The Integrated Framework for the Examination of Airline Industry Evolution: Past, Present Analysis and Future Projections

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Abstract

In the past, airline distribution process, which was between airline companies and customers, was under the control of intermediaries such as GDSs. After the advancement of internet technology in airline distribution, online players emerged, and airlines established their websites to bypass the intermediaries. Since new technologies have still been emerging to meet the key factors such as customer expectations, technological innovations and technical insufficiency of the intermediaries in distribution industry, the airline distribution will continue to evolve in the next decade. In this study, we aimed to understand how the industry evolved according to the emerged players and developed technologies by utilizing secondary data (relevant literature and industry reports). As a result, we constituted an integrated framework for analyzing the industry in timeline including three phases (past, present, future) and from four aspects (market forces, technology trends, ecosystem players, ecosystem canvas).

Keywords: Airline distribution industry, Market pull, Industry forces, Airline ecosystem, ecosystem canvas.

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Introduction

In early years of airline distribution industry, the travel agents in off-center offices were processing reservations manually (Wardell, 1991). Because of the increasing demand, the computerization era began. In 1962, the first CRS (Computer Reservation System), Sabre, was developed as the earliest example of e-commerce in travel industry (Smith et al., 2000). In time, more CRSs were established and given under travel agents' use. Finally, reservation systems transformed as Global Distribution System (GDS) and spread widely and included services like hotel bookings (Gasson, 2003). Airlines were paying booking fee to GDSs per ticket sold, commissions and overrides to travel agents. These payments constituted the airlines' third largest operating expense (Clemons and Hann, 1999). Since then LCCs (Low-Cost Carriers) which were the pioneer of investing on their online channel arose, the airline business models were mainly divided into two types (Vinod, 2009). While the long-established airlines, FSCs (Full-Service Carriers), aimed to meet the customers' requirement by providing in-flight entertainment, free food and drink, LCCs cut costs significantly by providing no-frills service and online sales. Since LCCs attracted price-sensitive customers, FSCs reshaped their distribution strategy to remain their competitiveness and focused on direct distribution through their websites (Sismanidou et al., 2008; Hunter, 2006).

After the advancement of the internet technology, the first OTAs, Travelocity and Expedia, emerged in 1996 to transform the information provided by GDSs into user-friendly interfaces for

customers at a low cost (Granados et al., 2008). In response, some US airlines launched Orbitz in 2001 based on the search technology developed by ITA Software which used the same database with ATPCO (Airline Tariff Publishing Company) to bypass GDS and access participating airlines' reservation systems directly. Later, a similar technology, Opodo, was developed by European airlines. Orbitz and Opodo were called Supplier Link Portals. In 2005, SideStep launched its meta-search engine to combine and sort information obtained from online players and route the customers to the relevant supplier (Granados et al., 2007; Brown and Kaewkitipong, 2009).

The structure of airline distribution industry has been evolving to different phases with the effect of external factors. Porter's 5-Forces model explains external forces in the industries to define possible strategies with their advantages and disadvantages. It analyzes the relative competitive pressures exerted on a firm by five different forces which are competition, power of customers, power of suppliers, substitutes and new entrants (Shaw, 2007). Based on this model, Gasson (2003) conducted a study to understand the change of travel agents' role with new information technologies in airline distribution industry. In addition, business model canvas (BMC) which is a visualized tool with an emphasis on key partners, key product/services, value propositions, channels, key resources, customer relationships, can be used to design more sustainable business models (Osterwalder & Pigneur, 2010; cited in Joyce et al, 2016). Spil et al. (2017) used BMC to understand the strategic use of social media in airline industry. However, the evaluation of the changes in terms of BMC is an unresearched area.

In this study, we investigated the airline distribution ecosystem, and proposed an integrated framework for the industry ecosystem canvas in a timeline with three phases (past, present, future). Thus, BMC was extended as an ecosystem canvas via different aspects along with the time dimension. We evaluated the past, present and future of the airline distribution industry from perspectives of key players by exploring the critical developments in the industry. Consequently, we aimed to analyze the evolution in airline distribution industry by focusing on the airline ecosystem players, technology trends and market dynamics referring Porter's 5-forces as a theoretical lens and suggested an ecosystem canvas in a timeline as a research contribution.

Methodology

In this study, we aimed to understand how airline industry evolved in line with emerged players and developed technologies by utilizing secondary data. The data sources were publicly available data and industry reports. We extensively reviewed the relevant literature and industry reports. At the end, we constituted an integrated framework for analyzing the airline industry in three phases (past, present, future) and from four aspects (five-forces, technology trends, ecosystem players and ecosystem canvas).

We constituted the three phases (past, present, future) based on the pioneering players. In 1962, the first CRS, Sabre was developed and in 1996 the first online players, Travelocity and Expedia, emerged and both opened new eras in the distribution industry. According to the reports of SITA (2017) and Switchfly (2018), since the internet technology continues to develop, the airline distribution industry will embrace new technologies and experience a significant change in the next decade.

We constituted integrated framework for analyzing four aspects of airline distribution industry as follows; first of all, we examined the key ecosystem players and their interactions in terms of booking, payment and information flow for three phases. Then, we investigated technological trends in past and present phases, and envisioned the future. After that, we adopted Porter's 5-Forces model which explains external forces to define the market pull in airline distribution industry for present phase. Later, we extended key players, technological trends and market analysis for potential future projections based on our secondary data. Finally, we developed the airline distribution ecosystem canvas in a timeline having three phases (past, present analysis and potential future expectations) (See Table 1).

INSERT TABLE 1 HERE

The main contribution of this study is the constitution of airline distribution ecosystem canvas which is adapted from the concept of BMC to overview the industry from different elements such as the structure, resources and challenges.

Findings and Discussion

The structure of the airline distribution industry in the past is shown in Figure 1. Accordingly, airlines publish their fares through ATPCO to be received by GDSs which aggregate fares and availability for multiple airlines through a single access point and TTAs (Traditional Travel Agencies) distribute the information obtained from GDSs to customers. GDSs receive subscription fee from TTAs and booking fee from airlines per ticket sold. In the meanwhile, the revenue of TTAs is the incentive fee from GDSs, commissions and overrides from airlines and hidden service fee from customers included in the ticket price.

INSERT FIGURE 1 HERE

Figure 2 shows the current structure of the industry with the emerged distribution channels of the internet technology in airline distribution. In present structure, airlines stop paying commissions to TTAs. However, they won't be eliminated from the industry since airlines need to compromise with them not to lose the customers who prefer travel packages. Airline Websites appear as suppliers' online players. Airline Ticket Offices (ATO) exist in the industry as direct distributor of the supplier to support customers without additional price. OTAs and Supplier Link Portals receive service fee from customers and booking fee from airlines per ticket sold. Differently, OTAs request incentive

fee from GDSs and meta-search engines route customers to the OTAs or airline companies by a fee (Brown and Kaewkitipong, 2009).

INSERT FIGURE 2 HERE

It is expected that GDSs won't be able to meet the future requirements and will be replaced by technologies such as VCHs (Value Creation Hubs). VCHs will use new-generation airline commerce technology infrastructure used to power airline PSS (Passenger Service System). Unlike GDSs which work with individual airlines, VCHs will be developed for each major alliance to serve as a gateway between the airlines which participate in a given VCH as shown in Figure 3 (Harteveldt, 2012).

INSERT FIGURE 3 HERE

The structure of the airline distribution industry in the future is shown in Figure 4 which is developed in this study. Accordingly, VCH will interact with alliances by paying the subscription fee. Non-traditional companies will emerge to route the bookings for a referral fee like meta-search engines.

INSERT FIGURE 4 HERE

In the light of the research made, we revised the Porter's Five Forces model to explain external forces for present and future of airline distribution industry as shown in Figure 5.

INSERT FIGURE 5 HERE

After the emergence of online players such as LCCs and meta-search engines, customer loyalty of airlines decreased (Wang and Pizam, 2011). To gain loyalty, collaborations can be established between the industry players. Since non-traditional distributors and meta-search engines will have the power to display the supplier on the top of the searching list for an advertising fee, they can prioritize the supplier which pays a considerable price. However, they can be limited by regulators because of the non-neutral competition. Furthermore, the online players can associate fare families with their products by considering the customers who do not use all services included in the standard package price. They can also adopt the dynamic pricing to create better content for customers (LSE Consulting Report, 2016).

The substitutions of airline travel are other travel options like high-speed trains and improved technologies like video conferencing. To meet customer expectations better, developments such as virtual assistants with voice recognition can be implemented into the mobile applications to gather personal data and offer relevant ancillary services (LSE Consulting Report, 2016).

As the internet technology led the emergence of online players, new distribution channels like VCHs will appear based on technological innovations. Moreover, non-traditional companies will play an important role with their power in accessing customer data.

Since customers could compare the ticket prices online, they tended to choose the cheapest one by treating the airlines' tickets as commodity. The commoditization effect provided them a bargaining power (LSE Consulting Report, 2016). However, since customer expectations are growing over time, the focus is shifting from price to content (SITA, 2017). When the players adopt Active Distribution strategy, they can provide more relevant flight shopping content by implementing the technologies like Artificial Intelligence (AI). Since personalized content is an important part of this strategy, they should develop their CRM (Customer Relationship Management) and integrate the most preferred payment methods in their system (Harteveldt, 2016).

Meta-search engines and GDSs can access more potential customers and service with considerable fees. Airlines can adopt the wholesale model to bypass GDS and empower the relationship with travel agencies. In this model, airline companies sell the tickets to travel agencies at a lower price to be retailed (Harteveldt, 2012). To increase sales, the online players should pay attention to their IT infrastructure. They need to analyze their resources and capabilities of IT staff elaborately to decide about making huge investment on IT or outsourcing it.

We constituted airline distribution ecosystem canvas which is adapted from the concepts of business model canvas as illustrated in Figure 6. We classified the airline distribution industry into seven concepts and explained the relationship between industry players with their main functions to find their business models. GDSs adapted to the current industry by offering OTAs. However, the emergence of VCHs or similar technologies can erode the GDSs.

INSERT FIGURE 6 HERE

Technology trends of the players in different time phases are shown in Figure 7. With the developments in internet technology, new entrants emerged with improved infrastructures and online user-friendly portals to contact with customers directly. GDSs upgraded their old infrastructure and supported OTAs. In the future, new entrants will appear to meet increasing customer needs, and mobile technologies will be among the key developments.

INSERT FIGURE 7 HERE

Conclusion

In this study, we analyzed past, present and future of airline distribution industry by constituting an integrated framework which contains ecosystem players, market forces, technology trends, and ecosystem canvas.

Customers have been governing and forming the industry with their choices and expectations, as they adopted the internet technology easily. New technologies and opportunities are in service for all industry players. However, the player which wants to adapt to new era will meet challenges and limitations because the future is ambiguous. In the future, non-traditional companies and meta-search engines will play an important role since both of them can prioritize a particular supplier

through their biased advertising model. However, regulators may intervene to limit their power for sustaining competitiveness in the industry.

Airline distribution industry will embrace new technologies and experience a significant change in the next decade. However, it will not be evolved soon since the developments will involve high investments and long time for being implemented and tested.

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Figures and Tables

Table 1. Integrated Framework for Analyzing Airline Distribution Industry

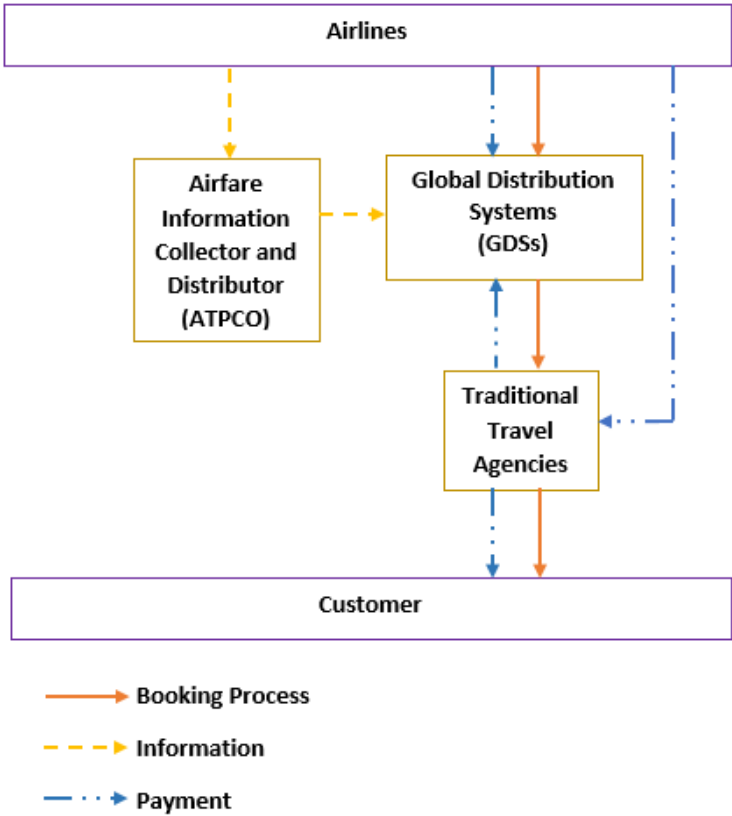| PHASES / ASPECTS	PAST (1962-1996)	PRESENT (1996-2018)	FUTURE (2018-2027)
ECOSYSTEM PLAYERS	ILLUSTRATED IN FIGURE 1	ILLUSTRATED IN FIGURE 2	ILLUSTRATED IN FIGURE 4
MARKET PULL	N/A	ILLUSTRATED IN FIGURE 5	
TECHNOLOGY TRENDS	ILLUSTRATED IN FIGURE 7		
ECOSYSTEM CANVAS	ILLUSTRATED IN FIGURE 6		

Figure 1. Airline Distribution Industry in the Past
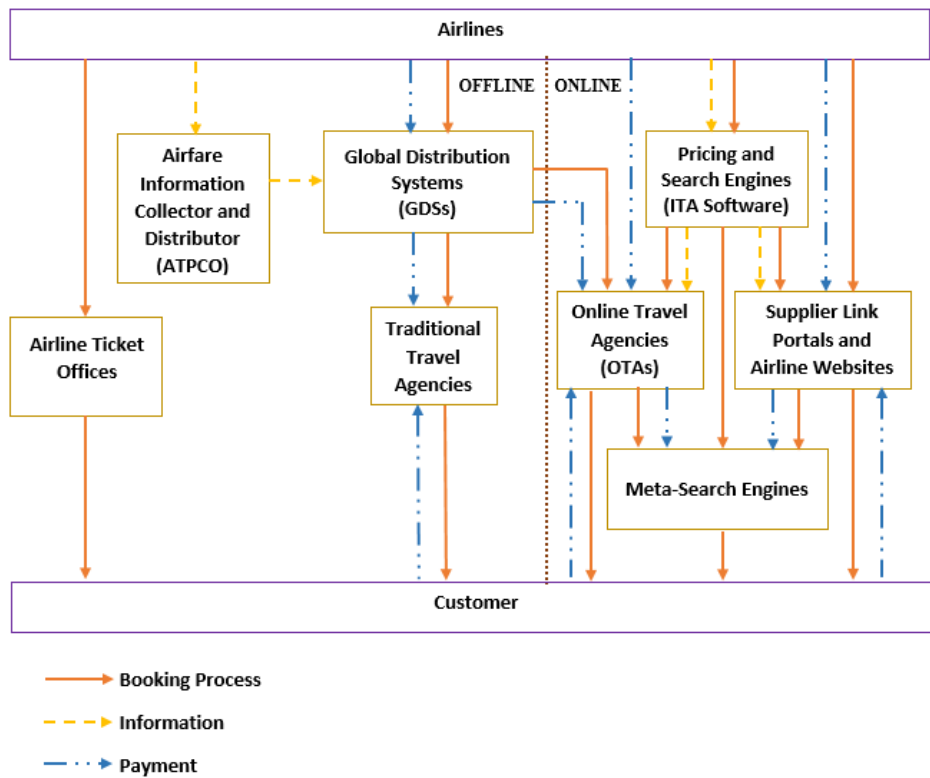
(Adopted from Granados, et al. 2008)

Figure 2. Current Airline Distribution Chain with Offline and Online Players

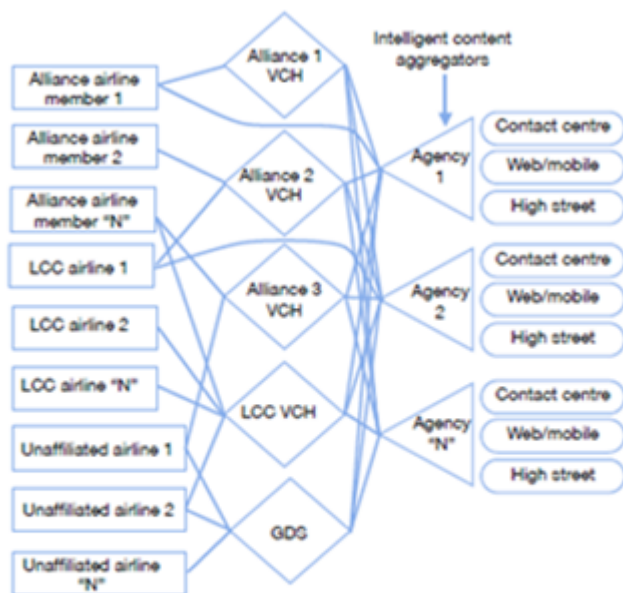(Adopted from Granados, et al. 2008)
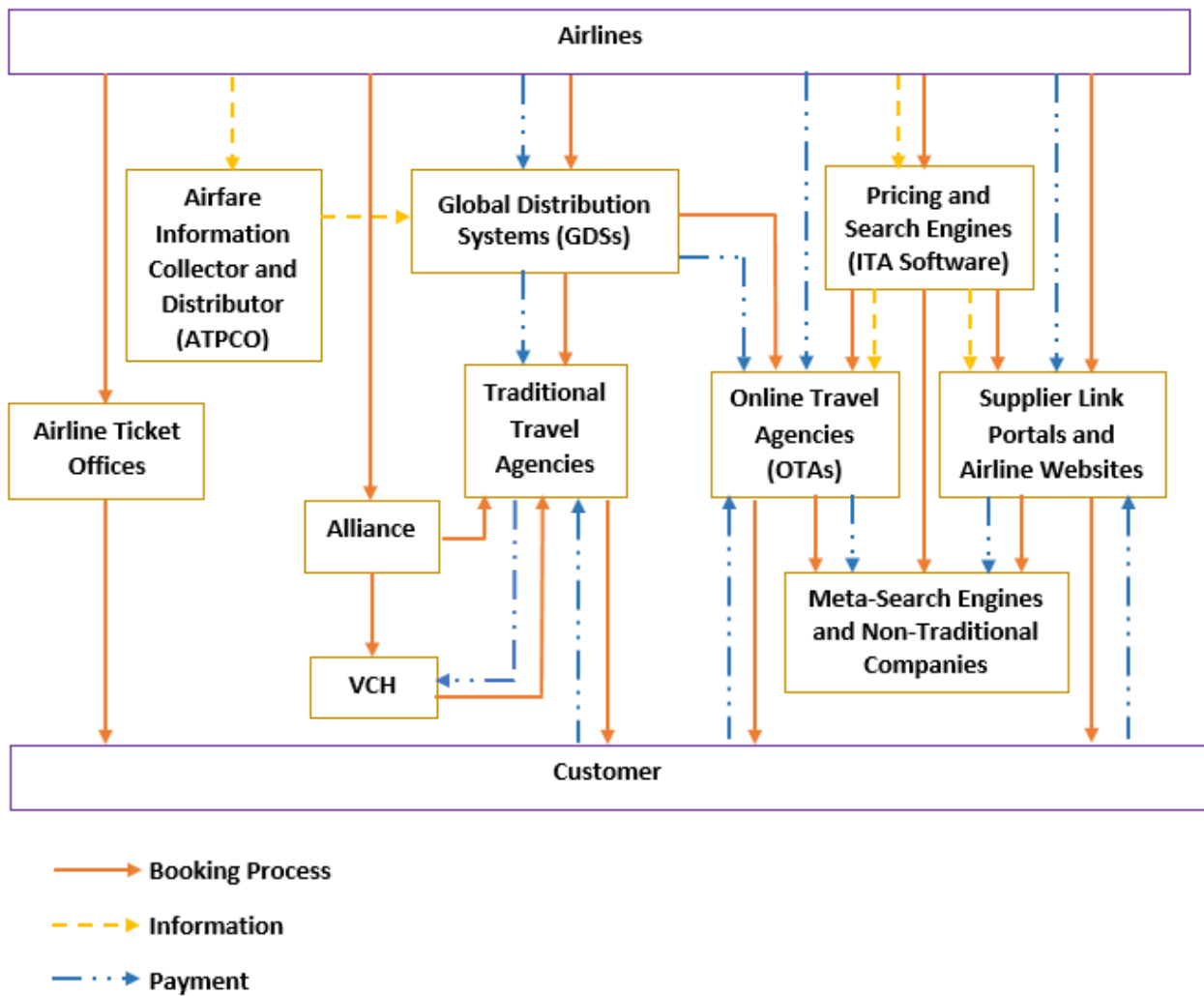

Figure 3. New Commerce Channel VCH

(Harteveldt, 2012)

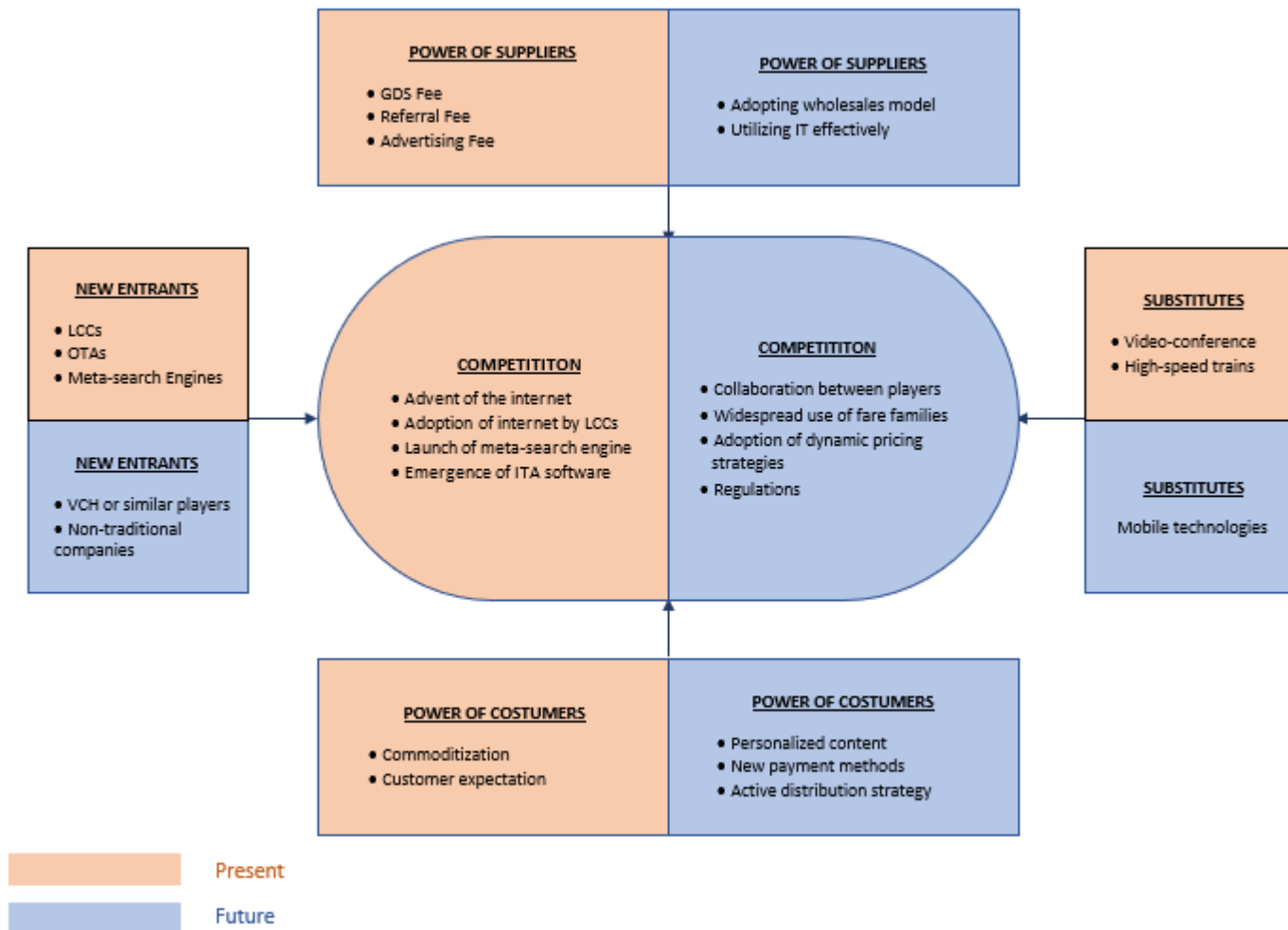Figure 4. The Expected Airline Distribution Industry in the Future

POWER OF SUPPLIERS

- GDS Fee
- Referral Fee
- Advertising Fee

POWER OF SUPPLIERS

- Adopting wholesales model
- Utilizing IT effectively

NEW ENTRANTS

- LCCs
- OTAs
- Meta-search Engines

NEW ENTRANTS

- VCH or similar players
- Non-traditional companies

COMPETITITON

- Advent of the internet
- Adoption of internet by LCCs
- Launch of meta-search engine
- Emergence of ITA software

COMPETITITON

- Collaboration between players
- Widespread use of fare families
- Adoption of dynamic pricing strategies
- Regulations

SUBSTITUTES

- Video-conference
- High-speed trains

SUBSTITUTES

Mobile technologies

POWER OF COSTUMERS

- Commoditization
- Customer expectation

POWER OF COSTUMERS

- Personalized content
- New payment methods
- Active distribution strategy

Present

Future

Figure 5. Adopted Porter's 5-forces Model for Present and Future

KEY PRODUCTS AND SERVICES

Past	Present	Future
GDS: Aggregation of schedules, fares, availability and booking capability. Ticket distribution for FSCs **TTAs:** Comprehensive flight information to consumers	**GDS:** (+) ticket distribution for LCCs. IT services **TTAs, OTAs and Supplier Link Portals:** Flight information to consumers **Meta-search engines:** Collecting the online offers for customers to route them to the relevant supplier **Airline websites and ATOs:** Servicing customers for the relevant airlines	**Non-traditional companies:** Routing customers to the relevant supplier. Servicing customers directly. Collaborating with other players in the industry. **VCHs:** Aggregation of schedules, fares, availability. Ticket distribution for the member airlines

VALUE PROPOSITIONS

Past	Present	Future
GDS: Combination of information received by aggregating too many requests. Transaction all the time and in a short response time **TTAs:** Establishing direct connection between airlines and the customers who don't want to arrange their travel plan by themselves.	**OTAs and Supplier Link Portals:** 7/24 online service **Meta-search engines:** The possibility to compare all online offers. Reaching more customers **Airline website:** 7/24 online service **ATOs:** 7/24 support via telephone	**Non-traditional companies:** The possibility to compare all online offers. Reaching more customers. Finding the relevant content for the customers **VCHs:** High-frequency and high-volume shopping.

KEY RESOURCES

Past	Present	Future
GDS: Technical infrastructure. Skilled staff. GUI **TTAs:** GDSs	**OTAs:** Pricing and search engines. GDSs **Supplier Link Portals:** Pricing and search engines. Airlines **Meta-search engines:** Technical infrastructure to combine and sort prices. Pricing and search engines **ATOs:** Airline reservation systems **Airline websites:** Airline reservation systems. Pricing and search engines	**Non-traditional companies:** Infrastructure to combine and sort airfares from OTAs, Supplier Link Portals and airline websites. Pricing and search engines **VCHs:** Huge investment in technical infrastructure. Skilled staff

REVENUE STREAMS

Past	Present	Future
GDS: Booking fee. Subscription fee **TTAs:** Incentive fees. Overrides. Hidden service fee	**OTAs:** Incentive fee. Service fee. Booking fee **Supplier Link Portals:** Service fee. Booking fee **Meta-search engines:** Referral fee. Advertising fee **ATOs and airline websites:** Ticket price. Invest on technological infrastructure.	**Non-traditional companies:** Referral fee. Advertising fee **VCHs:** Subscription fee. Incentive fee

KEY PARTNERS

Past	Present	Future
GDSs – TTAs	**GDS:** (+) OTAs **Supplier Link Portals:** Airlines **Meta-search engines:** OTAs, Airlines, Supplier Link Portals **Airline websites and ATOs:** The relevant airline	**Non-traditional companies:** OTAs, Airlines, Supplier Link Portals **VCHs:** Alliances / Airlines, TTAs, OTAs

CUSTOMER RELATIONSHIPS

Past	Present	Future
GDS: Establishing the connection between airline and TTAs **TTAs:** Selling tickets to the customers directly.	**OTAs, Supplier Link Portals, ATOs and airline websites:** Selling tickets to the customers directly. **Meta-search engines:** Routing the customers to the relevant supplier's website.	**Non-traditional companies:** Routing the customers to the relevant supplier's website. Selling tickets to the customers directly. **VCHs:** Establishing the connection between airline or alliance and TTAs / OTAs.

CHANNELS

Past	Present	Future
GDS: Technical support for TTAs. No direct interaction with customers. **TTAs:** Meeting face-to-face or via telephone	**OTAs, Supplier Link Portals, meta-search engines and airline websites:** Websites. Mobile applications **ATOs:** Meeting with customers face-to-face or via telephone	**Non-traditional companies:** Websites. Mobile applications **VCHs:** Websites. Mobile applications

Figure 6. The Proposed Airline Distribution Ecosystem Canvas

	PAST	PRESENT	FUTURE
YEARS	(1962-1996)	(1996-2018)	(2018-2027)
INFRASTRUCTURE	• GDSs receive information from fare aggregators and distributors such as ATPCO. • GDSs based their system architectures on mainframe computing platforms running TPF (IBM´s durable Transaction Processing Facility OSS). • GDSs provide technical infrastructure for traditional travel agencies without interacting with the customers directly.	• GDSs have started migrating programs to open service-oriented architectures (SOAs) which enables a major up-front cost advantage over IBM mainframes in terms of hardware and software licenses to support both TTAs and OTAs. • GDSs have introduced data feeds in XML, but data must be converted back into the original TPF application to interact with the core GDS host at some point. • GDSs developed a GDS network using XML Application Programming Interfaces (APIs) which allows LCCs to connect to GDS with a simpler protocol. • ITA has provided websites support for multiple airlines by providing online access to fare search engine of an airline through its QPX software. • Supplier Link Portals are based on the search technology developed by ITA Software to avoid reliance on legacy system infrastructures. • Meta-search engines receive information from supplier websites through screen scraping procedure. • ATOs use airline reservations systems which are based on Eastern's Programmed Airline Reservation System (PARS).	• It is expected that the infrastructure of GDSs won't meet the future requirements. • VCHs will use the new-generation airline commerce technology infrastructure used to power airlines' PSS and eCommerce solutions. • Non-traditional companies especially Google will be supported by ITA Software. Google will establish integration between its functions.
FRONTEND	• GDSs provide a complex sales platform for TTAs with an almost one-stop-shop content. • TTAs establish face-to-face meetings with customers to make reservation for them.	• GDSs developed more features and functionality to agency desktop applications. • OTAs converts information provided by GDSs into user-friendly websites for customers at a low cost. • Supplier Link Portals use web interfaces to connect customers. • Meta-search engines perform a search and compare function via their websites to be used by customers directly. • Airlines has commercial websites and mobile application for accessing customers directly. • ATOs use platforms which are proposed by relevant airlines.	• VCHs will offer an online platform to establish a connection between alliances and TTAs. • Non-traditional companies can offer their mobile applications and/or websites. They can perform a search and compare function via their websites to be used by customers directly.
INTEGRATION	• Airlines provide information to ATPCO to be received by GDSs. • GDSs obtain price and information from multiple airlines for TTAs. There is a back-office integration between them.	• OTAs, airlines and Supplier Link Portals receive support from ITA Software while meta-search engines collect prices from them.	• VCH will interact with alliances which are the cooperation of subscribed airline companies to obtain offers for TTAs. • Non-traditional companies will route the customers to the relevant supplier for reservation. They have power to reach consumer data including in their travel preferences.

Figure 7. Technology Trends of Key Players