaces, it is the combination of the factors that changes our thinking, as the value created comes from identifying sets of combinations of different strategic approaches. The generic strategic directions developed in this paper go beyond the tactical approaches of addressing individual factors of vertical scope, and, thus, provide a helpful orientation for researchers and practitioners.

Additionally, our approach of leveraging the IA concept and translating it into an industry-specific context can serve as an orientation for researchers to develop an understanding of dynamics within vertical relationships between industry segments. As we could show, besides the hypercompetitive situation within the airline segment, there are additional, industry-structural, limitations but also opportunities to airline value migration.

Today, airlines are not the least replaceable actor in the industry structure. Our analysis emphasizes the importance to develop and discuss strategies that move airlines (back) into a position of reduced replaceability. In this regard, we find that LCC and full-service network carriers (FSNC) are in different architectural positions, and, thus, might be required to pull differentiated triggers when optimizing their vertical embeddedness into the industry structure. Large LCCs have, to a certain extent, already managed to sidestep distribution segments and play out airports against each other. Large airline groups, which often operate multiple airline brands and Air Operator Certificates, show a different picture and increased complexity (Westerveld et al., 2023). From an architectural perspective, their main challenge is to balance embeddedness into standardised systems and processes enabling global reach and connectivity with a setup that moves the respective firm into a position of architectural advantage and reduces its replaceability. Furthermore, large FSNCs must coordinate several interlining and code-sharing agreements (for example, *Lufthansa*: 38, *United Airlines*: 33, *Cathay Pacific*: 264). This clearly illustrates the challenge of building own ecosystems

while ensuring that the global, partnership-fuelled business can operate seamlessly. Optimizing vertical strategies for airlines to improve their weak structural positioning will most likely involve a reinterpretation and expansion of their raison d'être beyond flying of aircraft (Daft et al., 2021), requiring a systemic approach along the entire industry structure and winning-back the integrator role especially in commercial relevance.

In our paper, we provide a set of industry examples, in which basic features of our strategic directions find initial application in the industry context. These examples can be a useful starting point for further research on the effectiveness of such strategies in the context of the airline industry. We see the first corresponding strategic moves in the industry, such as Ryanair's 'Amazon of Travel' (CAPA Centre for Aviation, 2018) or Lufthansa Technik's Aviator platform (CAPA Centre for Aviation, 2017) in the maintenance area. However, vertical interface manipulation requires an upfront investment, especially in technology, customer-relevant brands, and products. This presumes a mindset shift, as investment needs to be prioritised accordingly beyond classic airline investment cases, such as fleet renewal. On the other hand, recovering from the COVID-19 crisis requires a strict cost discipline and limits the airlines' ability to invest in future readiness at the commercial end (Suau-Sanchez et al., 2020). There is a threat that some airlines or airline groups will not have sufficient financial means to invest into a value migration promoting setup.

Especially in the more digital, data-driven distribution segment, this imposes a dilemma, as competitors or adjacent industry segments are often digital firms, which are less cash-strapped and might be willing and able to invest into a value-optimising setup at their end, deteriorating the situation of the airlines further. The carriers must carefully prioritise investments accordingly, as the literature underlines that a phase of industry disruption might be a valuable entry gate for industry outsiders to enter and shape the segments by introducing new rules of the game (Crittenden et al., 2019). The high boundaries of technology and infrastructure currently protect the airline industry structures (IATA, 2011). While Google, Amazon, and Uber appear to be the most logical candidates to expand in this field (Skift Research, 2018), smaller players, such as virtual interlining companies, should be on the airlines' radar. While they might initially impose a higher threat on the consumer-facing intermediaries (Skift Research, 2018), they could emerge as a new, powerful category, further challenging the airlines' access to customer data, that is, as outlined, crucial for value migration.

Our research can enhance airline decision-makers' understanding of the dynamics of the value-adding processes and co-specialised relationships, in which the airline is integrated. Furthermore, crises - such as the COVID 19-pandemic, or the war in Ukraine pandemic - catalyse industry transformation (Bouwer et al., 2022; Economics, 2022) in a time of financial tension from the large-scale indebtedness of many airlines. On the other hand, the COVID-19 also triggered a number of airline start-ups (Sun et al., 2022), which - if successful enough to stay in the market - have the potential to design their vertical strategy and industry interfaces from scratch. Our systemic analysis and the mindset of value migration leveraging the developed structural framework can provide valuable inputs to designing a robust, future-ready airline business model that can manipulate its structurally weak position within the industry structure by enhancing resilience and removing inefficiencies in the overall value chain set-up (Bouwer et al., 2022; Economics, 2022). By this, we provide a relevant structural framework to help addressing the growing transformative need of the global airline industry.

#### 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.

#### CRediT authorship contribution statement

**Lars-Michael Wendel:** Conceptualization, Data curation, Formal analysis, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Sascha Albers:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Wouter Dewulf:** Conceptualization, Methodology, Supervision, Writing – review & editing.

#### Appendix A.

Cluster/segment	Expert job position/profile	Company
Industry structure overarching	Partner, aerospace & aviation	Porsche Consulting
	Industry expert aviation	German Federal Ministry for Economic Affairs and Energy
Airline	Senior expert loyalty & customer insights	Deutsche Lufthansa AG
	Senior expert group & portfolio strategy	Deutsche Lufthansa AG
Distribution	Regional director	Sabre Travel Solutions
	Senior industry analyst	Skift Research
	Senior industry manager	Google
Manufacturer /Airline services: MRO	Associate partner, maintenance & engineering	Lufthansa Consulting; former senior product manager at MRO provider
Airline services: Ground handling	Senior industry consultant/owner	Airbus/Nabla Services
Airport	Associate partner, airport & infrastructure	Lufthansa Consulting; former managing director at regional airport

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