

New developments in Global Distribution Systems (GDSs) for the airline industry: first-mover mechanisms that enabled incumbent firms to maintain a leading position

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Abstract

Global Distribution Systems (GDSs) have served as the platform for electronic commerce in travel for decades, providing virtual real-time connectivity between thousands of suppliers of travel inventory and hundreds of thousands of retail sellers of travel products. After decades of leadership the GDSs were challenged in 2005 by a set of new players claiming to provide a cost-effective distribution. Two years later these new entrants have not yet managed to change the travel distribution status quo.

This paper analyses the GDS industry, provides an overview of the changing market dynamics, analyses the environment that led to the appearance of the GDS New Entrants (GNEs), and applies the sources and mechanisms identified in the 'first-mover advantages' literature to explain why traditional GDSs remain to be the undisputable leaders in travel distribution. The paper drives its conclusions from extensive research in industry data sources and academic literature, as well as interviews with industry experts and affirms that in the case of travel distribution GDSs marketing capabilities have played a more vital role in their performance than technology.

Keywords: Global Distribution Systems (GDSs); Airline industry; Information and Communication Technologies; First-mover advantages.

1. Introduction

A key question technology companies are confronted with is what is the right time to enter the market or in other words under which circumstances does timing of entry to market provide a first mover advantage to the pioneer entrant, i.e. a significant leap-frog in performance that pre-empts the success chances of follower entrants. Further, over the past 30 years, economic and management theorists have expended considerable effort exploring the conditions under which a suboptimal technology may become dominant in the market place (Economides, 1996; Dougan and Bronson, 2003).

In this article we are concerned with the question of how GDS technology has become the industry standard given the emergence since 2004 of alternative technologies in appearance not worse than the incumbent ones. We examine the travel distribution industry and its latest trends to later describe the first-mover mechanisms that have enabled incumbent GDSs to maintain a leading position. According to Katz & Shapiro (1985) for certain technologies the relative number of adopters of a given standard substantially influences adoption decisions.

We argue that this is the case with the GDS industry, where the performance of the incumbents' technology is vital but a secondary consideration in comparison to the massive and worldwide customer scale achieved by these systems.

2. First mover advantages literature

Lieberman and Montgomery (1988) describe in their Strategic Management Society award winning article "First-Mover Advantages", the mechanisms that confer advantages and disadvantages on first-mover firms. They argue that mechanisms that promote first-mover advantages rise from three primary sources: (1) technological leadership, (2) pre-emption of assets, and (3) buyer switching costs. Conversely, first-mover disadvantages may result from free-rider problems, delayed resolution of uncertainty, shifts in technology or customer needs, and various types of organisational inertia.

Early entrants may be able to pre-empt resources of various types. These include superior positions in geographic space, technology space (e.g. patents), or customer perceptual space. Pioneers may be able to expand and defend their positions by blocking product space with a broadening product line. Equally important but less widely recognised, early entrants may be able to mould the cost structure of customers. This can occur in three different ways. First, there is evidence (Carpenter and Nakamoto, 1989) that customers perceptual space may evolve in a manner that favours the initial position of the pioneer. Second, customers may develop switching costs as they accumulate experience with the pioneer's product. Third, 'network externalities' may establish the pioneer's product as the industry standard. In the latter case, customers enjoy lower costs (or greater benefits) when using the standard product, which allows compatibility with the largest base of external users. In this case the firm's resource is the size of its customer base. In all three cases it is interesting to note that the superior resources do not reside within the pioneering firm; rather, they exist at the level of customers, whose preferences have been shaped to favour the pioneer's products.

According to theory regarding markets with network externalities, purchasers are purportedly influenced to choose an alternative based on information regarding the number of adopters of that technology or the expected number of adopters of that technology. This circumstances arise in industries like telecommunications and electronic funds transfer (Dougan and Bronson, 2003; Katz and Shapiro, 1985). In these industries the presence of more adopters of a specific technological standard increases the value of that technology for any individual adopter. We regard the GDS industry as a clear case of direct network externalities, where connection of each additional users (travel agency or airline) increases the accessibility to that company from, and to, all other users on the network.

Ruiz-Ortega & Garcia Villaverde (2007) have undertaken an empirical study analysing the influence of different capabilities on the performance of companies that enter the market as pioneers versus early and late followers. The authors test a set of hypotheses employing a regression analysis of the different capabilities identified in the first-mover advantages theory as relevant to the success or failure of a firm. They conclude that in a dynamic industry, with high levels of rivalry and imitation, pioneer firms can get and maintain competitive advantage in spite of their products being easy to copy and the entry barriers being low; certain marketing capabilities, like advantages in client relations, the customer installed base or the control of distribution channels can establish strong resource position barriers for follower firms with respect to competitors (Ruiz-Ortega & Garcia Villaverde, 2007; Makadok, 1998). The study identifies identified three capabilities, out of thirteen, as key and relevant to a pioneer firm's performance: marketing, technical, and cost leadership capabilities.

Surprisingly (taking into account that the study was based on the information and communication technology industry), technical capabilities had a relevant but smaller influence on firm performance. The same capabilities are also key to the late entrants' performance, although in this case the technical abilities are more important than the marketing abilities.

3. The GDS market

With GDS (Global Distribution Systems) we refer to the technology companies that provide electronic distribution services to the travel industry. These companies were initially called CRSs (Computerised Reservation Systems) and evolved in parallel to the air travel market.

Buhalis (2002, 1998), Hopper (1990) and Copeland & McKinney (1988) describe the history of the GDS industry. In the early days air travellers were relatively few, and each airlines routes and fares were tightly regulated by the Civil Aeronautic authorities. As time evolved, demand for air transport increased and schedules grew more complex, rendering the until then man-driven booking process impractical. CRS took shape in response to airlines' inability to monitor their inventory of available seats manually. The CRS functionality expanded greatly as the technology provided a base for generating flight plans, tracking spare parts, and scheduling crews and evolved into a computerized go-between linking suppliers of travel and related services to retailers and customers.

Because of the strategic advantage emanating from increases in yield, in-house CRSs were considered valuable assets by airlines. The first system, SABRE, was introduced in 1960 by American Airlines and by 1964 was the largest civil data processing centre in the world. Terminals were installed in the travel agencies' offices connecting them to the airline and reservations started being made remotely without the need of a phone call or fax. Other airlines soon established their own systems and soon travel agents began pushing for a system that could automate their side of the process, i.e. enable them to access all different airlines on one single system.

European airlines also began to invest in the field in the 1980s, propelled by growth in demand for travel and the imminent entry of competing American airlines' systems into Europe. In 1987, a consortium among Air France, Lufthansa, SAS and Iberia developed Amadeus and in 1993 another consortium (including British Airways, KLM, United Airlines, and Alitalia, among others) formed Galileo.

Though initially perceived and used by the airlines, CRSs soon extended their reservation services to other travel providers such as hotel and car rental companies, tours, cruises, and railroads. GDSs now allow travel providers to market and sell their flight and fare information through a travel network of more than 150,000 travel agency locations worldwide and provide the booking engine to most travel e-commerce companies and airline web pages.

GDSs, progressively consolidated their position to only four major systems: Sabre, Amadeus, Worldspan and Galileo (the two latter wholly owned since 2006 by Travelport and marketed under the same umbrella) with backing from the airlines that had created and funded. For a few years starting in the late 1990s, all existing GDS were spun off to the stock markets raising their value considerably before getting again all privatised over the last two years, this time with the airline owners divesting their parts.

4. Recent developments

4.1. Travel distribution developments

After almost four decades of GDS oligopoly with the main players acting as the sole facilitators of airline distribution the Internet revolution brought to a new state of affairs. The emergence of the Internet forced airlines to reshape their distribution strategy in order to boost their competitiveness. Both incumbent and low-fare carriers identified the Internet as a major opportunity to tackle distribution costs and to reengineer the structure of the industry (D. Bouhalis, 2004) and started to shift more and more of their sales to their direct to consumer web channels.

With online sales and direct distribution on the boost, GDS were faced with the threat of desintermediation and commoditisation. The appearance of online alternatives to the GDS eroded the traditional model based solely on travel agency distribution and made unjustified the high GDS booking fees (more than USD 10 per ticket).

The shift to direct sales did not come for free as airlines had to lower their ticket prices in order to shift consumers to their private channels but at the same time it allowed them to put pressure on GDS and lower the cost of distribution. It is said that airlines have over the last three years achieved up to 40% discounts in their booking fees.

Another source of threat for the GDS industry came from the regulators. The US Department of Transportation eliminated in 2004 the regulations governing GDSs bringing to a new state of affairs where airlines are not obliged to the same level of participation in the different GDS platforms and where biased reservation data displays and differential pricing are permitted, raising thus the airlines' negotiation power. Similar changes are discussed for introduction at the European Commission level.

4.2. Technological advances

The system architectures of the four major GDS are largely based on a mainframe Transaction Processing Facility framework, which, while reliable and capable of large workloads, has relatively little processing power and can be expensive to maintain and upgrade. These platforms served the GDS and airlines well for decades because of their reliability and fast response times. The GDS applications have been repeatedly amended to accommodate new functionality, each time adding complexity and cost.

Recently, GDSs have started migrating most processes from their older mainframes to open service-oriented architectures. Flexibility and open architecture have become key requirements in the market as the Internet explosion has brought to new demands: first new players with internet-based technology require applications compliant with their systems and second high-performance, lower-cost platforms were necessary to improve ability to handle a fast-rising "look-to-book" ratio; that is, the total number of shopping transactions compared to actual purchases (as consumers generate more availability and fare comparison transactions before buying than travel professionals).

New technology not only makes it easier to write applications with an emphasis on adaptability and ease of integration with other systems. It also allows such applications to be run on PC-class servers running Linux OS, enabling a major up-front cost advantage over IBM mainframes in terms of hardware and software licenses. The implications for the GDS

industry have been critical: on the one hand they lowered the entry barriers for new entrants wishing to offer travel distribution technology and on the other hand raised the financial burden on incumbent players who in order not to become obsolete are being obliged to migrate their legacy systems to open system architectures.

4.3. Emergence of alternatives to traditional GDS

In 2005, almost after 40 years of undisputable traditional GDSs' dominance in travel distribution, a new set of entrants burst onto the distribution scene promising to provide a GDS replica with a big reduction in supplier segment fees and more flexible and functional distribution technology. These companies include G2 SwitchWorks, ITA and Farelogix and were termed GNEs (GDS New Entrants).

Technology was core to the positioning and marketing of the GNEs, who with lower-cost but increasingly reliable and flexible servers offered a distribution price per transaction of less than half than GDSs. However, levels of content, service and market reach that the new entrants could provide were far from being comparable to those of traditional GDS.

Despite the initial hype, GNEs were soon faced with the key challenge in travel distribution: mass coverage. Agencies would not use their technology without content (and of course incentives), and suppliers would not use them if they did not provide access to agents.

5. First-mover advantages in the GDS industry

In spite of the hostile environment for traditional GDS, it remains uncommon for a travel agency to operate without the use of at least one of the four major GDSs. Three years after the emergence of companies claiming to offer exactly the same as traditional GDS it is still very uncommon for a travel agency (online or offline) to operate without the use of at least one of the big four GDS systems. The new players still account for well under 1% of the US domestic market for segments, according to the leading travel technology research company PhocusWright. In this section we apply the sources and mechanisms identified in the first-mover advantage empirical studies and theory to explain why traditional GDSs still remain the undisputable leaders in travel distribution.

5.1. Technological leadership (technical capabilities)

The GDS have been moving aggressively for several years to more modern, flexible software architectures, incorporating open standards, object-oriented languages and other technologies. These advances have enabled the GDSs to add a lot more features and functionality to agency desktop applications over the years. However, even though the GDSs have introduced data feeds in modern languages such as XML, at some point all of that data must be converted back into the original TPF application to interact with the core GDS host. This can add complexity and cost when writing to the GDS specifications, especially when attempting to incorporate more sophisticated functionality.

On the new entrant side, the GNEs' underlying technology, which represents a fundamental departure from the legacy GDS systems, enables them to be far more cost-effective and introduce functional capabilities far beyond what the GDS can offer (although there are concerns as to what degree such cost-efficiency would be maintained if the GNEs ever reached the GDS scale of business).

First-mover advantage theory also affirms that there exist cost advantages if learning can be kept proprietary. This has not been the case in the GDS sector, as GNEs were created or staffed by a number of former GDS employees who disseminated the technology knowledge to the new companies.

It follows from the above, that we cannot explain the GDS market leadership on the basis of technology supremacy as the new entrants are able to offer a similar (if not superior) technology. It is also true, that although the GNEs emerge with an apparently better technology, GDSs have narrowed the gap by updating functionality and introducing new product.

5.2. Pre-emption of assets

The first-mover firm may be able to gain advantage by pre-emptying rivals in the acquisition of scarce assets (Lieberman and Montgomery, 1988). GDSs have been very successful in pre-empting the business opportunity of new entrants: first they employed their initial backing by owner airlines to expand their travel agencies base to more than 50,000 locations each worldwide. Second, they developed a close relationship with these agents: they developed travel agency specific technology, created of country specific GDS marketing companies to manage the relationship locally, and paid agents, in the form of incentives, a big chunk of the booking fee charged to travel suppliers. Third, the GDSs focused their interest on the most profitable travel niche, i.e. the corporate travel agencies limiting the amount of business opportunity available for subsequent entrants. Finally, the GDSs managed to influence the economics of the sector to their benefit: they lobbied at the regulators level and managed a regulated environment for decades that raised their negotiation power in the airline-GDS-travel agency triangle.

With the outcome of Internet and direct distribution GDSs built on the assets they had previously achieved to maintain their leading position. Although they have lost part of the business as traditional retail travel agencies –especially in leisure- lost market share, the GDSs have maintained overall growth in bookings volumes by securing segment-generating online travel agency business either as vendors or acquirers by creating their own Web interfaces and online travel company subsidiaries. The most active of them, Sabre, owns Travelocity, Getthere and Lastminute, while Travelport owns Orbitz and Amadeus Opodo. Online travel agencies accounted for more than one third of all airline tickets bought online in 2005. According to PhocusWright (2006) nearly 81% of online corporate bookings and 75% of offline transactions in the US go through intermediaries (traditional and Internet travel management companies), which use the GDSs for almost all transactions.

In another pre-emptive move GDSs have changed their business model, offering more flexible pricing. Whereas previously, all segments cost the same amount the new model allows different prices for different booking channels (online, offline, direct and indirect) and scope of travel (business, leisure, national or international). This on the one hand allowed GDSs to bring down distribution cost in the areas where they faced competition (e.g. online and direct bookings), whilst maintain an even higher margin in the niches left without competition (e.g. corporate travel made by travel agents).

5.3. Buyer switching costs

Travel agencies are committed to existing GDS contracts and have in many cases substantial financial and human resources invested in existing technologies and business processes.

Travel agencies would only switch to a new platform if it provided overwhelmingly superior technical and financial benefits to compel an agency to invest the resources and time to make the switch and this has not been the case.

Farrell and Saloner (1985) argue that the demand for some types of goods, such as computer applications software, increases along with the increased presence of a compatible good, e.g. compatible operating software. Travel management companies have rigorous and complex requirements for fulfillment, exception handling and back-office integration and have built heavily on top and in line with the GDS software. Capability to meet these requirements, which the GDSs have already invested in heavily to support, quickly add to the cost and complexity of interfaces. For travel agencies to switch platform, GNEs had to provide overwhelmingly superior technical and financial benefits to compel an agency to invest the resources and time to make the switch.

6. Conclusions

We have examined the GDS firms and their recent competitors with regards to the set of capabilities identified by the first-mover advantage theory as relevant to the success of pioneer companies. Our analysis suggests that while their technological leadership was seriously challenged and does not explain their continued success, incumbent players managed to maintain their leading position because travel distribution is less about technology and more of a means to access to content and manage relationships between buyers and suppliers of travel services.

The GDS success stems from a set of asset pre-emption mechanisms. These assets included the creation of network externalities and an established reputation with suppliers and distributors that allowed GDSs to raise significant entry barriers for new entrants who had to recreate from scratch the network developed by the GDSs. The advantages enjoyed by the new entrants such as access to cheaper and more efficient technology, better adaptability to the new dynamic needs of the Internet era and organisational flexibility did not suffice to overcome their main disadvantage, that is lack of marketing capabilities.

Lieberman and Montgomery (1988) suggest that if one firm has unique R&D capabilities while the other has strong marketing skills it is in the interest of the first firm to pioneer and the second firm to enter at a later date. Both may earn significant profits entering in this sequence, but neither would gain if the order to entry were reversed. Applying this logic in the reservation systems area, it seems reasonable to suggest that new players challenging the leadership of traditional GDSs should as a minimum be able to demonstrate superior marketing capabilities than incumbent players, at least in a niche market.

As Henderson and Clark (1990) assert if the shift to the new generation is radical enough, incumbents will be hampered by their existing capabilities: i.e., they will be unable to adapt. GDS new entrants could become relevant players in the travel distribution scene if they shifted their focus to building capabilities (technical and marketing) in new areas where traditional GDSs are weak: i.e. internet technology for direct airline channels or platforms with access to many GDSs simultaneously. This window of opportunity makes us believe that despite their initial failure GNEs could be here to stay.

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