The Case of Switzerland During the Last 20 Years

Miriam Scaglione and Roland Schegg

Prof. Dr. Miriam Scaglione
University of Applied Sciences and Arts Western Switzerland Valais
miriam.scaglione@hevs.ch

Prof. Dr. Roland Schegg
University of Applied Sciences and Arts Western Switzerland Valais
roland.schegg@hevs.ch

Abstract

Information and communication technologies (ICT) have been recognized for quite some time (cf. Buhalis, 2003, p. 338; Scaglione & Murphy, 2012) 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.

During the last 20 years, various papers at the AIEST conference have followed the ICT evolution using Switzerland tourism sectors for case studies. These studies focused on either diffusion and implementation (Perruchoud-Massy, Scaglione, Schegg, & Murphy, 2005; Scaglione, Ismail, Trabichet, & Murphy, 2010; Scaglione, Johnson, & Trabichet, 2010, 2011; Scaglione, Schegg, Steiner, & Murphy, 2004a; Schegg, Scaglione, Liebrich, & Murphy, 2007; Varini, Scaglione, & Schegg, 2011) or the impact on revenue generated by ICTs in Switzerland (Scaglione, Schegg, & Murphy, 2006, 2009)

The central aim of the present research is to describe the evolution of ICT adoption and implementation in the Swiss tourism sector and in conclusion to show the importance of supporting innovation policy through the whole process but also to show the possible thread of Online Travel Agencies (OTA) for the hospitality sector. This research reviews empirical results and spells out the role of public policy in accompanying the ICT adoption and implementation processes in Switzerland.

Last but not least, this paper is a tribute to the president of AIEST, Professor Peter Keller, by showing his role during the early stages of ICT adoption and implementation in Switzerland.

Introduction

Tourism is one of the main economic sectors in Switzerland. The share of export revenue due to tourism (Tourism Balance of Payments) was around 5.5% in 2012, which means that the sectors ranked in the fourth position after chemical industry, metal and machine industry and watchmaking industry. In 2009, tourism ranked in the third position ahead of the watchmaking industry affected at that time by the global economic down-turn. The Tourism Balance of Payments for 2012 showed that revenue from foreign tourists was of 15.4 billion CHF (Swiss Tourism Federation, 2013). In terms of labor force, the tourism sector is a major employer: in 2005 it represented 4.4% of the total Swiss workforce (Presence Switzerland-Federal Department of Foreign Affairs, Unknown) and in 2012, the accommodation sector represented 3.6% of the tertiary sector (Federal Statistical Office, 2013).

Tourism is also a traditional sector in Switzerland, even though it has lost the dominant position, once enjoyed in the 19th century *Belle époque* and boosted by the creation of the *Rhaetian Railway* and the attraction of the of the *Gornergrat* and the *Jungfraujoch* mountains (OCDE, 2000). From the early stages, the tourism marketing in Switzerland was characterized by a dynamic and modern approach. In 1893, the Association of Swiss Tourist Offices was founded and in 1904 the Swiss Federal Railways (SBB) introduced its advertising offices to promote tourism (Switzerland Tourism, 2007). On the 28th of November 1917, the national association for the promotion of tourism was founded, namely, the Swiss National Tourist Office (SNTO) and on the 1st of July 1940, following a federal resolution, the SNTO received the official status as the Swiss Central Office for Tourism Promotion (Switzerland Tourism, 2007).

After the Second World War, especially since 1950, total overnights increased due to the new ski resorts making Switzerland one of the top five destinations in the world in the '50s. During the '70s it suffered from stagnation but nevertheless, during the '80s, Switzerland was still among the top ten destinations in the world. Yet, the tourism sector in Switzerland had to face an important down-turn during the first part of the '90s as a result of the recession between 1992 and 1996 (Conseil fédéral suisse, 2010; OCDE, 2000). "This crisis in tourism did have one positive result, despite losses amounting to billions of francs, in that it demonstrated to many people in political and economic circles just how important tourism is for economic growth and employment in Switzerland. Fortunately growth has returned in the meantime." (OCDE, 2000, p. 2).

The Swiss Confederation has assumed the role of a planner regulator and developer of tourism channels in a pioneering way as it has been the first country in the world to build an instrument of sustainable development in 1979 known as the *Swiss Tourism Concept* (Commission consultative fédérale pour le tourisme, 1979). This document initiated the Swiss tourism policy during the '80s and

90's aiming at "an acceptable optimum between the positive and the negative externalities" (OCDE, 2000, p. 4, N. 11). During the same year, the federal government provided a contribution of CHF 5 million over 2 years (1979 and 1980) which allowed the introduction of a phone number "120" for tourist information and a computer screen text system.

In 1995, SNTO became Switzerland Tourism (ST) which was reorganized as a marketing company, and an agreement between ST and 12 regional tourism regions was signed. ST launched also in 1995, its online presence (MySwitzerland.com) and its own e-mail system (Switzerland Tourism, 2007).

On the 29th of May 1996 the Swiss federal government (Federal Council) presented to the Parliament a plan to improve the tourism industry's framework conditions and finally in December 1999, the Swiss Parliament agreed to increase to 190 million CHF the support for ST for the period from 2000 to 2004. In 1997, *Innotour* was created as an instrument for promoting innovation and co-operation in the tourism sector (OCDE, 2000); this program was first supposed to exist until 2001 but is still in service in 2014. *Innotour* provides financial support for innovation projects and private sector companies "that develop and implement parts of the project and are expected to participate in the cost to the extent of 50 per cent..." (OCDE, 2000, n. 19).

Since and actually already before the publication of the leading document on Swiss tourism policy in 1979 (Commission consultative fédérale pour le tourisme, 1979), the tourism and hospitality industry has undergone radical changes, one of which has been the revolution induced by the development of information and communication technologies (ICT). 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) have generated not only a paradigm shift but an actual change in operational practices in the industry (Buhalis & Law, 2008; Ip, Leung, & Law, 2011). Werthner & Klein (1999a) pointed out from the beginning that ICT and travel/tourism industry are closely "interrelated and intertwined" (p. 256).

The central aim of the present research is to describe the evolution of the ICT adoption and implementation in Swiss tourism and in conclusion, to show the importance of the supporting innovation policy through the whole process. The structure is as follows: The second section of the paper, the literature revue, will discuss the evolution of ICT diffusion in the tourism sector and its evolution and relationship with developments in the Swiss tourism policy. The third section consists of a meta- analysis of research on the evolution of ICT in Switzerland based on the papers published by a multidisciplinary team of researchers and mainly published in conferences (ENTER, AIEST) since 2003. The fourth sec-

tion will discuss the observed success of ICT innovation in the Swiss tourism industry and also the path being taken.

Literature review

ICT and distribution channels: a generational approach

ICT impact and evolution in the tourism sector deserves a study from a historical perspective. Kracht & Wang (2010) carried out this kind of approach by examining the evolution of distribution channels in the tourism sector. They focused on the progressively larger number of intermediaries in the distribution landscape and showed, at the same time, the simultaneous disintermediation and re-intermediation of contemporaneous business models. 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 (G1: traditional channels) emerged in the pre-World-Wide-Web (WWW) era, before 1993 and were composed of traditional retail and traditional corporate travel agents, traditional tour operators, Global Distribution Systems (GDSs), incoming travel agents, CRS of hotel chain or franchisee and destination marketing organizations (DMOs) as wells as the direct channels of suppliers such as telephone, fax or letters (op. cit. cf., p. 739). GDS was the channel which enjoyed an oligopolistic position in the distribution environment that could be only massively broken by the arrival of the WWW protocol. Even though, some of the other channels such as toll-free call centers held by regional/national tourism organizations or retail outlets helped suppliers to sell directly (McCubbrey, 1999; Werthner & Klein, 1999b), this generation is mostly characterized by a *traditional intermediation process*.

II. The second generation channels (G2: online direct channels) developed after the communication protocol of the WWW had been made freely available in 1993. Suppliers began to connect directly with customers through web-mediated channels (Kracht & Wang, 2010, 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 and internet booking engines (IBE) on hotel websites. As various studies have shown, traditional Internet technologies have helped small to medium sized tourism enterprises (SMEs) develop their business and gain a competitive advantage (Buhalis & Main, 1998; Morrison & Rhodri, 1999), as they have been able to reach directly the final consumer/tourists even in far away markets.

III. Third generation channels (G3): new online intermediaries. In spite of the underlying *disintermediation* process in G2, a new intermediation layer - Online Travel Agencies (OTAs) - grew in importance in the late 1990s due to the concurrent development of internet search engines such as Google and Yahoo. OTAs have been able to show that their business models survived the Internet bubble of 2000 and had increasing market success thereafter. The first 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 (Kracht & Wang, 2010, p. 741).

Travel meta search engines such as Kayak, SideStep (now owned by Kayak), Mobissimo, and Trivago represent probably the next big stage in how guests search and shop for travel (Christodoulidou, Connolly, & Brewer, 2010) and could thus become the fourth generation. It is clear that these 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" (Christodoulidou, et al., 2010, p. 1049). The beginning of this fourth generation (G4: Meta search engines) can be situated in 2006 when Kayak's popularity started to grow and led to awards such as BusinessWeek's 2006 'Best of the Web' and among the "50 Coolest Websites" by Time Magazine (Anonymous, 2007).

The evolution of distribution channels into different generations; from disintermediation (G1 to G2) and then the re-intermediation (G2 to G3), increased the complexity of ICT layers and was driven to a large extent by the technological advances. Though we do not pretend to rule out socioeconomic factors such as changes in travelers' behavior in the search and booking process, the perceived risk in on-line booking, etc. (i.e. cf. Bieger & Laesser, 2005; Bieger, Laesser, & Beritelli, 2004), the evolution of ICTs went along and enabled these customers' evolution as a supply pushing factor. The role of the internet in disintermediation is more than evident in the evolution from G1 to G2 during the Web 1.0 era. The shift from the G2 to G3 was preceded by "newcomers" like web robots and internet search engines (e.g. Google and Yahoo), and other applications such as iTunes during Web 1.5 (Graham, 2005). The basic idea of these search engines is to index the entire content of web pages instead of only the titles or Uniform Resource Locators (URL) and has contributed to the re-intermediation process in the early stages of G3 (cf.Kracht & Wang, 2010, pp. 741-745). Since then,

customers have been able to find information without targeting a specific website or URL beforehand and therefore are given a greater range of choices (Buhalis & Law, 2008).

The success of the third generation channels (OTAs) is coincident with the momentum of the Web 2.0 characterized by mass collaboration and User Generated Content (UGC), such as videos, blogs, wikis, podcasts and tags, allowing consumers to share their experiences online and to create positive or negative reviews of services they have experienced (Kasavana, Nusair, & Teodosic, 2010). This latter information is known as e-word-of-mouth (eWOM), and some studies have stressed the important role of this information during the planning process of travelling, along with consumer degree of trust (Gretzel & Yoo, 2008; Yoo, Lee, Gretzel, & Fesenmaier, 2009). As a result, Web 2.0 has made communication between travel companies and travelers (Hvass & Munar, 2012) at the same time easier and more complex. Planning tools such as interactive maps and traveler discussion boards facilitate travel planning and provide additional communication channels and opportunities for direct customer feedback for travel/tourism providers (Scaglione, Schegg, Syed-Ahmad, & Murphy, 2008). Thus Web 2.0 challenges marketing techniques and some scholars claim that all marketing research should be adapted because collaborative tools allow companies to take advantage of any rapid changes in social and media environments (Cooke & Buckley, 2008).

The meta-search engines that characterize G4 enjoy the advances in ICT interoperability techniques. Interoperability has to deal with provision in a consistent and predictable way of well-defined, end-to-end services (Buhalis & Law, 2008; Werthner & Klein, 1999b). Interoperability is a central issue in a complex sector like e-tourism, where business of third-party players consists in the combination of heterogeneous products, e.g. airline tickets and accommodation, in order to optimize planning process of travellers. It has always been a challenge to maintain consistency between different software systems given that each of the suppliers' websites evolve dynamically and independently, and may change the implementation independently from clients to correct faults or meet new requirements (Tosi, Denaro, & Pezze, 2009; Werthner & Klein, 1999b). The advances in the field of the so-called "Web Science" (Berners-Lee et al., 2006), specifically in the Semantic Web (Shadbolt, Hall, & Berners-Lee, 2006) , sometimes referred to as Web 3.0, have been driving factors for the evolution of G4. Scholars have developed a whole corpus of science by the adoption of common conceptualizations in the field of e-tourism called *ontologies* (cf. Pan, Xiang, Law, & Fesenmaier, 2011; Xiang, Gretzel, & Fesenmaier, 2009).

As with the internet search engines in G2, OTAs and meta-search engines increased the choice and the transparency of prices for consumers in an unprecedented way. (Dynamic) pricing is one of the most important aspects that reshaped e-tourism.

Compared to hotel websites, OTAs sell travel related products offering consumers a "one-stop-shop" (O'Connor, 2008) where they can purchase the whole travel experience giving OTAs a competitive advantage over hotels' owned websites. The reason for hoteliers employing multiple online and offline channels is to maximize exposure and market share, and reduce costs (Toh, Raven, & DeKay, 2011). Yet the use of OTAs, or third-party websites is associated with considerable costs. Nevertheless, OTA gained increasing market shares since the very early stages of the development of online distribution (Runfola, Rosati & Guercini, 2012) owing among other reasons to a superior product choice to the traveler (OTAs offer multiple alternatives of hotels and room prices). Hotels were slower and less efficient in using the opportunity offered by the online distribution (Gazzoli et al. 2008), thereby losing control over this channel (Phelan et al. 2011), for instance, in terms of price integrity and brand equity (Runfola, Rosati & Guercini, 2012). SME hotels have historically underestimated the need for an effective online marketing strategy whereas OTAs had invested heavily in Internet marketing and aggressive conversion techniques (Egger & Buhalis, 2008). The fact that online intermediaries are likely to continue to play a central role in the sale of hotel rooms changes the opportunities that small and medium sized independent hotels have to maximize profits (Varini et al., 2011).

Figure 1 shows the historical evolution of subsequent generations of distribution (sales) channels along with the technological milestones and below the graph, the main characteristics of the distribution processes. The vertical axis shows the evolution of ICT: from the birth of the Web 1.0 in 1993 when WWW became freely available to the Web 2.0 in 2004, year when Tim O'Reilly coined the term (O'Reilly, 2005) and finally the Semantic Web (Web 3.0) in 2006 when Berners-Lee et al. (2006) published their seminal work about the subject. The horizontal axis shows the evolution of subsequent generations of distribution channels. For G2,the milestone was the year 1995, a moment when the first Swiss hotel adopted its domain name (.ch) in switch (cf. Scaglione et al., 2004a; Scaglione, Schegg, Steiner, & Murphy, 2004b) and ST launched the website "MySwitzerland.com". The third generation channels G3, composed of OTAs that survived the dot-com bubble in 2000, is placed in 2002 and finally, the possible fourth generation (G4) in 2005, when Kayak gained the increasing popularity as pointed out above. The flags on the right side of Figure 1 show the time line of tourism policy actions of the Swiss government and their position within the IT-based evolution of distribution channels.

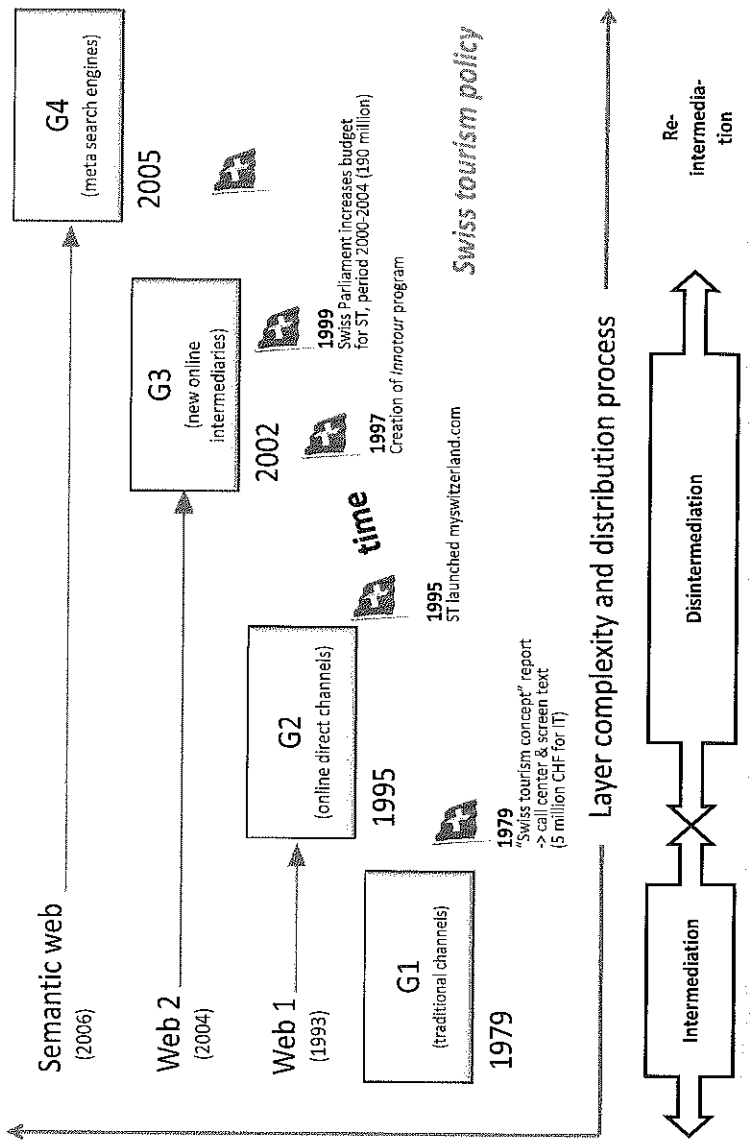

Figure 3: Schema of ITC evolution (vertical axis) and layer complexity over the time. The arrow shows the miles stone of synchronic Swiss tourism policy.

Innovation adoption and implementation in theories of innovation diffusion

Diffusion research shows resemblances in how enterprises and organizations adopt technologies (e.g. Damanpour, 1991). Management characteristics as well as internal and external structures and processes influence organizational capacity to innovate (e. g. Abrahamson & Rosenkopf, 1993; Rogers, 1995). Not like simple binary decisions (yes/no) with adoption of innovations by individuals, organizational adoption ranges from awareness of an innovations to successful infusion of the innovation in the workflow and the processes of the organization (Murphy, Schegg, & Olaru, 2006; Raho, Belohlav, & Fiedler, 1987).

The ICT adoption process by tourism sectors in Switzerland was not homogenous in the past; different dynamics depending on multiple factors such as geographical position of the enterprises, size of the companies or the industry sector itself, can be observed. Yet, a theoretical framework enables the quantitative analysis of innovation processes with a model which basically consists of two different processes: adoption and implementation. The innovation technology process evolves over a continuum for one specific organization: from having a technology (adoption process) to its effective use throughout the organization (implementation process) (Abrahamson & Rosenkopf, 1993; Rogers, 1995). According to Ismail, Hashim, Schegg, and Murphy, (2009), the adoption stage refers to develop competencies for using an innovation, such as training and hiring personnel, or acquiring the innovation whereas the implementation stage relates to innovation use and organizational performance.

The diffusion of innovation theory suggests five adopter categories for a given population: "pioneers" (2.5% of population), "early adopters" (13.5%), "early majority" (34%), "late majority" (34%) and "laggards" (16%) (Rogers, 1995). The approach based on Bass' (1969) model (Equation 1, hereafter called the B-R model) classifies Rogers' adopter categories based on actual data and reflecting two coefficients: innovation and imitation. Whereas innovators are influenced by **external** mass communication channels, imitators are influenced only by **internal** resp. inter-personal communication channels. In equation 1 below, N(t) is the cumulative number of adopters at time t, and m is the total market potential for new products.

An innovation coefficient p suggests the propensity to adopt driven by external information. The imitation coefficient q, suggests the propensity to adopt driven by interpersonal communication channels (Mahajan, Muller, & Srivastava, 1990). With pure innovation, q=0 and p>0, Equation 1 is a modified exponential function. With pure imitation, p=0 and q>0, Equation 1 is a logistic function (Meade & Islam, 2006). Apart from these extreme cases, comparing the p and q parameters helps examine adoption dynamics across sectors and the adoption of

different innovations by the same population. The q/p ratio, internal communication divided by external communication, shows each channel's relative strength in the adoption process. A high q/p ratio shows that imitation relative to innovation drives adoption. Although the diffusion rate of adopter categories varies widely, a coupled Bass and Rogers diffusion model (Mahajan, Muller, & Bass, 1990; Mahajan, Muller, & Wind, 2000) helps predict the diffusion rate.

Equation 1

$$\frac{dN(t)}{dt} = \underbrace{p(m - N(t))}_{\text{adoption due to } \textbf{external} \text{ influence or independent adoption}} + \underbrace{\frac{q}{m}(m - N(t))}_{\text{adoption due to } \textbf{internal} \text{ influence or internal adoption}}$$

Past research suggests that geographical location of an organization is one of the most influential factors in the adoption process (e. g.Hagerstrand, 1967; Rees, Briggs, & Oakey, 1984). In Switzerland for example, Salvisberg, Klarer, & Sacchi (2001) found that one in four SMEs in the French-speaking region had websites compared to one in two in the German-speaking region. Some other organizational characteristics have an influence on technological adoption such as characteristics of the CEO, management attitudes, business strategies, size of the company and general environment (Croteau & Bergeron, 2001; Rogers, 2003).

The implementation stage relates to innovation use and organizational performance (Brynjolfsson & Hitt, 2000; Fichman, 2000; Zhu & Kraemer, 2005). Hotels were not only slow to adopt new technology, especially independent hotels (Egger & Buhalis, 2008; Schegg et al., 2007), but also they lacked the skills needed to capitalize on new e-commerce opportunities (Martin, 2004). Irvine & Anderson (2008) found that a significant proportion of SME businesses embraced the Internet as a useful way of attracting business, but struggled to maximize opportunities.

The evolution of successive generations of distribution channels in tourism (Kracht & Wang, 2010) shed some light on the substitution effect among market players. 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. Substitution effects theories model the evolution of the share of each generation when it is

replaced by a new one (Meade & Islam, 2006). Researchers had already used multi-generation simulations in the service area to model the diffusion/substitution effects across several generations of technologies 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). One of the most popular theoretical model of substitution for the analysis of the evolution of market shares of various product generations is 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 2 where f is the fraction substituted:

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

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, the "takeover time" is the period necessary to go from the minimum time for the take-off (10%) up to 90% of the substitution. Research presented in the following sections gives the results of substitution effect models across the successive generation in Swiss hotels (Scaglione & Schegg, 2013; Schegg & Scaglione, 2013).

The next section will shed some light on the effects that the latter had on the adoption and implementation of ICTs by Swiss sectors in terms of the successive generation.

Evolution of ICT adoption in Switzerland: a review of ten years of research

Adoption of domain names (Web 1.0)

Research on the adoption of the technologies associated with the Web 1.0 by the Swiss tourism industry focused at first mainly on hotels and was then extended to other sectors. These studies used the date of domain name registration (DNR) in switch.ch as a token of Web adoption. The approach and the data collection method is explained in Scaglione et al. (2004a). Based on this measure, the penetration of DNR was 38% in 2001 (Schegg, Steiner, Frey, & Murphy, 2002); up to February 2004 the penetration was estimated at 40% (Scaglione et al.,

2004a) and at the end of 2005 more than 90% of members of hotelleriesuisse (athe Swiss hotel association) (Scaglione et al., 2006).

In line with the general findings in the theory of diffusion, there is a relationship between some organizations' characteristics and DNR adoption dynamics. By modeling the diffusion dynamics with the B-R model (Equation 1), Scaglione et al.(2004a) were able to show that size of hotels (number of rooms) have a positive relationship with the timing of adoption; larger hotels register DN earlier than smaller ones. The same observation can be made for the hotel category (number of stars): higher rated hotels registered DN earlier than lower rated ones. Finally, the authors also showed that compared to non-affiliated hotels, affiliated hotels have a more dynamic domain name registration pattern. On the one hand, affiliated hotels registered early than non-affiliated and the percentage of adoption due to external factors is higher than in non-affiliated ones represented by the parameter p in Equation 1.

Another study extended the focus to *Guesthouses, Auberges* or *Pensions* (Scaglione et al., 2004b). For this type of accommodation enterprises, DNRs are correlated only to imitation as the innovation parameter; p in equation 1, could not be found to be significantly different from zero. Another finding is that hotels showed a faster DN registration dynamic than guesthouses. These results shed some light on the rapid development of the Web, not only in terms of opportunities but also of threats from small and medium tourism enterprises' (SMEs) perspective. At that time, a lack of opportunities for economies of scale in marketing, distribution and operations further exacerbated their situation. Some sectors seemed to be driven by external influences and to be pushed to re-engineer their business more quickly than others due to the pressure of strategic intermediary partners such as Travel Agencies (TA), Tour operators (TO), destination management organizations (DMO) and to be able to connect to their distribution network (Buhalis & Main, 1998; Scaglione et al., 2004a, 2004b).

Scaglione & Murphy (2012) studied, besides the mentioned data sets above, 9 fresh data sets on DNR from different tourism sectors and regions. The specific data sets range in size from 96 to 2,467 organizations and are spread geographically across the globe, Europe and four countries—Austria, Germany, Malaysia and Switzerland. The six tourism sectors in the data sets comprise cable cars/ski lifts, DMOs, hotels, guesthouses, restaurants and tour operators. The B-R model estimation (Equation 1) yields the following conclusion based on the coefficients of innovation and imitation ratio (q/p) in the decreasing order:

- Three tourism sectors in Switzerland (cable cars, guesthouses and DMOs) have a logistic distribution meaning that only imitation drove their Internet adoption (q/p tends to ∞).
- Swiss hotels had the highest q/p ratios, ranging from 35 to 26 depending on the segment resp. enterprise characteristics.

- These six Swiss tourism sectors adopted due either to imitation more than innovation or exclusively to imitation. There seems a general parsimony of Swiss sectors, sensible to the critical mass of adopters and a wait and see behavior. It seems that the effects of channel communication have helped to accelerate the adoption process.
- The median group— Malaysian hotels, Swiss restaurants, Swiss travel agents and German DMOs—had imitation/innovation ratios towards 10.
- The lowest group are Austrian DMOs shows the lowest q/p ratio (2.94) followed by hotels chains (3.8) and European TOs (5.8).

From the point of view of the final forecasted market penetration for DNR, Scaglione & Murphy (2012) could only calculate the values for 10 sectors, excluding Austria and German DMOs and European tour operators due to the lack of reliable statistics. The median of forecasted (final) Internet penetration rate for the 10 remaining segments was 80%. Below the median are Swiss cable cars, Malaysian hotels and non-affiliated Swiss hotels. These sectors tend to comprise small organizations and have low levels of internationalization, which can help explain their low level of final penetration. The low penetration of the accommodation sector could also be due to a *leapfrog effect;* whereby late adopters my forego traditional websites in favor of a new technology such as social networks (Hashim, Scaglione, & Murphy, 2012). Close to the median are Swiss hotels (overall and affiliated hotels) and international chain hotels showing consistent behavior in the accommodation sector. At the highest level are Swiss DMOs and TAs. The increasing role of Internet in holiday planning by consumers has probably constrained the classical intermediaries to follow the online trend to a larger extent than the suppliers in order to meet market needs. In spite of the adoption lag by the Swiss accommodation industry in comparison to other sectors under study; the efforts carried out by the Swiss hotel association with the government support as a push factor, has succeeded in increasing Internet use over time. Though we do not show here direct evidences, Swiss hotels association might have acted as a communicator and emulation environment that helps adoption.

The relative lag of the accommodation sector could be explained by the reluctance of the hotel managers to perceive ICTs as an opportunity to increase customer value, a perception which is linked to the B-R adopter category. Perruchoud-Massy et al. (2005) showed, on the basis of a survey addressed to Swiss hotels, that this perception is reflected in the implementation stages of their websites. Early domain name adopter hotels have more advanced websites and seem more confident with the ICT opportunities; they are also less afraid about the risk compared to hotels from later B-R categories. Laggards and non-adopters seem to perceive websites simply as an additional marketing channel and fail to prioritize technologies that add customer value such as the lower use

of Customer Relationship Management (CRM) tools and corporately weak customer service focus (i. e. providing Internet access to customers).

Adoption of Web 2.0

Web 2.0 arises contemporaneously with the third generation distribution channels (G3 in figure 1 above) as the second generation of Web-based services. The complex infrastructure of Web 2.0 was considered as an array of evolving technologies and application or services (Anderson, 2007) and often referred to two main streams of actions (Alby, 2007) in the early days of development:

- User-generated content and collaborative evaluation
- Technologies that improve user interfaces such as AJAX, RSS, APIs, mashups and tagging.

Schegg, Liebrich, Scaglione, & Ahmad (2008) analyzed Web 2.0 applications and technologies present on websites of almost 3,000 tourism businesses in 2007 with the help of 13 binary criteria which were collected with a web bot. Swiss tourism organization included were DMOs, mountain railways, travel agencies and hotel, but the study comprised also samples of international tourism enterprises, namely European tour operators and International hotels chains. The overall presence of Web 2.0 technologies on the websites analyzed was low. The top feature, XHTML, was present in 15% of the websites within the population. "Although XHTML is a core Web 2.0 application, it would take a leap of faith to assume that every site using this standard did embrace Web 2.0." (Schegg et al., 2008, p. 160). All other Web 2.0-related technologies showed generally frequencies of less than <1% and the sector analysis indicated that the adoption in the two international sectors was significantly higher than the average of penetration of the overall.

In 2008, the overall penetration of Web 2.0 features on website of tourism enterprises over all sectors was 19% when including XHTML and 3.7% without it. The follow-up study in 2009 (Scaglione, Johnson, et al., 2010) added also Swiss restaurants. In both studies, early BR adopter categories showed significant higher level of adoption than the latter ones. Scaglione, Ismail, et al. (2010) studied the relationship between Web 1.0 and 2.0 adoption by focusing the research on the leapfrogging phenomenon. The study found that laggards in Web 1.0 adoption had leapfrogged the earlier B-R categories in user-generated content adoption (UGC).

Yet these early studies discussed above did not take into account the new Social Media (SM) actors which started to emerge in recent years. Amongst many others, social networks (Facebook, Twitter), online communities, and hotel evaluation portals (TripAdvisor, HolidayCheck) are included in the list of new

Web 2.0 players. The aim of a recent research by Scaglione, Schegg, & Trabichet (2013) was thus to update the 2008 figures (Schegg, et al., 2008) by enlarging on the one hand the range of tourism sectors analysed and on the other hand by taking into account the technological and economic changes within the Web 2.0 landscape. Therefore, some changes were made in the classification of web 2.0 features. The study found that the Web 2.0 feature that had the highest progression is Videocast/Podcast, followed by AJAX and at almost the same level Atom/RSS and folksonomy. The only feature showing a negative difference is the blog, probably due to the growth of external social channels such as social networks. According to the authors the uptake of Web 2.0 technologies advanced rapidly compared to the situation back in 2008. They further state that tourism enterprises are aware that assimilating these technologies is important today and that Web 2.0 goes beyond pure technological aspects requiring reengineering of marketing paradigms and even changes in operational business processes. Yet, mainly tourism organisations and tour operators seem to be leveraging the opportunities of the Web 2.0; probably due to the fact that they are as intermediaries under strong pressure from suppliers and travellers and have to provide added value to stakeholders.

Figure2 shows the evolution of web 2.0 penetration across sectors and time (2008-2012). Besides the two international sectors (European tour operators and International hotels chains), only Swiss DMOs and cable cars have also reached the full penetration potential. These Swiss sectors had also the greatest growth over the period. Once again, Swiss hotels showed rather low penetration levels of Web 2.0 features demonstrating a similar adoption behavior as for Web 1.0.

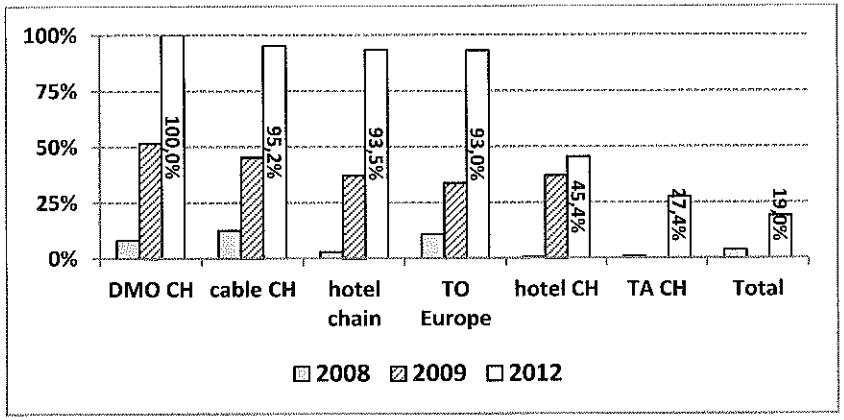

Figure 4: Penetration evolution of Web 2.0 features excluding XTLM . Data sources Source: Scaglione, Johnson, et al., 2010; Scaglione, Schegg, et al., 2013; Schegg et al., 2008)

Scaglione, Johnson, & Trabichet (2013) used the samples that yielded the latest results about penetration of Web 2.0 features to extend the analysis to the adoption of social networks (SN) focusing on Facebook (FB).

This study analyzed also the timing of adoption of the FB pages for organizations having adopted one. In terms of age of page adopters, European Tour Operators and International Hotel Chains have the highest ages together with Austrian DMOs. Local providers such as Swiss restaurants and travel agencies jointly with Swiss hotels are the youngest FB page adopters. From the point of view of the implementation, one out of six companies preferred to offer on their website either only a FB sharing option or both (sharing and friending) whereas only FB friending is preferred by four out of six companies. This high level in the area of the exclusive implementation of friending could be motivated by the fact that the number of followers/fans is an essential measure for communicating with stakeholders and management. Turning to the level of engagement, the average of followers/fans for hotel chains and European tour operators outperform other sectors; however, the number of "talk about"/comments is still higher for European tour operators followed by Swiss and Austrian DMOs, and hotels chains follow them with an average level that is not significantly different from the overall sample. Once more, Swiss DMO's are ahead in the implementation of Web 2.0 compared to other sectors in Switzerland.

Adoption of ICT in tourism enterprises (online distribution, technology use)

The Internet has been acknowledged as a powerful tool in terms of the whole marketing mix in tourism, it does therefore not only provide opportunities in terms of product and service presentation and promotion but it also offers selling opportunities (Buhalis, 2003). In 2002 online distribution was already been seen as a promising progressive shift away from traditional sales channels (O'Connor & Frew, 2002). The study of the evolution and adoption of online sales channels in the Swiss hotel industry was therefore a main issue of several surveys since 2003 (see Schegg, Stangl, Fux, & Inversini, 2013) for a summary of results). The comparison of predominant booking channels by these authors revealed that direct booking channels (telephone, fax, walk-ins, e-mail, form or booking engine on own website) have been remaining the dominant sales tools for Swiss hotels (67.0% in 2011 compared to 75.4% in 2002) since 2002. Their proportion in the distribution mix has been steadily diminishing though (Schegg & Fux, 2010). Yet the trend towards online booking channels seems to be unbroken. The sales channel with the highest growth rate is OTA which could multiply its market share within few years.

Schegg & Scaglione (2013) analysed the past evolution of distribution channels in order to forecast future trends. They could show substitution effects across

different clusters of distribution channels and shed light on the dynamics of competing sales funnels using the F-P model (Equation 2 above). The data are the series of annual member surveys since 2002 which monitored the evolution of market shares of 15 individual distribution channels. Details on data collection and descriptive results are from our publication (Schegg & Fux, 2013) and from unpublished data of the last survey, conducted in January 2013. The authors grouped the distribution channels into three generations (G1 to G3) described in the literature review above. Figure 3 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. Results show, for the traditional channels (G1) a declining fractional growth (2α in Eq. 2) which is negative (-0.11) as it has been substituted by the two following generations (G2 and G3). The same parameter for the online direct channels G2 (0.04) is lower than G3's (0.27); moreover annual fractional growth for G3 is more than 6 times greater than the second (0.27/0.04). Therefore, *ceteris paribus*, the estimated year when Online Travel Agencies (G3) of channels will reach half of booking share will be 2017 and in the long run the G3 will dominate the booking channels. This is just a theoretical trend given that it does not take into account the rise of possible forthcoming generations of distribution channels. Given this fact, the results give some evidence of the domination of G3 over the two previous ones. New industry data[1] by skift.com on the past and future booking turnover and market shares of Priceline (booking.com) in Europe support our results. This analysis foresees a market share for booking.com in 2018 of 22% in Europe. When adding up the shares of other relevant OTAs such as Expedia or HRS one might easily approach the final penetration values estimated by Scaglione et al. (2013).

This domination of G3, nevertheless, does not affect homogenously all the categories of hotels. Scaglione & Schegg (2013) analyzed this issue using the same set of data as in the previous research by splitting them by either hotel category or size (numbers of rooms) for the forecast of the final share of penetration using the B-R model (Equation 1). Analysis by hotel category yields a final OTA market share of at 37% (Confidence Interval -CI: 28%-63%) for budget hotels (0-2 stars) but the peak of diffusion was already reached in 2010 showing that the process of diffusion is at the beginning of its mature phase. For middle class hotels the final market share of OTAs is 59% (CI : 22%-96%), its peak of diffusion is forecasted to be in 2016 which means that the diffusion is still in progress and that hotels in this segment can be situated in the early majority adoption class. The margin of progression is still high, given that the upper

[1] http://skift.com/2014/04/16/the-big-growth-opportunity-left-for-the-worlds-biggest-travel-company/

value of the CI is 96%. Finally, for upscale hotels no model yields a significant value for the final market parameter.

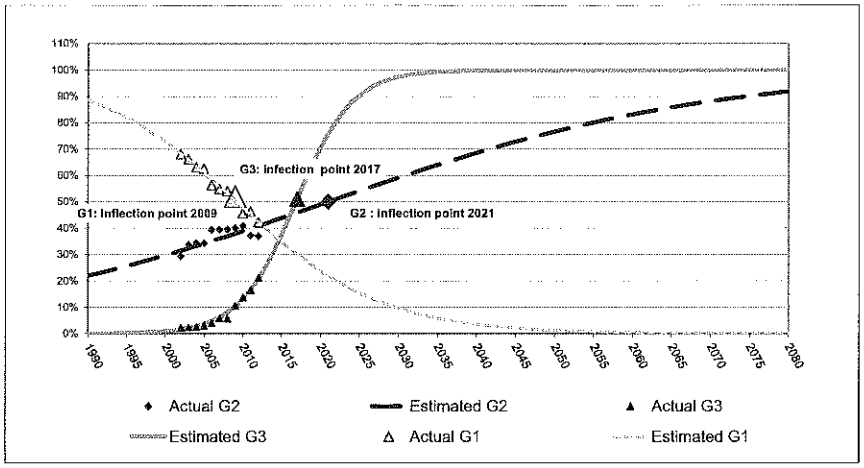

Figure 5: Evolution of market shares for the 3 generations of distribution channels: observed (2002-2012), backcasted (1990-2012) and forecasted (2013- 2080)

This research shows that except for mid-scale hotels with an estimated final penetration rate of more than 50%, the final share for OTAs is below 40%. Budget hotels have the highest OTA market share at the moment, but will reach the ceiling level soon; whereas upscale hotels might see a steadily increasing OTA market share for a long period. Three-star hotels constitute the majority (>50%) of the members of hotelleriesuisse and are therefore the most important element of the Swiss lodging sector. The foreseen very high market share of OTAs is therefore a serious threat for the Swiss lodging sector. Online intermediaries have become increasingly powerful in recent years 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 (Carroll & Siguaw, 2003).

Conclusion: Past success and foreseen paths for the Swiss tourism sector

Since the end of the XIX century, Switzerland that has always had a pioneer position and dynamism in its marketing approach and it could not miss to address the challenges associated with the development of ICT. Tourism is not

only a traditional sector in Switzerland but also a very important economic /strategic one (OCDE, 2000, n. 3). This change was not easy to manage given that from the beginning that ICTs and travel/tourism industry were closely "interrelated and intertwined" (Werthner & Klein, 1999a). ICT-based distribution and marketing strategies not only open new possibilities but also raise new challenges such as the high technical demands in terms of human skills and infrastructure. The results presented in our review show that big players in tourism, either in terms of internalization of their business or the size of company, are more willing to face ICT innovation than SMEs. SMEs represent the predominant share of players in the Swiss tourism industry such as hotels. The majority (>50%) of the members of *hotelleriesuisse* are 3-star hotels and are therefore the most important element of the Swiss lodging sector.

The importance of the support of the Swiss government during the early stages of the Web development seemed to be relevant in the improving of marketing and distribution at least in the Swiss accommodation sector. Two cases studies on 147 hotels in canton Valais (Scaglione et al., 2006, 2009) shed some light on the success of the adoption of Internet by showing the impact on the total room revenue (2006) and revenue per available room or RevPAR (2009) . These studies indicate that website adoption related positively to a performance indicator (either RevPAR or total room revenue) based on the analysis of hotels' monthly revenue between 1992 and 2003. The results show that performance indicators of hotels were higher after adoption than before and hotels with no web presence showed a negative trend in revenues. Furthermore, revenue growth rates were stronger for hotels with their own website than for hotels with a web presence via regional portals.

This paper presents other empirical evidence that Swiss tourism policy such as the allocation of CHF 190 million for Switzerland Tourism in 1999 (for promotion and IT developments) and the Innotour program have helped to create a kernel of innovators and early adopters of companies that encourage innovation and adoption by the whole tourism industry. As a result, once the "take–off" conditions were created, the others followed in response to the imitation effect that characterizes any innovation. Moreover, some sectors adopted Web 1.0 only by imitation such as guesthouses; whereas nonaffiliated hotels showed a higher influence of imitation than innovation compared to hotels affiliated to hotelleriesuisse. Nevertheless, it seems not very clear why some actors still cannot perceive the use of ICT (e-marketing, online distribution, eCRM, etc.) as a tool to increase customer value or only as a new but traditional marketing channel. When we look to the increasing importance of the share of bookings due to OTAs, especially for 3-stars, it seems that, at least the latter sector, has not yet developed (online) marketing and distribution strategies (e.g. creation of CRM systems to capture customers from other sources other than OTAs) which help them to stay competitive.

One of the milestones for the take-off in the Swiss tourism sector, from our point of view, was the launch of the site mySwitzerland.com, which seems to have been a catalyst for the adoption and implementation process for the other regional or local DMOs. The previous sections give some empirical evidence about the leading position of Swiss DMOs in the adoption of Web 2.0 features on their websites and also in the implementation of FB where they outperform other sectors in the level of customer engagement (FB "talking-about").

On the down side, one of the greatest threads for the Swiss tourism industry, specifically the accommodation sector, is the increasing domination of OTAs. In the preceding section we showed that the share of OTAs is increasing very quickly though the effects are different depending on the size and / or the categories of the hotels. Medium size and category hotels are under more pressure than others (budget/small, upscale/big). This growing power of OTAs and the dependency of hotels is a central topic for the industry and raise fundamental questions: Can or should the (fragmented) hotel sector fight against an oligopoly of global booking portals? Is the increasing power of the "new online" intermediaries a thread (e.g., unfair market practices, high commissions, and decreasing profit margins) or an opportunity (e.g., efficient global online market reach) for individual hotels?

As in the beginning of the century, still now the challenge is to "develop new products, new information technology distribution channels and new co-operative structures at all levels" (OCDE, 2000, n. 19) as Professor Dr. Peter Keller pointed out in this government document. In 1979 he was in charge of the *Swiss Tourism Concept* having the central role of the reporter. Throughout the period he has spent in the Swiss federal administration (SECO) in Bern in charge of tourism, as President of the AIEST and professor in HEC at the University of Lausanne, he has raised timely, relevant issues not only on an operational business level but also from a theoretical point of view. He was one of the first to grasp the importance of the evolution of ICTs and he faced his duties as a policy maker and as a researcher with remarkable success. He had always found the necessary consensus in the Swiss Parliament to allocate public funds to support promotion, cooperation and innovation projects in the Swiss tourism industry as shown in Figure 1. In the AIEST and during his presidency, newcomers to tourism research were welcome in the association. Tourism research has become, since then, more interdisciplinary, computer scientists have joined forces with tourism marketers, economists and geographers, among other disciplines. Those new-comers have enjoyed the possibility through the AIEST conferences to become familiar with the tourism field, and the association was the arena where exchanges across disciplines were not only possible but fruitful. The aim of this paper was to shed some light on the value of Professor Keller's contribution to the Swiss tourism sector and the scientific research; by doing so, authors wish to express a tribute for his outstanding contributions and career.

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Bibliography

Abrahamson, E., & Rosenkopf, L. (1993). Institutional and Competitive Bandwagons: Using Mathematical Modelling as a Tool to Explore Innovation Diffusion. *Academy of Management Review, 18*(3), 487-517.

Alby, T. (2007). *Web 2.0: Konzepte, Anwendungen, Technologien.* München – Wien: Hanser.

Anderson, P. (2007). What is Web 2.0? Ideas, Technologies and Implications for Education. JISC Technology & Standards Watch. Retrieved September 8th, 2007 http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf

Berners-Lee, T., Hall, W., Hendler, J. A., O'Hara, K., Shadbolt, N., & Weitzner, D. J. (2006). A framework for web science. *Foundations and trends in Web Science, 1*(1), 1-130.

Bieger, T., & Laesser, C. (2005). Travel Market Switzerland: Basic Report and Database Specification. St. Gallen: IDT-HSG. *St. Gallen: IDT-HSG.* http://www.unisg.ch/org/idt/cfac.nsf/338a93192a5036c7c12568ff0040fed0/DD111D3EF93DE18CC125703F0032B04E/$FILE/Travel+Market+Switzerland+2004.pdf

Bieger, T., Laesser, C., & Beritelli, P. (2004). Informationsquellen für Reiseentscheidungen - ein prozessorientierter Ansatz. In B. Thomas, L. Christian & B. Pietro (Eds.), *Jahrbuch der Schweizerischen Tourismuswirtschaft* (pp. 15-26). St.Gallen: IDT-HSG.

Brynjolfsson, E., & Hitt, L. M. (2000). Beyond Computation: Information Technology, Organizational Transformation and Business Performance. *The Journal of Economic Perspectives, 14*(4), 23-48.

Buhalis, D. (2003). *ETourism : information technology for strategic tourism management.* Harlow, England: Financial Times Prentice Hall.

Buhalis, D., & Law, R. (2008). Progress in information technology and tourism management: 20 years on and 10 years after the Internet—The state of eTourism research. *Tourism Management, 29*(4), 609-623. doi: 10.1016/j.tourman.2008.01.005

Buhalis, D., & Main, H. (1998). Information Technology in Peripheral Small and Medium Hospitality Enterprises: Strategic Analysis and Critical Factors. *International Journal of Contemporary Hospitality Management, 10*(5), 198-202.

Commission consultative fédérale pour le tourisme. (1979). *Conception suisse du tourime. Base de la politique du tourisme. Rapport final.* Berne.

Conseil fédéral suisse. (2010). *Stratégie de croissance pour la place touristique suisse: rapport du Conseil fédéral du 18 juin 2010 en réponse au postulat Darbellay (08.3969) du 19 décembre 2008.* Bern (Switzerland): Publications fédérales, 3003 Berne Retrieved from www.seco.admin.ch.

Croteau, A.-M., & Bergeron, F. (2001). An information technology trilogy: business strategy, technological deployment and organizational performance. *The journal of strategic information systems, 10*(2), 77-99.

Damanpour, F. (1991). Organizational Innovation: A Meta-analysis of Effects of Determinants and Moderators. *Academy of Management Journal, 34*(3), 555-590.

Egger, R., & Buhalis, D. (2008). *eTourism Case Studies: Management and Marketing Issues*. Oxford: Butterworth-Heinemann.

Federal Statistical Office. (2013). *Statistical Data on Switzerland 2013*. January 2014: Retrieved from http://www.bfs.admin.ch/bfs/portal/en/index/news/publikationen.html?publicationID=5071.

Fichman, R. G. (2000). The Diffusion and Assimilation of Information Technology Innovations. Framing the Domains of IT Management. In R. W. Zmud (Ed.), *Projecting the Future through the Past* (pp. 105-128). Cincinnati, Ohio: Pinnaflex Publishing.

Fisher, J. C., & Pry, R. H. (1971). A simple substitution model of technological change. *Technological forecasting and social change, 3*, 75-88. doi: http://dx.doi.org/10.1016/S0040-1625(71)80005-7

Graham, P. (2005). Web 2.0. http://www.paulgraham.com/web20.html

Gretzel, U., & Yoo, K.-H. (2008). Use and impact of online travel reviews. In P. O'Connor, W. Höpken & U. Gretzel (Eds.), *Information and Communication Technologies in Tourism 2008 : Proceedings of the International Conference in Innsbruck, Austria, 2008*. Wein, New York: Springer Verlag.

Hagerstrand, T. (1967). *Innovation Diffusion as a Spatial Process*. Chicago: University of Chicago Press.

Hashim, N. H., Scaglione, M., & Murphy, J. (2012). Modelling and Comparing Malaysian Hotel Website Diffusion. In M. Fuchs, F. Ricci & L. Cantoni

(Eds.), *Information and Communication Technologies in Tourism 2012, proceedings of ENTER 2012* (pp. 167-178). Helsingborg, Sweden: Springer-Verlag.

Ip, C., Leung, R., & Law, R. (2011). Progress and development of information and communication technologies in hospitality. *International Journal of Contemporary Hospitality Management, 23*(4), 533-551.

Irvine, W., & Anderson, A. R. (2008). ICT (Information communication technology), peripherality and smaller hospitality business in Scotland. *International Journal of Entrepreneurial Behaviour & Re-search, 14*(4), 200-218.

Ismail, A. F., Hashim, N. H., Schegg, R., & Murphy, J. (2009). *Internet Implementation Leapfrogging and Website Performance.* Paper presented at the Australian & New Zealand Marketing Academy Conference, Melbourne, Australia.

Kasavana, M. L., Nusair, K., & Teodosic, K. (2010). Online social networking: redefining the human web. *Journal of Hospitality and Tourism technology, 1*(1), 68-82.

Kracht, J., & Wang, Y. (2010). Examining the Tourism Distribution Channel: Evolution and Transformation. *International Journal of Contemporary Hospitality Management, 22*(4-5), 736-757.

Mahajan, V., Muller, E., & Bass, F. M. (1990). New Product Diffusion Models in Marketing: A Review and Directions for Research. *Journal of Marketing, 54*(1), 1-26.

Mahajan, V., Muller, E., & Srivastava, R. (1990). Determination of Adopter Categories by Using Innovation Diffusion Models. *Journal of Marketing Research, XXVII*(February), 37-50.

Mahajan, V., Muller, E., & Wind, Y. (2000). New Product Diffusion Models: From Theory to Practice. In V. Mahajan, E. Muller & Y. Wind (Eds.), *New-Product Diffusion Models* (Vol. 11, pp. 3-24). Boston, Massachusetts: Kluwer Academic Publisher.

Martin, L. M. (2004). E-innovation: internet impacts on small UK hospitality firms. *International Journal of Contemporary Hospitality Management, 16*(2), 82-90.

McCubbrey, D. J. (1999). Disintermediation and reintermediation in the US air travel distribution industry: a Delphi study. *Communications of the AIS, 1*(5es), 3.

Meade, N., & Islam, T. (2006). Modelling and forecasting the diffusion of innovation-A 25-year review. *International Journal of Forecasting, 22*(3), 519–545.

Meade, N., & Islam, T. (2008). The Effects of Network Externalities on the Diffusion of Cellular Telephones. *Telektronikk: Telecommunications Forecasting, 3*(4), 74-81.

Morrison, A., & Rhodri, T. (1999). The Future of Small Firms in the Hospitality Industry. *International Journal of Contemporary Hospitality Management, 11*(4), 148-154.

O'Connor, P., & Frew, A. J. (2002). The future of hotel electronic distribution: expert and industry perspectives. *Cornell Hotel and Restaurant Administration Quarterly, 43*(3), 33-45.

O'Reilly, T. (2005). What is the Web 2.0? Design Patterns and Business Models for the Next Generation of Software. O'Reilly Radar. from http://www.oreilly.de/artikel/web20.html

OCDE. (2000). *Swiss tourism policy-A synthesis*. Organsation for Economic Co-operation and Development (OCDE) Retrieved from http://www.oecd.org/cfe/tourism/33649503.pdf.

Pan, B., Xiang, Z., Law, R., & Fesenmaier, D. R. (2011). The dynamics of search engine marketing for tourist destinations. *Journal of Travel Research, 50*(4), 365-377.

Perruchoud-Massy, M.-F., Scaglione, M., Schegg, R., & Murphy, J. (2005, 28th August -1st September 2005). *Adoption of Innovation by Swiss Hotels: Exploring Internet Strategies and Dynamics*. Paper presented at the Proceeding of the 55th AIEST-Congress 2005. Innovation in tourism :Add customer value, Brainerd/Minnesota (USA).

Presence Switzerland-Federal Department of Foreign Affairs (Producer). (Unknown, 24 February 2014). Tourism. Retrieved from http://www.swissworld.org/en/economy/key_sectors/tourism/

Rees, J., Briggs, R., & Oakey, R. (1984). The Adoption of New Technology in the American Machinery Industry. *Regional Studies, 18*(6), 489-504.

Rogers, E. M. (1995). *Diffusion of Innovations* (Fourth ed.). New York, New York: The Free Press.

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York: The Free Press.

Salvisberg, A., Klarer, U., & Sacchi, S. (2001). Une exploitation inégale des sites Internet par les enterprises en Suisse. *La Vie économique - Revue de politique économique, 7*, 53-60.

Scaglione, M., Ismail, A. F., Trabichet, J.-P., & Murphy, J. (2010). An Investigation of Leapfrogging and Web 2.0 Implementation Information and Communication Technologies in Tourism 2010. In U. Gretzel, R. Law & M. Fuchs (Eds.), (pp. 441-453): Springer Vienna.

Scaglione, M., Johnson, C., & Trabichet, J.-P. (2010). How the Swiss Tourism sector is managing the change to Web 2.0. In P. Keller & T. Bieger (Eds.), *Managing Change in Tourism Creating Opportunities – Overcoming Obstacles* (pp. 101-118). Berlin: ERICH SCHMIDT VERLAG.

Scaglione, M., Johnson, C., & Trabichet, J.-P. (2011). The Swiss Tourism Sector and Web 2.0 Change Management. In P. Keller & T. Bieger (Eds.), *Managing Change in Tourism. Creating Opportunities – Overcoming Obstacles* (Vol. 4, pp. 101-118). Berlin.

Scaglione, M., Johnson, C., & Trabichet, J.-P. (2013). *User generated content : The adoption and implementation of Facebook across tourism segments*. Paper presented at the 63rd AIEST Conference. Advances in Tourism Research: Perspectives of Actors, Institutions and Systems, Izmir (Turkey).

Scaglione, M., & Murphy, J. (2012). *Modeling Internet Diffusion across Tourism Sectors*. Paper presented at the AIEST Conference 2012-Advances in Tourism Research: Perspectives of Actors, Institutions and Systems, Khon Kaen/Thailand.

Scaglione, M., & Schegg, R. (2013). *Forecasting the Final Penetration Rate of Online Travel Agencies (OTA) in Swiss Hotels*. Paper presented at the 63th AIEST Conference - Advances in Tourism Research: Perspectives of Actors, Institutions and Systems Izmir (Turkey).

Scaglione, M., Schegg, R., & Murphy, J. (2006). Investigating Website Performance in Valais' Hospitality Industry. In P. Keller & T. Berger (Eds.), *Marketing Efficiency in Tourism - Coping with Volatile Demand* (Vol. 1, pp. 131-142). Berlin: Erich Schmidt Verlag.

Scaglione, M., Schegg, R., & Murphy, J. (2009). Website Adoption and Sales performance in Valais' Hospitality Industry. *Technovation, 29*(9), 625-631.

Scaglione, M., Schegg, R., Steiner, T., & Murphy, J. (2004a). The Diffusion of Domain Names by Small and Medium-Sized Swiss Hotels *54th AIEST Congress* (Vol. 46, pp. 259-271). Petra, Jordan: Editions AIEST.

Scaglione, M., Schegg, R., Steiner, T., & Murphy, J. (2004b). *Internet Adoption by Swiss Hotels: The Dynamics of Domain Name Registration*. Paper presented at the 11th International Conference on Information Technologies in Tourism, Cairo, Egypt.

Scaglione, M., Schegg, R., Syed-Ahmad, S. F., & Murphy, J. (2008). *An explanatory field of Web 2.0 in tourism*. University of Applied Sciences Valais, Switzerland, Sierre.

Scaglione, M., Schegg, R., & Trabichet, J.-P. (2013). Analysing the Penetration of Web 2.0 in Different Tourism Sectors From 2008 to 2012 *Information and Communication Technologies in Tourism 2013* (pp. 280-289): Springer.

Schegg, R., & Fux, M. (2013). *Vertrieb in der Schweizer Hotellerie – ein Vergleich mit Österreich und Deutschland.* Jahrbuch der Schweizer Hotellerie. hotelleriesuisse und Schweizerische Gesellschaft für Hotelkredit, in press.

Schegg, R., Liebrich, A., Scaglione, M., & Ahmad, S. F. S. (2008). An Exploratory Field Study of Web 2.0 in Tourism. In P. O'Connor, W. Höpken & U. Gretzel (Eds.), *Information and Communication Technologies in Tourism 2008: Proceedings of the International Conference in Innsbruck, Austria, 2008* (pp. 152-163). Vienna: Springer

Schegg, R., & Scaglione, M. (2013). Substitution Effects Across Hotel Distribution Channels. In Z. Xiang & I. Tussyadiah (Eds.), *Information and Communication Technologies in Tourism 2014* (pp. 801-812): Springer International Publishing.

Schegg, R., Scaglione, M., Liebrich, A., & Murphy, J. (2007). Internet Use by Hospitality SMEs in Alpine Destinations. In M. Sigala, J. Murphy & L. Mich (Eds.), *Proceedings of the ENTER Conference 2007, Ljubljana, Slovenia. Information and Communication Technologies in Tourism 2007* (pp. 469-480). Wien-New York: Springer-Verlag.

Schegg, R., Stangl, B., Fux, M., & Inversini, A. (2013). Distribution Channels and Management in the Swiss Hotel Sector. In L. Cantoni & Z. Xiang (Eds.), *Information and Communication Technologies in Tourism 2013: Proceedings of the International Conference in Innsbruck, January 22-25, 2013* (pp. 554–565). New York, Berlin: Springer.

Schegg, R., Steiner, T., Frey, S., & Murphy, J. (2002). Benchmarks of Web Site Design and Marketing by Swiss Hotels. *Information Technology and Tourism, 5*(2), 73-89.

Shadbolt, N., Hall, W., & Berners-Lee, T. (2006). The semantic web revisited. *Intelligent Systems, IEEE, 21*(3), 96-101.

Snellman, J., Vesala, J., & Humphrey, D. (2001). Substitution of Noncash Payment Instruments for Cash in Europe. *Journal of Financial Services Research, 19*(2-3), 131-145. doi: 10.1023/a:1011151219545

Swiss Tourism Federation. (2013). *Swiss tourism in figures 2012. Structure and Industry data. Partnership. Politics. Quality.* Bern: STF Retrieved from www.swisstourfed.ch.

Switzerland Tourism. (2007). *90 years of tourism marketing in Switzerland.* Retrieved from www.stnet.ch/files/?id=4932.

Tosi, D., Denaro, G., & Pezze, M. (2009). Towards autonomic service-oriented applications. *International Journal of Autonomic Computing, 1*(1), 58-80.

Varini, K., Scaglione, M., & Schegg, R. (2011). Distribution channel and efficiency: An Analytic Hierarchy Process approach. In R. Law, M. Fuchs & F. Ricci (Eds.), *Information and Communication Technologies in Tourism 2011.Proceedings of the International Conference in Innsbruck, Austria, January 26-28, 2011.* Wien-New York: Springer-Verlag.

Werthner, H., & Klein, S. (1999a). ICT and the changing landscape of global tourism distribution. *Electronic Markets, 9*(4), 256-262.

Werthner, H., & Klein, S. (1999b). *Information technology and tourism—A challenging relationship* (1st ed.). Vienna: Springer-Verlag.

Xiang, Z., Gretzel, U., & Fesenmaier, D. R. (2009). Semantic representation of tourism on the Internet. *Journal of Travel Research, 47*(4), 440-453.

Yoo, K.-H., Lee, Y., Gretzel, U., & Fesenmaier, D. R. (2009). Trust in Travel-related Consumer Generated Media Information and Communication Technologies in Tourism 2009. In W. Höpken, U. Gretzel & R. Law (Eds.), (pp. 49-59). Vienna Springer.

Zhu, K., & Kraemer, K. L. (2005). Post Adoption Variations in Usage and Value of E-Business by Organizations: Cross-Country Evidence from the Retail Industry. *Information Systems Research, 16*(1), 61-84.