

Substitution effects across hotel distribution channels

Roland Schegg,
and Miriam Scaglione

Institute of Tourism
University of Applied Sciences and Arts Western Switzerland Valais, Switzerland
[roland.schegg, miriam.scaglione]@hevs.ch

Abstract

The evolution of distribution channels in the hospitality sector has followed different paths over time depending on the technology used. This research analyses the evolution of market shares of different clusters or generations of distribution channels using multi-generation diffusion methods. The data for the study are a series of annual member surveys by *hotelleriesuisse* since 2002 which monitored the evolution of market shares of 15 individual distribution channels. We grouped the distribution channels into three generations starting with the pre-World-Wide-Web era (travel agent, destination organisation, etc.); the middle generation comprises Internet-based direct booking channels (e-mail, reservation forms on hotel websites, etc.) and the latest generation includes online intermediaries such as Online Travel Agencies and social media. The results of our analysis show substitution effects across different clusters of distribution channels and shed light on the dynamics of competing sales funnels. From the practitioner's point of view, the study gives insight into the future evolution of the distribution mix. This evolution is crucial for hotel marketing strategies as the Internet is the most powerful marketing tool in the hospitality industry today.

Keywords: hotel, distribution, OTA, Switzerland, Fisher-Pry model, substitution effects

1 Introduction

Information and communication technologies (ICTs) have been recognized for quite some time (cf. Buhalis, 2003, p. 338) as a key tool for marketing and distribution in tourism. Actually, not only do they offer opportunities in terms of information diffusion (24*7*365) on product and service presentation, pricing strategies and promotions (last minute, location-based offers, etc.), but also they broaden selling opportunities for tourism suppliers including getting customer feedback from social media sites.

ICTs have been changing the way in which business is conducted in the tourism and hospitality industry (e.g. Buhalis & Law, 2008; O'Connor & Frew, 2002) since the 1970s: the development of Computer Reservation Systems (CRS – 1970s), Global Distribution Systems (GDS – 1980s), and the advent of the Internet (1990s) generated not only a paradigm shift but an actual change in operational practices in the industry (Buhalis & Law, 2008; Ip, Leung, & Law, 2011).

Yet, in spite of the potential that the Internet provides, it has been mainly exploited, already in an early stage, by big international brands (O'Connor & Frew, 2002); whereas many small and medium-sized enterprises (SME) in the hotel sector are

challenged by the vast amount of opportunities and the variety of alternative distribution systems (Toh, Raven, & DeKay, 2011).

From an industry perspective tourism managers understand that the Internet can give tremendous added value to their businesses at both the marketing and the sales level (Buhalis, 2003; Werthner & Klein, 1999) if they manage it properly and professionally. But even if the rising importance of online distribution channels in tourism is recognized nowadays (Li, Pan, Zhang, & Smith, 2009), many (Swiss) hotels still do not fully exploit their own websites (Scaglione, Schegg, & Murphy, 2009; Schegg, Scaglione, Liebrich, & Murphy, 2007) as a tool for selling hotel rooms and as a way to gain a competitive advantage (Law & Jogaratnam, 2005).

The steadily increasing complexity with regards to managing the online distribution environment (Kracht & Wang, 2010, p. 736) seems to be a challenge for the whole industry, but small and medium tourism enterprises (SMTEs) in particular struggle with aspects such as learning and adopting new technology (Scott et al., 2010), globalisation and increasing competition (Stratigea & Giaoutzi, 2006). Consequently, many hotels rely increasingly on third-party websites (intermediaries such as online travel agencies, OTAs) which allow users to compare different products across multiple suppliers (Rao & Smith, 2006).

According to Kracht & Wang (2010, p. 737), “this evolution and transformation of tourism distribution channels resulted in greater choice for the consumer, increased competition for distribution participants”. The authors further state that ICTs have introduced complexity to the distribution system with various permutations such as additional layers of intermediation or disintermediation when certain players bypass traditional intermediaries. Yet, there is still little research - with the exception of the work by O’Connor and Frew (2002) - looking at the evolution and the future market share of (online) distribution channels. The aim of this research is thus to model the substitution effects across different clusters of distribution channels in the Swiss hotel sector and thus gain an understanding of the dynamics of competing sales funnels.

2 Literature review

2.1 The rise of online in the hotel distribution

Hotels have traditionally used a large variety of distribution channels (Christodoulidou, Connolly, & Brewer, 2010). Direct hotel-owned sales channels include telephone, fax, walk-ins and since the development of the Internet in the 1990s also e-mail, web forms and real-time booking on the hotel website. In addition to direct sales, hotels use an array of various intermediaries including traditional brick-and-mortar partners such as travel agents, tour operators or destination management organisations, affiliation partners (e.g. hotel franchises) and in recent years more and more online intermediaries such as OTAs.

Online distribution was seen as a promising progressive shift away from traditional sales channels such as mail, telephone and fax (Kasavana & Singh, 2002; O’Connor & Frew, 2002) because traditional channels are seen as inefficient and expensive by both hoteliers and final customers (O’Connor, 2001). Starkov and Price (2007) recorded

that two out of three reservations were completely made online (i.e. search, book, pay directly online) or were influenced by the Web (i.e. web search and actual reservation through other channels such as the phone). An investigation by TravelCLICK (2009) of thirty international major brands and chains showed that 48% of hotel reservations were made over the Internet; 27% were made by brick-and-mortar travel agents; and 25% were made by voice (e.g. telephone and/or walk-ins).

An analysis by Schegg, Stangl, Fux, & Inversini (2013) showed that direct booking channels remain the dominant sales tools in Switzerland, although their proportion in the distribution mix has been decreasing steadily over the last 10 years in favour of online intermediaries. The rise of electronic channels has been paralleled by a decline in the market share of the classical intermediaries (DMOs, tour operators, travel agents, event organizers). Such an evolution was predicted by several authors in the past (e. g. Kasavana & Singh, 2002; O'Connor & Frew, 2002) and given the dynamics of the market place, it seems to be important to examine and understand the evolution of hotel distribution over the long-term in order to foresee future development.

2.2 Evolution of distribution channels

A recent review paper by Kracht & Wang (2010) examined the historical evolution and progression of distribution channels in the tourism sector. The study focused on the evolution of the structure over time revealing the progressively larger number of intermediation layers, in spite of concurrent disintermediation and re-intermediation activity. The authors structured distribution channels into three different generations setting 1993 as a milestone, owing to the introduction of the web browser into the marketplace which enabled direct communication between suppliers and consumers:

- I. The first generation channels emerged in the pre-World-Wide-Web era, before 1993 and are composed of traditional retail and traditional corporate travel agents, traditional tour operators, Global Distribution Systems (GDSs), incoming travel agents, switches, destination marketing and destination marketing organizations (DMOs) and suppliers (op. cit. cf., p. 739).
- II. The second generation channels developed after the communication protocol of the World Wide Web had been made freely available in 1993. Suppliers began to connect directly with customers through web-mediated channels (op. cit. cf., p. 741) and thus began the disintermediation of traditional intermediaries. This second generation is characterized by the growing importance of new direct communication/distribution channels such as e-mail, online booking forms or internet booking engines on the website of the hotels.
- III. According to Kracht & Wang (2010) , slightly after the time that suppliers started disintermediating traditional intermediaries, another layer of intermediation began to develop based on the growing importance of internet search engines such as Google and Yahoo. The first Online Travel Agencies (OTAs) were Internet Travel Network (ITN) in 1995, Travelocity in 1996 and Priceline (one of the dominant players in today's market place) in 1998 (op. cit. cf, p 741). OTAs with sound business models survived the internet bubble of 2000 and saw increasing market success thereafter.

According to Christodoulidou et al. (2010), travel meta search engines such as Kayak, SideStep (now owned by Kayak), Mobissimo, and Trivago represent the next stage in how guests search and shop for travel. They state that “meta search engines differ from online travel intermediaries in that they do not process booking transactions – nor do they provide the full range of services and destination content typically found on an OTA site. (p. 1049)”.

2.3 Multi-generation diffusion models

The aim of multi-generation simulations is to model the diffusion/substitution effects across several generations of technologies. In services, among other examples, researchers used these models in the simulation of successive generations of mobile bands (Meade & Islam, 2006, 2008) and the replacement of cash payment by electronic means in European countries (Snellman, Vesala, & Humphrey, 2001). There are two important effects to consider in multi-generation models: diffusion and substitution effects. Diffusion effects allow understanding the rationale of behaviour across adopters by showing the degree of imitation and innovation in diffusion processes following the traditional Bass diffusion model interpretation (Bass, 1969; Mahajan, Muller, & Bass, 1995). Substitution effects show the evolution of the share of each generation when it is replaced by a new one (Meade & Islam, 2006).

One of the most popular models of substitution when the available data shows the market share of various product generations is the family based on the pioneering work by Fisher & Pry (1971).

The F-P model follows an S-shaped curve for each generation characterized by two constants: the early growth rate and the time at which the substitution is half complete as shown in equation 1 where f is the fraction substituted:

$$f = (1/2)[1 + \tanh \alpha(t - t_0)] \text{ Equation 1}$$

Where α is half the annual fractional growth in early years and t_0 is the time at which the share of the generation is 50%, namely when the substitution is half complete (cf. Fisher & Pry, 1971, p. 76). The “takeover time” is the period necessary to go from the minimum time for the take-off (10%) up to 90% of the substitution.

Finally, an important concept is the “fractional rate of substitution of new for old generation” referring, for a given time t , to the ratio between penetration (f) over the remaining percentage ($1-f$) to be substituted at time t . F-P assumes that this ratio is a linear function of time in a semi-log model that follows equation 2

$$\log [f / (1 - f)] = 2\alpha(t - t_0) \text{ Equation 2}$$

Therefore, the fractional growth or rate (2α) is constant throughout the whole substitution process. The F-P model is based on logistic growth (Bhargava, 1995; Meade & Islam, 2006). Bhargava (1995) proposed some extensions allowing the fractional growth of substitution (2α) to change over the time. He applied these models to the substitution of color TV for B&W in Japan, nylon tire cord for rayon tire cord in USA, synthetic for natural fiber also in USA. Equations 1 and 2 assume

that there are only two generations (cf. Norton & Bass, 1987) and all the applications in the literature are applied to this kind of setting.

3 Data and methodology

Data utilised was gathered since 2002, on a nearly yearly basis, through online surveys completed by the over 2,000 members of *hotelleriesuisse* (Swiss hotel association; this is the main trade organisation of the hospitality sector in Switzerland). The online questionnaire monitored how bookings are distributed among available direct (telephone, fax, walk-in, etc.) and indirect (tour operator, tourism office, GDS, OTA etc.) distribution channels; hoteliers specified how much each channel accounts for in percentages. Details on data collection and descriptive results are from our publication (Schegg & Fux, 2010; 2013) and from the unpublished data of the last survey, conducted in January 2013.

Based on the distribution channel typology of Kracht & Wang (2010), we have aggregated the individual channels in the following way in order to analyse the evolution of market shares of successive distribution channel generations (see Table 1):

- Generation 1 (traditional channels): Telephone, fax, letter, travel agency, tour operator, DMO (local, regional or Swiss Tourism), conference organizers, CRS of hotel chain or franchisee, GDS, others.
- Generation 2 (online direct channels): E-mail, reservation form on website, real-time booking on the property website.
- Generation 3 (new online intermediaries): OTA, social media channel

Table 1. Evolution of mean market shares of distribution channel generations 1-3 between 2002 and 2012

year (n=number of hotels participating in survey)	G1	G2	G3	total
2002 (n=202)	0.68	0.29	0.02	0.99
2003	.	.	.	.
2004	.	.	.	.
2005 (n=94)	0.62	0.34	0.03	1.00
2006 (n=100)	0.56	0.39	0.04	1.00
2007	.	.	.	.
2008 (n=184)	0.55	0.40	0.06	1.00
2009 (n=198)	0.49	0.40	0.11	1.00
2010 (n=211)	0.46	0.41	0.14	1.00
2011 (n=196)	0.46	0.37	0.17	1.00
2012 (n=200)	0.42	0.37	0.21	1.00

The time series covers 2002 to 2012 with three missing values (i.e. 2003, 2004 and 2007) when, unfortunately, the survey was not carried out. The authors estimated these values using exponential interpolation, namely semi-log regression model of the market share based on time (t). For the parameter estimation process, 2002 was

labelled as being $t=1$. Using equation 2 on time (t) the authors estimated the time series backwards for 11 years from 1990 to 2001 and forecasted 70 years from 2013 to 2060.

In order to model the substitution effect and given that the data are shares for each generation, the authors used the F-P model. They employed SAS V9.2 Nonlinear Least Square Proc Model procedure (SAS Institute Inc., 2011) for the estimation of the F-P model parameters α , namely half the annual fractional growth and t_0 , the time where half substitution is reached.

Table 2 shows the goodness of fit to data of the model. The coefficients of determination (R2) are higher than 0.9 for the first and the third generations; whereas the second generation shows a rather poor coefficient of 0.42 indicating that the trend of this series has been moderately well captured by the model. White's test of heteroscedasticity of the residuals and the Normality test are not significant for every generation. An exception is the third generation (G3) where the Normality test is significant at $p < 0.05$. Therefore, the model shows, in general, a good fit to data.

Table 2: Goodness of fit - F-P model

Nonlinear 3SLS Summary of Residual Errors				
Equation	SSE	MSE	Root MSE	R-Square
G1	0.00182	0.00018	0.01350	0.9759
G2	0.00737	0.00074	0.02720	0.4163
G3	0.00077	0.00008	0.00874	0.9822
Heteroscedasticity Test (White's Test)				
Equation	Statistic	DF	Pr > ChiSq	
G1	7.03	5	0.2184	
G2	6.79	4	0.1476	
G3	3.79	5	0.5795	
Normality Test (Shapiro-Wilk W)				
Equation	Value	Prob		
G1	0.93	0.3606		
G2	0.93	0.3939		
G3	0.85	0.0403		

4 Results

Table 3 shows the estimates of F-P parameters for the three distribution channel generations. The parameter 2α , which represents the annual fractional growth of each generation, is negative for the first generation (-0.11), which is in line with the fact that this generation is declining because it has been substituted by the two following ones. The same parameters for the second generation (0.04) are lower than those of the third generation (0.27); moreover annual fractional growth for the third generation is more than 6 times greater than the second (0.27/0.04).

Table 3: Estimates and t-statistics for F-P parameters and year represented by t_0

Nonlinear 3SLS Estimates						
Model	Term	Estimate	Approx Std Err	t Value	Approx Pr > |t|	Estimate year $\hat{t}=0.5$
G1	2α	-0.107	0.003	-32.76	<.0001	2009
	t_0	8.144	0.180	45.28	<.0001	
G2	2α	0.041	0.008	5.16	0.0004	2021
	t_0	19.991	2.870	6.96	<.0001	
G3	2α	0.275	0.011	25.08	<.0001	2017
	t_0	15.862	0.331	47.87	<.0001	

Figure 1 illustrates the observed and simulated evolution of market shares for two distribution channel generations (G1 and G3): backcasted trend before 2002, observed trend between 2002 and 2012 and forecasted trend after 2012. Due to the rather poor goodness of fit of the model for the second generation, backcast and forecasts trends are not quite reliable, and therefore omitted in their long run in figure 1. The third generation shows a well-defined S-shape. As the first generation is declining, its curve shows a reversed S-shape.

Moreover, the forecasted year when generation 3 reaches a market share of 50% is 2019. For the first generation, the raw data (Table 1) show that in 2009 half of the share of the traditional channels (generation 1) had already been substituted by the two others (generation 2=40% and generation 3=11%) and so yields the model estimation.

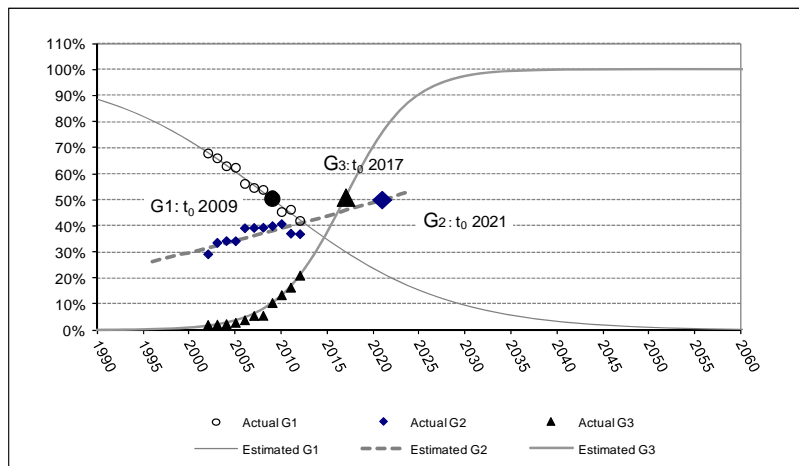


Figure 1. Evolution of market shares for the 3 generations of distribution channels: observed (2002-2012), backcasted (1990-2012) and forecasted (2013- 2060).

Therefore, *ceteris paribus*, the third generation of channels will reach half of booking share by 2017 and in the long run dominate the booking channels. Of course the long-run forecast has to be taken with parsimony, as this is just a theoretical trend, which does not take into account the rise of possible forthcoming generations of distribution channels. It does, however, give some evidence of the domination of the last generation over the two previous ones.

5 Discussion and conclusions

The growing power of OTAs and the possible dependency of hotels on them is a recurrent topic in the international hospitality industry. Electronic distribution systems have reached a state of rapid evolution since the emergence of web-based channels (Kang, Brewer, & Baloglu, 2007). According to these authors, multiple channel strategies in which suppliers use more than one distribution channel to serve the market have grown rapidly, because hotels are trying to maximize exposure and market share to fit the channel preference of their customers (Schoenbachler & Gordon, 2002).

The technology refresh in the travel distribution landscape will probably continue at a rather rapid pace with the introduction of new platforms/channels and features that make legacy forbearers obsolete in the long run. Our forecasted evolution of generations of distribution channels will therefore be directly influenced/modified by the probable evolution of coming and new distribution models and actors. Google recently entered hotel search with its Google Hotel Finder. Facebook and other social media are becoming relevant platforms for exchange of travel information and recommendations, while the mobile channel is rapidly emerging with considerable potential. According to Green & Lomanno (2012, p. 2) “Hotels rooms are for sale in a dynamic and volatile distribution landscape that is launching many market savvy and financially well-endowed “gatekeepers” who will become a new breed of third party intermediaries (e.g., Google, Facebook, Apple); their power will grow as they gradually become the preferred points of entry for consumers to do travel shopping and buying.”

In this context, the growing popularity of meta search travel sites such as Kayak, Trivago and TripAdvisor Meta Search, eased by the progresses in digital technology and customers’ perceptions of these sites as “unbiased” online one-stop shops, is certainly a relevant development in travel distribution. While travel meta search engines are still in their early stage as a distribution channel, the major OTAs have recognised their strategic potential in the last 2 years. Expedia’s acquisition of Trivago in 2012 (Shankman, 2012), Priceline’s acquisition of Kayak in 2013 (Schaal, 2013a) and the launch of TripConnect by TripAdvisor enabling a vast long-tail of smaller properties to participate and vie for direct bookings rings in the next round in competition among global OTAs (Schaal, 2013b).

In the Swiss hotel market, according to analysis (Schegg, et al., 2013), market shares of the classical intermediaries (i.e. DMO, tour operators, travel agents) have been declining over the past years (reaching 12.5% of all bookings in 2011 compared with 19% in 2002). The sales channel with the highest growth rate is the OTA channel which was able to multiply its market share within the past five years according to

these authors accounting now for nearly one out of five bookings (op. cit). The forecasted increasingly higher market shares of OTAs in our study are therefore a serious threat for the Swiss lodging sector. Online intermediaries have become progressively powerful and this development puts hotels in a difficult position of having to sell steadily growing portions of their inventory at (often) discounted rates and with high commission rates through third party intermediaries (Caroll & Siguaw, 2003).

According to Brewer, Feinstein, & Bai (2006) the growing importance of OTAs will result in hotels losing control of their (i) allotments, (ii) marketing, (iii) pricing, and it will lead to (iv) hotel brand erosion. Hotels will need therefore to increase their competencies with respect to the use of the new media, e.g., online marketing, social media, and websites and strive for cost efficiency, for example by stimulating direct bookings (Schegg, et al., 2013). But given the high marketing and technology investments of the OTAs (Toh, et al., 2011) which are constantly looking to foster their oligopolistic position in the market, the chances of success of a direct distribution strategy seem to be scant for an industry which is characterised by small and medium-sized enterprises which are struggling to adopt new technology (Scott, et al., 2010) and are operating with very limited resources both at a financial and at a human capital level (Schegg, et al., 2013).

Limitations: Our results have to be taken with caution because there are still few observations available. The poorer performance of our model for the second generation is probably linked to the still short time series. Besides, the initial assumption of the F-P model is that the number of successive generations is only two. We are aware of that limit but the calculi show that the pace of substitution of the second generation is much lower than for the third generation anyway (cf. Fig 1). Future research should use as raw data - not the market shares but the overnights - in order to be able to apply the Norton & Bass family of models and show some evidence of the rationale of customers' behaviour in terms of innovation and imitation.

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