Matthias Fuchs / Andrey Abadzhiev / Bo Svensson / Wolfram Höpken / Maria Lexhagen

A knowledge destination framework for tourism sustainability: A business intelligence application from Sweden

Abstract

Based on Grant's (1996) knowledge-based view of the firm, Jafari's (2001) knowledge-based platform of thinking and Schianetz, Kavanagh and Lockington (2007a) Learning Tourism Destination, the Knowledge Destination Framework (Höpken, Fuchs, Keil & Lexhagen, 2011) is introduced and a Web-based Destination Management Information system (DMIS) is presented. It is illustrated how knowledge creation, exchange and application processes can be improved by applying a Business Intelligence approach. By focusing on Online-Analytical Processing (OLAP), exemplarily for the Swedish tourism destination of Åre, it is highlighted how DMIS can be used as a monitor for measuring the proportion of tourists with the smallest ecological footprint (Dolnicar, Crouch & Long, 2008; Dolnicar & Leisch, 2008). After a discussion of study limitations, future research steps are outlined. The paper concludes by providing some critical remarks on the political economics of sustainability on a global scale and by outlining policy implications for the governance of sustainability at the level of tourism destinations.

Key words: *knowledge destination paradigm; learning tourism destination; business intelligence; online analytical processing (OLAP), ecological footprint, destination sustainability; Sweden*

Introduction

Tourism has demonstrated significant growth in international arrivals over the last 60 years (UNWTO, 2008), what, related to its economic contribution, is the primary reason for its adoption as an instrument of regional development (Sharpley, 2010). However, low-cost mass tourism, the creation of large-scale resorts, frequent travelling and powerful international tour operators were condemned by academics to entail the exploitation of people and places (Britton, 1982; Krippendorf, 1986). Problems, ranging from environmental destruction to serious impacts on society and traditional cultures, were increasingly seen as outweighing tourism's developmental benefits (Bramwell & Lane, 1993). As a consequence, since the 1990s, major attention in tourism research and policy is paid to tourism's negative impacts, and its development has become refocused through the lens of *sustainable tourism* (Ioannides, 2001; Bramwell & Lane, 2003).

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However, sustainable tourism remains a blurred concept characterized by vague definitions (Farsari, Butler & Prastacos, 2007; Buckley, 2012). For instance, the World Tourism Organization defines sustainable tourism as "*tourism that meets the needs of present tourists and host regions while protecting and enhancing opportunity for the future*" (UNWTO, 2004). Accordingly, sustainable tourism has become a form of a political 'catch phase' which, depending on the context in which it is being used, is a concept, a philosophy, a process or a product (Wall, 1997). Although being an early definition, Butler's (1993) description of what sustainable tourism 'is about' still dominates the literature: "*Tourism which is developed and maintained in an area in such a manner and at such a scale that it remains viable over an infinite period and does not degrade or alert the environment (human and physical) in which it exists to such a degree that it prohibits the successful development and well-being of other activities and processes*" (Butler, 1993, p. 91). However, operational definitions on tourism sustainability require details regarding what has to be sustained at which level by which means and for whom (Johnston & Tyrell, 2005).

The knowledge-based paradigm regards tourism as a complex social phenomenon where knowledge is the basis for sustainable destination development (Jafari, 2001). This school of thought postulates that through the generation and intelligent application of knowledge (on customer needs, collaborating suppliers, environmental, and human and cultural resources) information asymmetries between stakeholders can be reduced. This leads to an enhanced innovation and collaboration capacity, which, in turn fosters market cultivation and improves service effectiveness by using destination resources in a more sustainable way. From this background, the objective of the paper at hand is to present a prototype version of a Web-based infrastructure that drives knowledge creation and application as a precondition for organizational learning at the level of tourism destinations. By stressing the knowledge-based paradigm and by employing a Business Intelligence approach the application's present and future potential to monitor sustainability at the level of tourism destinations is outlined.

The paper is structured as follows: section two provides a review of the literature on sustainable tourism (Lu & Nepal, 2009). Section three introduces the paradigm of the knowledge destination. Subsequently, the knowledge destination framework and its basic architecture are discussed. The next section, exemplarily for a supplier-oriented knowledge application, presents the prototype of a newly developed and implemented destination management information system (DMIS). Study limitations are discussed and future research steps are outlined as well. The paper concludes by some critical remarks and by outlining policy implications for the governance of sustainability at the level of tourism destinations.

Review of the literature on sustainable tourism

Existing definitions of sustainable tourism show fundamental commonalties that encourage an understanding of tourisms impacts on the natural, cultural, human and economic environment, thus, support the idea that the financial feasibility of a destination should be reached without sacrificing the natural and socio-cultural environments (Wall, 1997; Butler, 1999; Hardy & Beeton, 2001; Ali, 2009). Accordingly, Swarbrooke (1999) conceptualized sustainable tourism as a process of using resources in a manner that protects the availability of resources to future events. Economical, ecological and social dimensions, known as '*triple-bottom line*', are equally stressed. Thus, sustainable tourism, although being economically viable, does not destroy the resources on which the future of tourism will depend on. The economic impact of tourism has long been acknowledged in the sustainability literature and there is

agreement that differing types of demand (e.g. spending behavior) have the potential to bring various levels of economic wealth to destinations (Lundie, Dwyer & Forsyth, 2007; Stabler, Papatheodorou & Sinclair, 2010). The environmental impact of tourism is more complex than that in most other industries, as tourism activities are affected by the quality of environmental resources: the environment (e.g., water, bio-diversity and energy) is not only an input factor for the tourism industry, but also a key output component (Collins, 1999; Razumova, Rey-Maquieira & Lozano, 2009; Fernandes & Rivero, 2009). Finally, community involvement and stakeholder collaboration is seen as a critical element to achieve tourism sustainability (Telfer & Sharpley, 2008). Accordingly, Butler (1999) proposes four main pillars to interpret tourism sustainability: economic, ecological, long term destination competitiveness, and the physical and human (i.e. socio-cultural) environments.

Jafari (2001) contends that the evolution of global tourism has been influenced by the sequential appearance of the '*advocacy', 'cautionary', 'adaptancy'* and '*knowledge-based'* platforms of thinking. The author underlines that all platforms coexist today (Jafari, 2001, p. 29); more importantly, these platforms are the starting point to understand the origins, applications and implications of sustainable tourism development (Balasubramanian, 2005):

The *Advocacy Platform* appeared in the post-war period and is characterized by a strong support that promotes the positive, mainly economic, impacts of tourism. Tourism is perceived as a panacea capable of generating significant economic development across a broad range of destinations, many of which were not considered amenable to more conventional forms of economic activity (Weaver & Lawton, 1999). Thus, the main argument for tourism focuses on the generation of direct and indirect revenues (i.e. *multiplier effects*). However, the result of this pro-tourism development approach shows numerous examples of unplanned, haphazard tourism growth, with apparent irreversible damage to the natural environment and local cultures (Weiermair & Fuchs, 1998; Weaver, 2006).

The *Cautionary Platform* acknowledges negative impacts caused by tourism. This shift resulted in a new focus including undesirable consequences, like seasonal and low-skilled jobs, benefits exclusively achieved by tourism firms and big corporations, the deterioration of nature and scenic formations, its commodities, people's cultures and the structure of the host societies (Jafari, 2003).

The *Adaptancy Platform* seeks for alternative tourism forms to balance negative and positive impacts of tourism in host communities and their socio-cultural, man-made, and natural environments. It provides tourists with new choices and experiences, known as alternative, green, soft, sustainable, responsible, and eco-tourism (Breakey, 2011). These tourism forms are community centered, employ local resources, are relatively easy to manage, are not ecologically destructive, benefit hosts and guests alike, and improve communication between them.

The *Knowledge-based platform* proposes a systems approach that regards tourism as a complex social phenomenon, where knowledge is the essential basis for development. The platform, dominant since the late 1990s, is characterized by a preference for scientific methods to obtain knowledge about the tourism sector, and by the concomitant rejection of simplistic judgments regarding the nature of mass and alternative tourism (Weaver & Lawton, 1999). It contributes to a holistic and systemic treatment of tourism that utilizes rigorous scientific methods to compile knowledge needed to assess and manage tourism development (Breakey, 2006). The platform is embedded in a multidisciplinary context that examines tourism phenomena at a personal, group, business, government and systems level[1].

As suggested by the knowledge-based platform (Jafari, 2001), latest contributions to tourism sustainability literature have been influenced by the *systems thinking* approach. McKercher (1999) and Farrell and Twining-Ward (2005) argue that sustainable tourism needs to be conceptualized in a comprehensive way so as to appraise meaningfully and critically its interconnectedness with the natural, social and economic elements at multiple scales and time periods (Nepal, 2008; McDonald, 2009). Instead of viewing nature as a duality between humans and nature, where there is an optimal point of resource use by humans, *complexity thinking* removes the duality notion and instead, views humans as part of a socio-ecological system (McGrath, 2006; Schianetz & Kavanagh, 2008). A complex system cannot be understood by reducing it into its components because relational information would be lost (Cilliers, 1998; Levin, 1998). Thus, the focus is not on the structure of tourism systems and its elements, but, rather on the processes and the relationships between the elements. Research findings show that tourism systems are indeed inherently complex, dynamic, exhibit non-linear interactions and feedback structures, and display far-from-equilibrium characteristics (Baggio, 2008). Accordingly, sustainable development has to be viewed as an evolving complex system that co-adapts to the specifics of a particular place and to the aspirations and values of local stakeholders (Farrell & Twining-Ward, 2005; Tyrrell & Johnston, 2008; Xing & Dangerfield, 2010).

To conclude, although literature on sustainable tourism advanced during the last two decades, it is claimed that the debate is fragmented, theoretically weak and based upon fragile or even false assumptions (Moscardo, 2007). For instance, Liu (2003) explores six issues that are overlooked in the literature so far: 1. No, or only too little, attention is paid to the *role and nature of tourism demand*; 2. Tourism studies often fail to appreciate that resources are a complex and dynamic concept, evolving with changes in preferences and technological capabilities of society (*nature of tourism resources*); 3. No attention is paid to the *imperative of intra-generational equity* and the fairness of benefits and cost distribution among tourism stakeholder groups; 4. The majority of writers argue that the social and cultural impacts of tourism are primarily negative and any tourism-related socio-cultural changes should be avoided (the *role of tourism in promoting socio-cultural progress*); 5. Problems exist with the determination of the level and pace of tourism development (the *measurement of sustainability*); and, finally, 6. The means and instruments advocated for achieving sustainable tourism are often fraught with simplistic or naive views (*forms of sustainable development*). Summing up, there are a variety of factors that limit the practical viability of sustainable tourism, thus, there is little evidence of adherence to the principles of sustainable development, whether from the perspective of consumer (tourist) behavior, business practices, or tourism planning and development, both at the destination and national level (Sharpley, 2010).

The knowledge destination paradigm

Tourism destinations are viewed as value networks of competencies that co-ordinate complex social stakeholder constellations and resource configurations to deliver and mediate co-created tourist experiences (Coles, Hall & Duval, 2006; Fuchs, Chekalina & Lexhagen, 2011). Both, the attractiveness and the innovation potential of tourism destinations are considered as major drivers behind destinations' competitiveness and sustainable development (Russell & Faulkner, 2004; Walder, Weiermair & Sancho Pérez, 2006). However, in order to fulfill stakeholders' changing expectations and to cope with complex webs of interaction (through which labor, capital and information flow), self-transformation,

and the adherence of effective actions call for effective learning between networked organizations and destination stakeholders (Urry, 2000).

Following the knowledge-based view (Grant, 1996), an organization's value is limited by the amount of knowledge within it. Thus, the economic and sustainable development of whole industries as well as (e.g. tourism) regions is related to the available (and accessible) knowledge needed to (re-)configure 'resources', particularly knowledge-based resources, to remain 'competitive'. Resources are defined as 'the totality of assets, capabilities, organizational processes, information, and knowledge controlled by an organization that enable it to conceive of and implement strategies that improve efficiency and effectiveness' (Barney 1991, p. 101). However, only if resources are valuable to customers, scarce and difficult to imitate and substitute, they fulfill the necessary condition to establish competitive advantages. Moreover, the entrepreneurial activity of combining and (re-)configuring resources is based upon (core) competencies which, in turn, need to be renewed and reconsidered through continuous knowledge acquisition and learning processes. This, 'ability to integrate, build and reconfigure internal and external competences to address changing environments' is described in the literature as *dynamic capability* (Teece, Pisano & Shuen, 1997, p. 516). Accordingly, organizational learning is operationalized by two core capabilities: by efficiently multiplying established processes and operations (*replication capability*), and by continuously modifying existing resource configurations through the acquisition and development of new core-competencies (*reconfiguration capability*). Replication capabilities are mainly driven by firm-internal knowledge transfer and related codification processes. By contrast, reconfiguration capabilities are predominantly determined by the absorbability of external knowledge (affected by the ability to learn) and by the potential to deduce generalizable cause-effect relationships from existing knowledge applicable to a wider range of strategic options (Back, Enkel & V. Krogh, 2007; Tajeddini, 2010). It has been empirically shown that the reconfiguration capability is particularly affected by the firm's proximity to the *customer*, thus, indicating the significant relevance of customer-related knowledge bases (Burman, 2002; Liu, 2003).

To sum up, through the generation, management and intelligent access of relevant information, the knowledge level of tourism stakeholders can be enhanced and information asymmetries be decreased. Consequently, knowledge relevant to tourism suppliers (e.g. information about customer behavior, destination stakeholders and the fragile natural environmental, human and cultural destination resources, etc.) will foster market cultivation processes, and destination competitiveness is strengthened through the capacity to innovate by improving service effectiveness using given destination resources in a sustainable way (Shaw & Williams, 2009). However, it is less the knowledge base existing at any time per se, than an organization's ability to effectively apply (and learn from) existing knowledge to create new knowledge and to take action that forms the basis for achieving the goal of sustainable development. Indeed, the major challenge of knowledge management at the level of tourism destinations is to make individual knowledge about stakeholders, products, processes, and vulnerable human and environmental resources available and meaningful to others (Back et al., 2007).

For tourism destinations, particular approaches are needed that promote stakeholder collaboration, and learning on an organizational, destination and regional level, respectively. Following Liu's (2003) criticism, that only little attention is paid to the role of tourism demand, Schianetz et al. (2007) claim the inclusion of the client/tourist in the learning system as well as the assessment of environmental and social impacts by planners and developers if the destination is to be sustainable. The authors propose a

framework of the *Learning Tourism Destination* to improve sustainability. By using a systems thinking approach, collective learning and systemic awareness is particularly fostered: "*the goal has changed from achieving sustainable tourism destinations to creating tourism organizations within a destination which are adaptive to change and capable of learning how to improve sustainability continuously*" (Schianetz et al., 2007, p. 1486). The authors define two major areas of knowledge, namely the area where knowledge is created and the area where knowledge will be applied and learning occurs. The learning process at tourism destinations is further determined by the processes of dissemination, processing and reflection, and the feedback-loop between the knowledge interface through which new external information is collected and the areas where this knowledge is applied (Schianetz et al., 2007, p. 1487). By acknowledging that organizational, community and individual learning are highly interlinked, the learning focus should be on the "*understanding of how a tourism destination functions, how market possibilities can be enhanced, the requirements for adaptation to changing environments, how to promote collective awareness of economic, social and environmental risks and impacts, and how risks can be minimized and/or countered*" (Schianetz et al., 2007, p. 1486). The authors argue that the implementation of a networked infrastructure that collects data and information as well as processes, but which also applies and disseminates gained knowledge, is fundamental to foster knowledge exchange between different organizations and allows for effective learning cycles. Finally, this makes particularly clear why information and communication technologies (ICTS) are playing that crucial role in realizing the full potential of a knowledge destination (Pyo, Uysal & Chang, 2002; Fuchs & Höpken, 2011).

The knowledge destination framework

The proposed *knowledge destination framework* focuses on the inclusion of the client/tourist and builds the fundament for a Web-based infrastructure that collects data, creates and disseminates knowledge and is, thereby, fostering large-scale intra- and inter-firm knowledge exchange and learning processes among destination stakeholders.

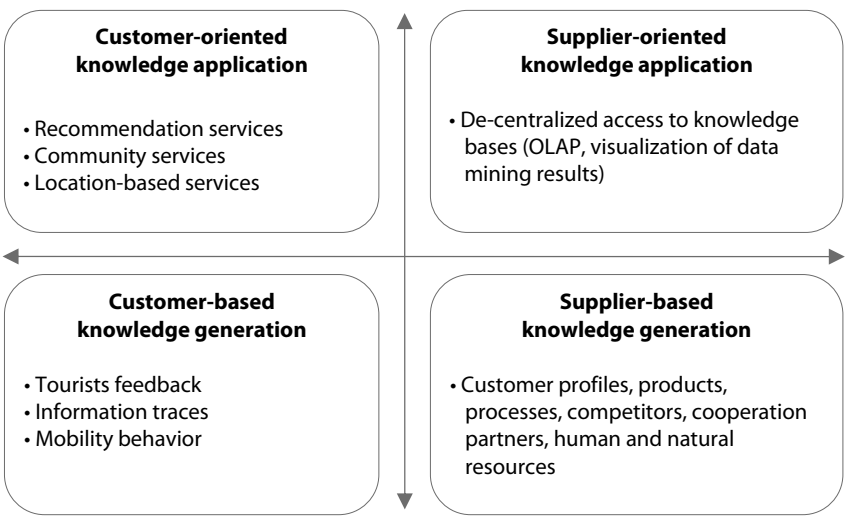
The outcome of individual and organizational learning depends on how the specific communication and information needs of destination stakeholders can be effectively satisfied (Shaw & Williams, 2009; Höpken et al., 2011). Accordingly, the sustainable development and the competitiveness of tourism destinations is largely affected on how knowledge creation and application processes as well as learning loops can be triggered and supported by ICT-based infrastructures and services (Buhalis, 2006).

However, although huge amounts of (e.g. customer-based) data are widespread in tourism destinations (e.g. webservers store tourists' website navigation behaviour, data bases save customer transaction and feedback data, etc.), these valuable knowledge sources typically remain unused. Thus, organisational learning and knowledge creation and acquisition processes in tourism destinations could be significantly enhanced by applying methods of *Business Intelligence* (Min, Min & Emam, 2002; Pyo et al., 2002; Sambamurthy & Subramani, 2005; Pyo, 2005; Fuchs & Höpken, 2009; Höpken et al., 20011)[2]. More concretely, according to the proposed *knowledge destination framework,* knowledge activities deal with extracting information from different customer and supplier-based sources as well as with generating relevant knowledge and applying it in the form of intelligent services for customers or destination stakeholders. Thus, as suggested by Schianetz et al. (2007a), the framework distinguishes between a *knowledge creation and a knowledge application layer* (Höpken et al., 2011, 2013a).

The *knowledge creation layer,* by applying methods of information extraction, makes knowledge sources accessible to destination stakeholders. For instance, on the client/tourist side, knowledge is generated through feedback mechanisms, like surveys and online evaluation platforms. Moreover, implicit knowledge can be made explicit by visualizing tourists' information traces (i.e. web search behaviour) through web-mining (Liu, 2008; Pitman, Zanker, Fuchs & Lexhagen, 2010). Furthermore, knowledge about tourists' buying behaviour is generated through mining transaction and booking data, while tourists' mobility behaviour may be traced by GPS/WLAN-based position tracking (Zanker, Fuchs, Seebacher, Jessenitschnig & Stromberger, 2009). On the destination supplier side, knowledge about products, processes, and cooperation partners is extractible from sources (e.g. websites) in the form of product profiles, availability information, information about resource consumption and resource quality, as well as the quality of life of residents and work satisfaction (Ritchie & Ritchie, 2002; Pyo, 2005; Höpken et al. 2011).

The *knowledge application* layer offers end-user services that intelligently inform about destination resources, supply elements and customers' activities. Thus, end-user applications for clients/tourists particularly comprise location-based services that support community building and intelligent consumption (e.g. through recommendation services and by being context sensitive as well as adaptive to the user; Höpken et al., 2011). By contrast, intelligent services for destination suppliers and local stakeholders particularly focus on tourism-related business intelligence applications (Cho & Leung, 2002; Olmeda & Sheldon, 2002), thus, allowing the de-centralized (ad-hoc) generation and access of relevant knowledge to the destination management organisation as well as private and public destination stakeholders (Höpken et al., 2011).

Figure 1
The knowledge destination framework

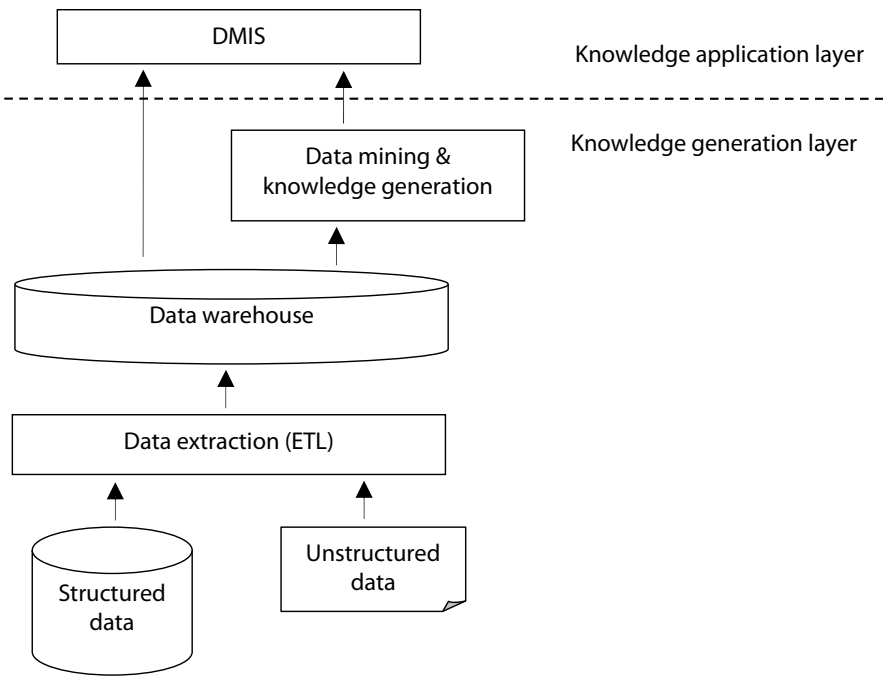


Source: adapted from Höpken et al. (2013a).

The knowledge destination framework architecture

Figure 2 displays major components of the knowledge destination framework architecture. The knowledge generation layer comprises the various customer-based data sources and components for data extraction, data warehousing, and data mining described in more detail next:

Figure 2
The knowledge destination framework architecture



Source: adapted from: Höpken et al. (2011, p. 420).

Data sources: since the advent of the WWW, a major part of tourism transactions are handled electronically, thus, nowadays customers leave electronic traces during all travel-related activities, like searching and trip planning, reservation & booking, service consumption (e.g. using mobile services and GPS/WLAN-based position tracking or loyalty programmes, like customer cards) and, finally, post-trip activities in community web sites (Höpken et al., 2011, p. 420). Consequently, huge volumes of data on customer transactions, needs and behaviour are typically stored by different stakeholders of a tourism destination. Thus, the main added-value of the proposed framework architecture is the comprehensive collection of data from different sources and their intelligent combination to generate new knowledge, e.g. the continuous analysis of customer behavior in all trip phases. Customer-based data comes either in the form of explicit tourists' feedback, provided knowingly and intentionally, such as guest surveys, ratings and e-reviews, or in the form of implicit tourist's information traces, provided unknowingly and unintentionally, like web-navigation data, online requests, booking and payment data as well as GPS-based coverage of tourists' spatial movements. More technically, data sources can be differentiated into *structured* data, e.g. transaction data, surveys, ratings, and *unstructured* data, composed by free text (e.g. e-reviews) and rich content from web 2.0 applications (e.g. YouTube.com) (Höpken et al., 2011, p. 421).

Data extraction: Different data sources require different techniques for the extraction, transformation and loading (ETL) of relevant information dependent on the data format at hand. Thus, the key task is the integration of heterogeneous data sources: structured and semi-structured data (e.g. html-documents) are typically extracted by means of semantic, linguistic or constraint-based techniques of information integration, while unstructured data are extracted by means of wrappers or text mining based on statistical language models or natural language processing approaches (Höpken et al., 2011, p. 421).

Data warehousing: Heterogeneous data from different data sources are mapped into a homogeneous data format and stored in a central Data Warehouse that embraces all data relevant to tourism stakeholders. However, only through a harmonisation process it is possible to carry out a destination wide and all-stakeholder encompassing analysis approach. Thus, based on a tourism-ontology, individual data sources are, first, transformed into a central data model and, finally, into a dimensional structure (Höpken et al., 2011, p. 421).

Knowledge generation through data mining: Relevant knowledge is generated for destination stakeholders based on the data collected in the Data Warehouse. By employing methods of data mining (i.e. techniques of machine learning and artificial intelligence) interesting patterns and relationships in the data can be detected. Interestingly, only recently, data mining became important for tourism because of its ability to discover unknown patterns in huge data bases, and, in contrast to most statistical methods, to also consider non-linear relationships (Olmeda & Sheldon, 2002; Magnini, Honeycutt & Hodge, 2003; Fuchs & Höpken, 2009; Höpken et al., 2011a). Although, the potential of data mining is not fully used in tourism yet, all major data mining techniques are found to be applied in the literature. For instance, descriptive/explorative analyses are used in form of reports (OLAP) to visualize tourism arrivals per dimensions, like time/season, travel type or customer origin (e.g. TourMIS, Wöber, 1998; Destinometer, Fuchs & Weiermair, 2004). Moreover, methods of supervised learning, like classification and estimation are used to explain tourists' booking, cancellation and consumption behaviour (Morales & Wang, 2008) or to predict tourism demand (Law, 1998; Chu, 2004; Vlahogianni & Karlaftis, 2010). As a method of unsupervised learning, clustering is typically applied to the task of customer segmentation or customer relationship management (Bloom, 2004). Finally, with the uptake of the World Wide Web the topic of *web data* mining gained attention in tourism: web content mining is analysing tourists' comments in blogs or review platforms especially in the form of opinion mining and sentiment detection (Kasper & Vela, 2011; Gräbner et al., 2012). Finally, web usage mining is dealing with the analysis of tourists' click- and search-behaviour when using tourism websites or online platforms (Pitman et al., 2010).

Finally, the presentation and visualization of data mining models and the underlying data rest on the *knowledge application layer* (see figure 2).

A supplier-oriented knowledge application: The destination management information system (DMIS)

Designing and engineering a knowledge-based destination management information system (DMIS) requires a profound understanding of the nature of knowledge behind management processes and an appropriate interpretation of the knowledge management objectives that support sustainable

development (Bornhorst et al., 2010). Accordingly, Hallin and Marnburg (2008) argue that the interrelated goals of measurement, control, and data storage in a tourism destination context should not be defined as "*filling gaps between existing and needed knowledge*" but, rather as "*memorizing real-time contextual knowledge*". Similarly, the facilitation and the development of knowledge processes should not be interpreted as "*developing non-existing knowledge"*, but rather as a "*continuous process of inter-organizational learning, competence development and change"*.

Thus, according to literature, knowledge relevant in a tourism destination context subsumes knowledge about market cultivation (e.g. how to attract valuable customers with the smallest ecological footprint) and knowledge relevant for destination management, development, and planning (e.g. facilities the avoidance of congestion, environmental protection, the development of product-market combinations for valuable and sustainable customer segments, training, private-public partnerships, etc.; Pyo et al., 2002; Gretzel & Fesenmaier, 2004; Wang & Russo, 2007; Bornhorst, Ritchie & Sheehan, 2010). Especially customer-based knowledge is created through customer segmentation techniques and service performance evaluation (Ritchie & Ritchie, 2002; Cho & Leung, 2002; Pyo, 2005). Thus, data collected, stored, analysed and visualised in the DMIS include tourists' demographic and psychographic characteristics, buying motives and brand perceptions as well as customers' information usage and product consumption patterns, respectively (Fuchs et al., 2011; Höpken et al., 2011, p. 422)

Since the effective use of a DMIS requires not only sophisticated technology applications, but particularly demands to establish organizational learning, it is crucial to integrate private and public stakeholders in order to define knowledge requirements. Thus, based on a literature review and input from stakeholders of the leading Swedish winter destination, Åre, the following set of indicators has been defined (Pyo, 2005): *Economic performance indicators*, like bookings, overnights, prices, occupancy, sales; *Customer behaviour indicators* comprising website navigation & search (e.g. page views, search terms), booking and consumption behaviour (e.g. booking channels, conversion rates, length of stay, cancellations, guest tracking), customer profile (e.g. country of origin, age, gender, skiing travel behaviour, customer life time value, preferred type of accommodation and transportation, purpose of visit), and, finally *Customer perception & experience indicators*, comprising destination brand awareness (e.g. brand visibility, knowledge about the destination, information sources), destination value areas (e.g. skiing & non-skiing winter activities, summer activities and attractions, services and features, atmosphere, social interaction), Value for money and customer satisfaction (e.g functional and emotional value, satisfaction) and loyalty (i.e. cognitive, affective and conative loyalty) (Fuchs et al., 2002; Pechlaner, Smeral & Matzler, 2002; Chekalina & Fuchs, 2009; Chekalina, 2012; Höpken et al., 2013b).

Through a business process oriented data modelling approach (i.e. multi-dimensional modelling) these indicators are assigned to sequential destination processes, like "*Web-Navigation*", "*Booking*" and "*Feedback*" (Kimball, Ross, Thronthwaite, Mundy & Becker, 2008; Höpken et al., 2013b). Each process is composed by the main variable(s) of analysis (*measures* or *facts*) and their context (*dimensions*). By identifying common dimensions across different business processes (*conformed dimensions*), this procedure allows DMIS to provide analyses *across* various processes. Information extraction, transformation and loading (ETL) are based on the *Rapid Analytics Business Intelligence server®*, while the DMIS cockpit is developed as *html*-based web application (www.dmis-are.com). In its present form DMIS provides instant reports (*dashboards*) and OLAP analyses, thus, grants destination stakeholders real-time access to the data stored in the Data Warehouse. In the near future, the DMIS cockpit will also provide data

mining processes, like classification, clustering, or prediction executed by the *RapidMiner*® data mining software (Höpken et al., 2013b). Exemplarily for guest survey data, figure 3 shows how a destination supplier can apply knowledge and trigger learning processes through the web-based DMIS cockpit and personally customized dashboards.

Figure 3
DMIS dashboard: Feedback process, winter survey data

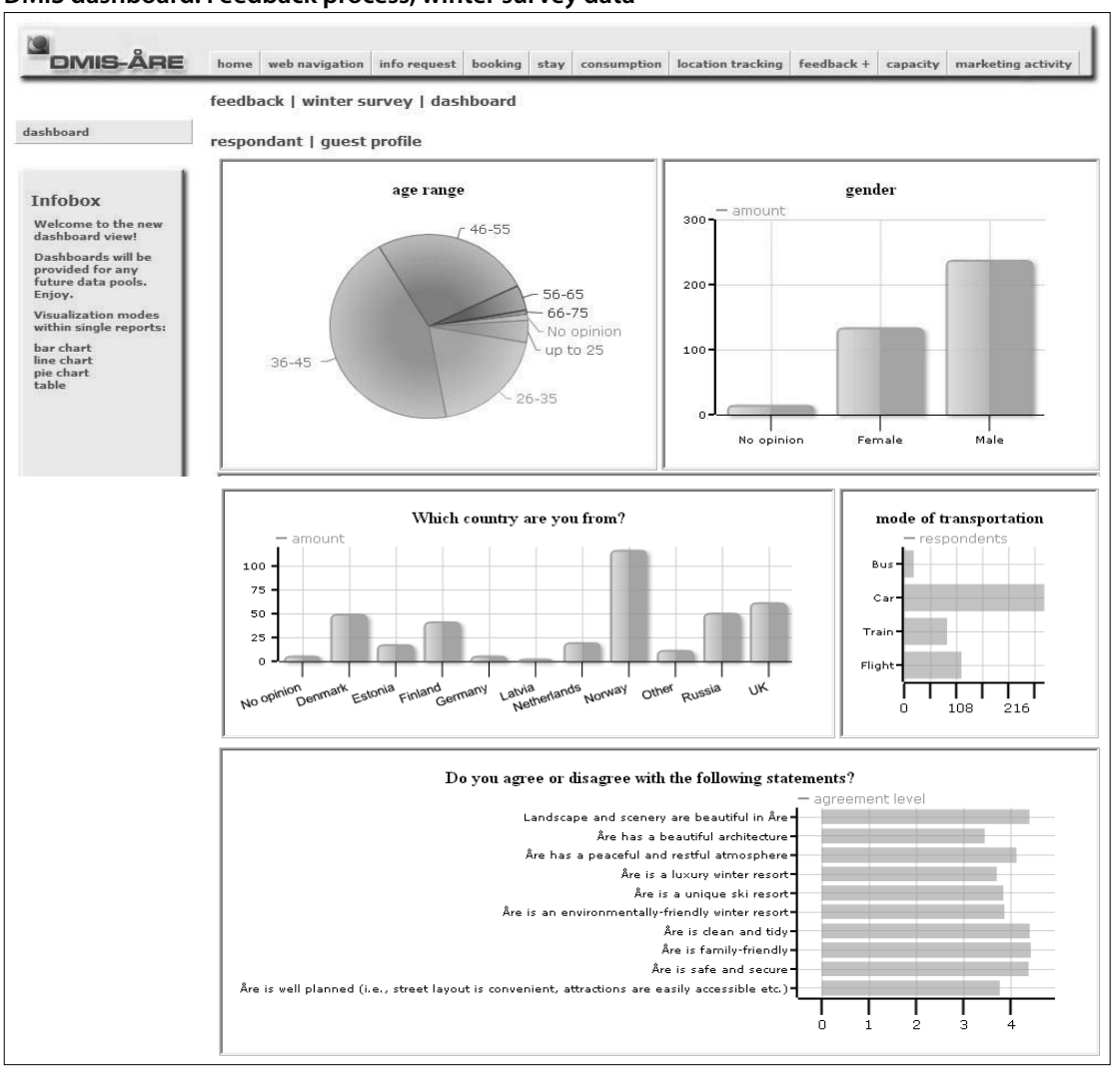
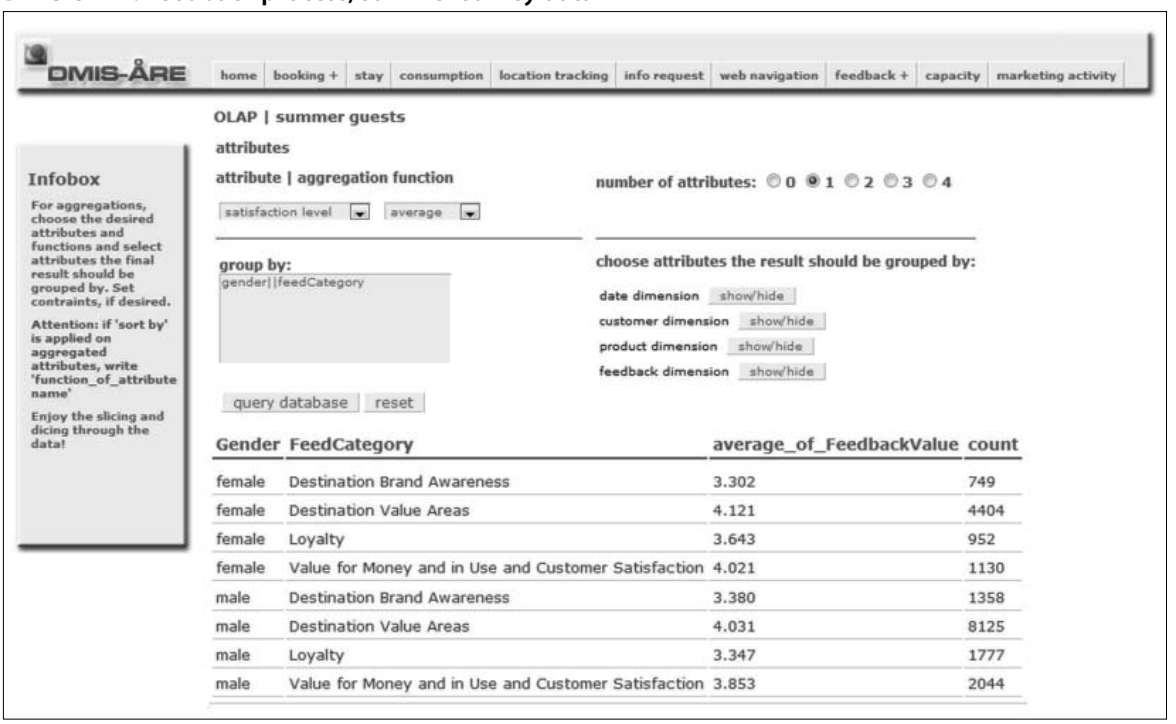


Figure 4 shows the DMIS cockpit user dialog for executing OLAP analyses. The user selects the facts (or attributes in general) to be shown, together with the appropriate aggregation function, defines one or several attributes (i.e. dimensions) the data are grouped by and, finally, specifies constraints the data are filtered by, if necessary. The OLAP analysis in figure 4 is again for customer feedback data: the selected fact is the feedback value (i.e. 1= totally unsatisfied; 5= totally satisfied), aggregated as average values. The data are grouped by the feedback category and gender. The example demonstrates the flexibility of the OLAP approach (Höpken et al., 2013b).

Figure 4
DMIS OLAP: Feedback process, summer survey data



Source: adapted from Höpken et al. (2013).

As outlined, DMIS also shows the potential to be used as a trend monitor for measuring the proportion of environmentally friendly customers within the total customer base of a tourism destination. In the course of establishing the "*Carbon Neutral Tourism Destination*" (Thierstein & Walser, 2000; McDonough & Braungart, 2002; Gössling, 2009), tourism scholars gained sufficient empirical evidence needed to characterize the environmentally sustainable tourist (Dolnicar et al., 2008; Dolnicar & Leisch, 2008; Reinsberg & Vinje, 2010). Accordingly, tourists with the relatively "*smallest environmental footprint*" are characterized by the following attributes:

1) Socio-demographics (Dolnicar & Leisch, 2008, p. 677):

- ✓ Middle-aged to aged
- ✓ Higher education

2) Travel behaviour and vacation styles

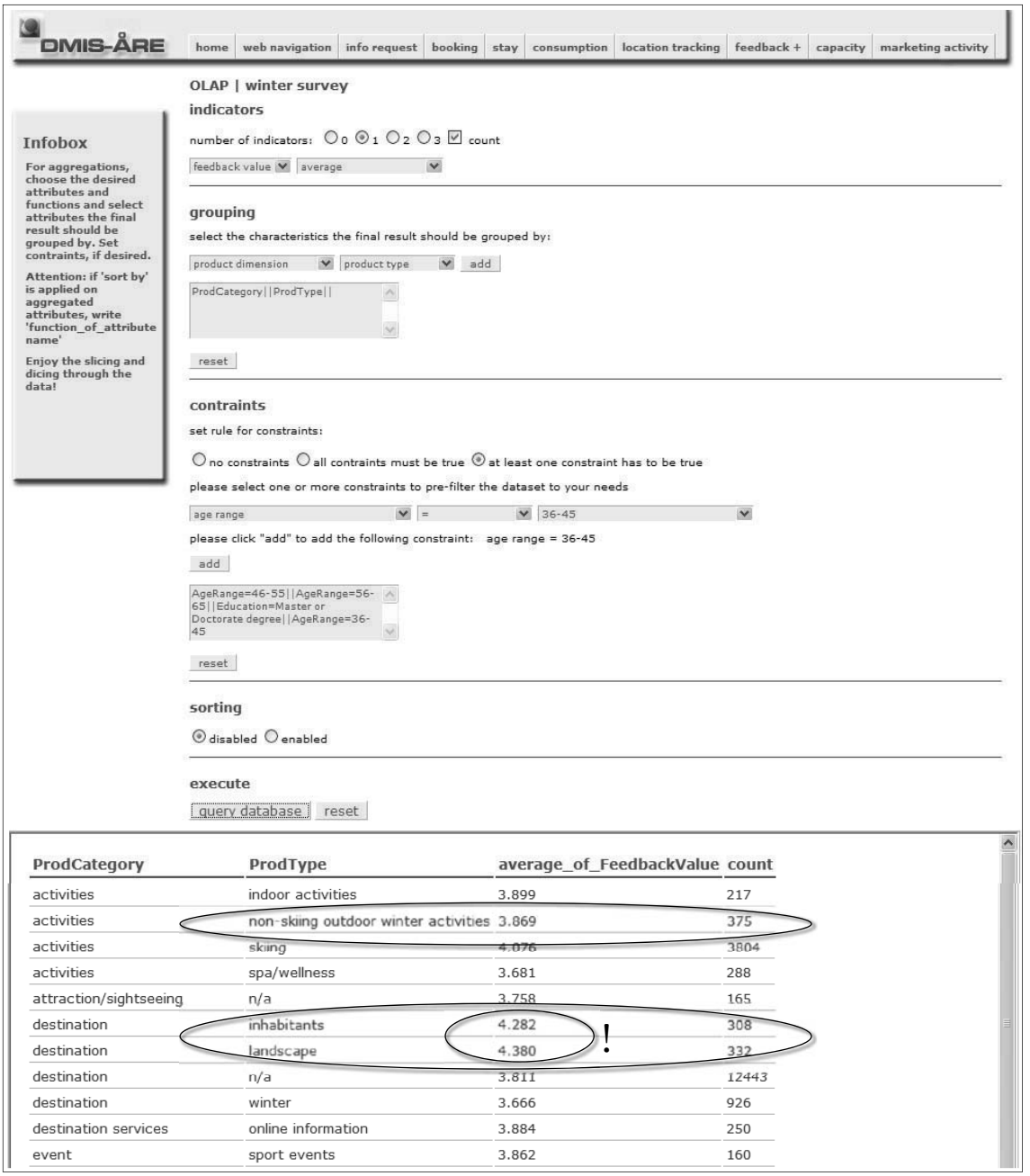
- ✓ Camping sites
- ✓ Private apartments

3) Positive attitudes towards nature-based activities

- ✓ Appreciation of nature and enjoyment of natural beauty and scenery
- ✓ Interaction with nature and preference for nature-based activities (e.g. hiking, cycling, fishing, climbing, nature observation, etc.)

- ✓ Preference for pure recreation (i.e. rest and relax)
- ✓ Activities related to learning about nature
- ✓ Respect for conservations and protection of nature

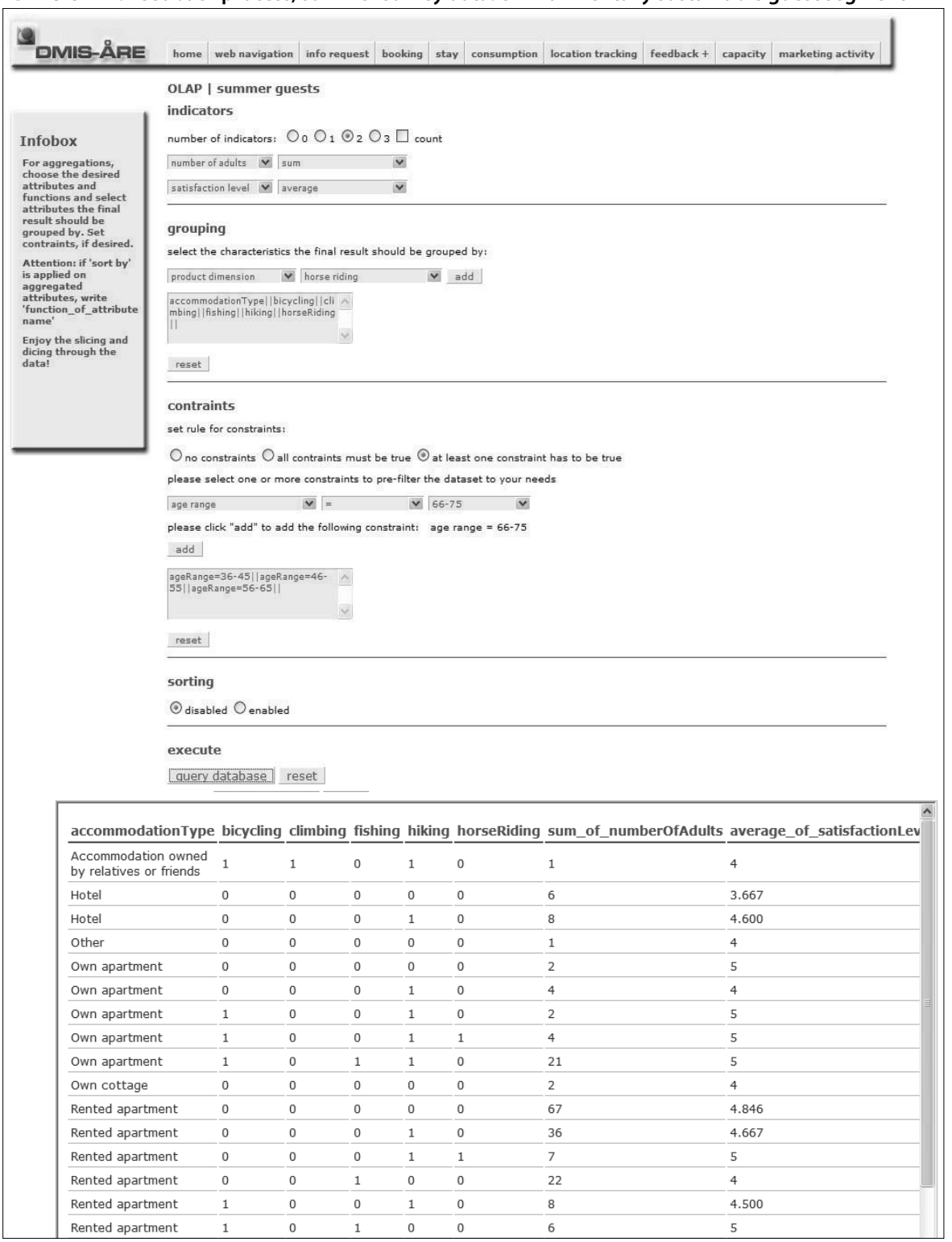
Figure 5
DMIS OLAP: Feedback process, winter survey data: environmentally sustainable guest segment



ProdCategory	ProdType	average_of_FeedbackValue	count
activities	indoor activities	3.899	217
activities	non-skiing outdoor winter activities	3.869	375
activities	skiing	4.076	3804
activities	spa/wellness	3.681	288
attraction/sightseeing	n/a	3.758	165
destination	inhabitants	4.282	308
destination	landscape	4.380	332
destination	n/a	3.811	12443
destination	winter	3.666	926
destination services	online information	3.884	250
event	sport events	3.862	160

Figure 6

DMIS OLAP: Feedback process, summer survey data: environmentally sustainable guest segment



accommodationType	bicycling	climbing	fishing	hiking	horseRiding	sum_of_numberOfAdults	average_of_satisfactionLev
Accommodation owned by relatives or friends	1	1	0	1	0	1	4
Hotel	0	0	0	0	0	6	3.667
Hotel	0	0	0	1	0	8	4.600
Other	0	0	0	0	0	1	4
Own apartment	0	0	0	0	0	2	5
Own apartment	0	0	0	1	0	4	4
Own apartment	1	0	0	1	0	2	5
Own apartment	1	0	0	1	1	4	5
Own apartment	1	0	1	1	0	21	5
Own cottage	0	0	0	0	0	2	4
Rented apartment	0	0	0	0	0	67	4.846
Rented apartment	0	0	0	1	0	36	4.667
Rented apartment	0	0	0	1	1	7	5
Rented apartment	0	0	1	0	0	22	4
Rented apartment	1	0	0	1	0	8	4.500
Rented apartment	1	0	1	0	0	6	5

The outlined tourist characteristics can be used to get an empirical picture about the proportion of environmentally friendly tourists from (i.e. survey-based) customer profile data. Figure 5 shows the OLAP analysis for winter survey data exemplarily for product categories (e.g. [winter tourism] activities, destination [activities], etc.) and product types (e.g. non-skiing outdoor activities, [getting in contact with local] inhabitants, [experiencing the natural] landscape, etc.) acting as the *grouping* variable. As suggested by the literature, the education level (i.e. Master/PhD level) and the mid- till aged age level (i.e. 36-65 years old) serve as filter variables (*constraints*). Next to the feedback (i.e. satisfaction) score value, the absolute size of the environmentally sustainable *winter guest segment* can be gained by the final "*count*" column (Figure 5). First of all, it is interesting to show that the total share of winter tourists with a likely small ecological footprint is about 1,015/8,381= 13%. More interestingly, however, and in line with the literature (Dolnicar et al., 2008; Gössling, Hall & Weaver, 2009), it clearly emerges that tourists with a small ecological footprint tend to reach higher satisfaction score values, namely those tourists "*getting in contact with local inhabitants*" (4.282) and those "*experiencing the beauty of the natural landscape*" (4.380) (Figure 5).

Similarly, figure 6 shows the OLAP analysis for summer survey data exemplarily for accommodation types (e.g. accommodation owned by friends, hotel, own apartment, etc.) and summer-based nature and outdoor activities (i.e. bicycling, climbing, fishing, hiking, horse-riding) as grouping variables. Again, the mid till aged age level (i.e. 36-65 years old) serves as filter variable (*constraints*). Next to the average feedback (i.e. satisfaction) score value, the absolute size of the environmentally sustainable *summer guest segments* is gained by the penultimate "*sum_of_number_of_adults*" column (Figure 6). As to be expected, and again in line with the literature (Dolnicar & Leisch, 2008; Gössling et al. 2009; Reinsberg & Vinje, 2010), the share of tourists with a likely small ecological footprint is significantly higher in an alpine summer tourism context (i.e. 208/451= 45 %) compared to an alpine winter (i.e. Skiing) context.

Study limitations

A major limitation of the present DMIS prototype version is the non-explicit consideration of sustainability indicators. Literature clearly puts that supporting sustainable tourism development is by proper evaluation tools and through the use of specific indicators (Dymond, 1997; Farsari & Prastacos, 2001; Miller, 2001; Twining-Ward & Butler, 2002). Moreover, tourism researchers suggest that without indicators the term sustainable is meaningless (Butler, 1999; Sirakaya et al., 2001). Indeed, tourism policy makers, destination developers, planners and managers require a base of reliable and valid measures corresponding to the ecological, social, economic and planning environments present in an area defined by spatial and temporal boundaries, in order to support responsible decision making (UNWTO, 2004).

However, while it is easy to proselytize about the needs for sustainable tourism development, it is far more challenging to develop an effective, yet practical, set of measurement indicators and related processes (Murphy & Price, 1998). Indicators of sustainable tourism should also differ from traditional development indicators because they should take into consideration the web of complex interrelationships and interdependencies of resources and stakeholders in the tourism system (Sirakaya, Jamal

& Choi, 2001). The World Tourism Organization identifies 11 core indicators to compare tourism sustainability between destinations (Table 1).

Table 1
WTO core indicators of sustainable tourism

1. Site protection: Category of site protection according to IUCN
2. Stress: Tourist numbers visiting a site (per annum/peak month)
3. Use intensity: Intensity of use in peak periods (persons per hectare)
4. Social impact: Ratio of tourists to locals (peak period and over time)
5. Development control: Existence of environmental review procedure or formal site controls
6. Waste management: Percentage of sewage from site receiving treatment
7. Planning process: Existence of organized regional plan for tourism
8. Critical ecosystems: Number of rare/endangered species
9. Consumer satisfaction: Level of satisfaction by visitors
10. Local satisfaction: Level of satisfaction by locals
11. Tourism contribution to local economy: Proportion of total economic activity generated by tourism

Source: adapted from: Manning et al., 1996

Although the work offered by the WTO represents a valuable initial point, closer examination reveals drawbacks, like the failure to justify the choice of indicators, the narrow tourism focus, the lack of stakeholder participation, and the omission of an appropriate monitoring framework to help translate indicator information into managerial or policy action (Twining-Ward & Butler, 2002). However, the indicators can provide a snap-shot at a particular time in a particular place, thus, they can be used as an early warning system to trigger planning and management strategies to prevent irreversible tourism impacts or prepare for a possible crisis (Mowforth & Munt, 2003; Vereczi, 2004; Sausmarez, 2007). Indeed, a growing number of researchers deal with indicator-based sustainability assessment in tourism (Craik, 1995; Weaver & Oppermann, 2000; Miller 2001; Dwyer et al., 2000; Twining-Ward & Butler, 2002; Dwyer & Kim, 2003; Roberts, 2004; Ko, 2005; Miller & Twining-Ward, 2005; Choi & Sirakaya, 2006; Reed et al., 2006; Fernandez & Rivero 2009; Jovović & Ilić, 2010). Frameworks for evaluating sustainability are either expert-led (*top-down*) or are based on a *bottom-up* participatory philosophy (Bell & Morse, 2001). Top-down approaches accept the complexity of social-ecological systems, but do not bring out the complex multiplicity of stakeholders (Reed, Fraser & Dougill, 2006). By contrast, bottom-up approaches enhance collective learning processes in tourism destinations by defining sustainability goals and priorities within the local context, but might not cover all sustainability aspects (Roberts & Tribe, 2008).

To conclude, table 2 provides an overview of previous research on sustainability indicators, applied methodological approaches as well as a proposed selection of sustainability indicators in a mountain tourism context to be integrated by DMIS in the future (Farrell & Twining-Ward, 2005).

Table 2
Overview of research on sustainability indicators

	Methodology	Economic dimension	Social dimension	Cultural dimension	Ecological dimension	Political dimension	Technological dimension
WTO, 1992	Drawn from a number of published sources	+	+	+	+	+	
		Develop core indicators of sustainable tourism on a macro level					
Craik, 1995		+	+	+			
		Develop cultural indicators of tourism impacts					
Weaver & Oppermann 2000	Drawn from a number of published sources	+	+	+	+	+	
		Develop a candidate list of sustainable tourism indicators by emphasizing on the interconnectivity of the tourism system					
Miller, 2001	Delphi-technique	+	+	+	+		
		Develop indicators to measure community tourism development within a sustainable framework					
Dwyer, Forsyth & Rao, 2000	Input–output analysis	+			+		
		Develop measures of economic and environmental yield					
Twining-Ward & Butler, 2002	Delphi-technique	+	+	+	+	+	
		Develop sustainable tourism development in Samoa, an independent small island state in the South Pacific					
Roberts, 2004	Drawn from a number of published sources	+	+	+	+	+	
		Develop indicators that can be applied at the micro-organisational level					
Ko, 2005	Drawn from a number of published sources	+	+	+	+	+	+
		Develop a procedure for the assessment tourism sustainability					
Miller & Twining-Ward, 2005	Delphi-technique	+	+	+	+	+	+
		Develop in-depth assessment of the use of indicators as tools for working towards sustainable tourism					
Choi & Sirakaya, 2006	Delphi-technique	+	+	+	+	+	+
		Develop indicators to measure community tourism development within a sustainable framework					
Reed, Fraser & Dougill, 2006	Expert-led methods	+	+		+		
		Develop a framework that summarises best practices of developing sustainability indicators at local communities					

Table 2 **Continued**

	Methodology	Economic dimension	Social dimension	Cultural dimension	Ecological dimension	Political dimension	Technological dimension
Schianetz & Kavanagh (2008)	Complex adaptive systems	+	+	+	+	+	+
		Develop an assessment methodology of tourism destinations sustainability by adopting a systemic indicator system					
Fernandez & Rivero, 2009	Factorial analysis model	+	+	+	+	+	
		Develop composite index of tourism sustainability					
Indicators to be integrated in DMIS		**Seasonality** (peak/ annual mean) **Work** (# jobs, %, ΔFTE) **Expenses/ Tourist/ Tight** **Tourism GDP** **Value for money** (tourists' perception) **Repeat Visitors**	**Tourists/ Locals** (over time) **Tourist satisfaction** (Song et al. 2012; Fuchs & Chekalina, 2009; Chekalina, 2012) **Quality of life of locals** (Fuchs, 2004) **Community involvement**	**Tourism awareness by locals** (% that agree tourism is positive) **Cultural assets** (% of revenues for conservation, tourists satisfied with cultural offer) **Security** (# of crimes affecting tourists, tourists' safety feeling)	**Climate change** (vulnerability, response) **Carrying capacity** (tourists/ hectare/day) **Energy use/ tourist** **Recycling** **Ecological footprint** (endangered species, vegetation, greenhouse gas, erosion)	**Environmental monitor & Sustainable tourism development Plan & control policy** (Budget for strategy implementation) **Intersectoral linkages** (local/ regional/ national)	**ICT Adoption and use** (new and low-impact technologies) (Fuchs et al. 2009; Fuchs et al. 2010) **Benchmarking** (generic and competitive/ efficiency ⇔ input/output; Fuchs et al., 2002; Fuchs & Weiermair, 2004; Fuchs & Höpken, 2005; Weiermair & Fuchs, 2007)

Concluding remarks on the political economics of sustainability

The shift towards sustainable development of tourism destinations cannot be considered in isolation from the economic and political sphere on a global scale. Therefore, the concluding remarks briefly discuss possible economic and political solutions towards sustainability.

As a consequence of the growth fixation inherent in neo-liberal thinking, a major problem of nowadays globalized world is the reckless shift of costs on common goods what, in turn, is causing the erosion of their entire substance (Max-Neef, 1995; Pallante, 2005; Jackson, 2009; Maxton, 2011). Common goods, or "*global commons*", comprise the *environmental capital*, like biodiversity, climate, ground floor, water and atmosphere, and the *social capital*, such as health, social participation and integration, distributive justice, as well as the intactness of human relationships (Scherhorn, 2011, p. 71). Growth theorists' neo-liberal assumptions can be traced back on two major erroneous trends in the more recent economic history: first, Bretton Woods' (1944) Global Monetary System favored an unequal growth of particular countries at the expense of others. The second biasing trend started in the 1950s by the

systematic depletion of global fossil energy sources tempting industrialized states to exaggerate their average wealth level through a fast-paced consumption of global commons (Scherhorn, 2011, p. 66). However, in the 1970s, Gross Domestic Products (GDPs) of industrialized countries reached such high absolute levels that growth rates started to shrink - although wages were assumed to still be associated with high rates of economic growth. To overcome this first post-war phase of stagflation, the 'neo-liberal formula' was to weaken unions, to abolish trade and mobility barriers, and, in particular, to stimulate the financial sector[3].

Unfortunately, policies with a strict growth focus don't differentiate between sustainable structures and such production types that are predominantly based on the overuse of global commons; rather, they appreciate everything that can be produced and sold. Indeed, the refusal to conserve and/or replace exhausted common goods allows firms to save a significant amount of costs, what, in turn, increases profitability as the major base for further growth and competitiveness. Economically spoken, this "*externalization of costs*" was possible only because there aren't any sanctions *against it*, while global competition imposes strong rewards and pressure *for it*, alluring for both producers and consumers (Scherhorn, 2011, p. 70).

However, since the 1970s, marginal costs to recover exploited common goods became higher than the benefits from additional GDP gains, implying a degradation of net-wealth (Scherhorn, 2011, p. 97). Recent ecological studies clearly show that further (quantitative) growth is no more achievable, even through an extensive consumption of global commons at zero costs (Trainer, 2006; Hansen, 2007; Stiglitz, Sen & Fitoussi, 2009; Daly & Farley, 2011; Randers, 2012). Thus, as being the opposite of growth regimes, policies of sustainable development foster particularly those production and consumption processes as well as structures that support the preservation of global commons. A policy of sustainable development particularly makes use of two major strategies: *rationing* (e.g. nature reserve areas, such as national parks, etc.) and/or *reinvestment in global commons* exhausted in production and consumption processes (e.g. through production norms, green tax, auctions for emission rights, rules for the recycling of scarce commodities, etc.; Scherhorn, 2011, p. 73).

To conclude, if global commons would consequently be preserved, sustained through replacement investments or even further developed through cultivation, a new composition as well as consciousness of the concept of "*GDP*" would emerge: as an alternative, the notion of *Wealth Accounting* would explicitly consider the quality of global commons, thus, implying a better balance between higher prices and taxes for private and public goods and preservation of the substance of global commons at the one hand, and smaller amounts of private goods and a higher quality of global commons at the other hand (Scherhorn, 2011, p. 74).

Indeed, sustainability is equivalent to the preservation of the common means of livelihood for future generations. In economic jargon, this is tantamount with the reversion of the ongoing "*externalization of costs"* towards an "*externalization of benefits"*. Thus, higher prices won't reflect inflation tendencies but, rather, a steady increase of qualitative values standing behind the concept of '*Wealth*' measured by indicators for *quality of life*, such as health & happiness, trust and cooperative behavior, independent meaningful activities, equality of education opportunities, employment, etc., and indicators for *environmental quality,* such as cleanliness of water and air, as well as biodiversity, etc. (Scherhorn, 2011; Botsman & Rogers, 2011; Visser, 2011)[4].

Implications for the governance of the sustainable tourism destination

As outlined in the concluding remarks, tourism and leisure activities as well as related stakeholder activities at tourism destinations play a crucial role in preserving and sustaining the base of the global commons, what, in turn, can be considered as *the* basic precondition for sustainable development at a global scale (Berno & Bricker, 2001; Hall, 2011). The DMIS prototype presented in this paper shows that research-based knowledge, emphasized as the key resource for tourism sustainability, is setting the foundation for sustainable destination development processes (Jafari, 2001; Schianetz, Kavanagh & Lockington, 2007). More concretely, through the proposed DMIS prototype, destination stakeholders are put on equal terms when it comes to the acquisition and exchange of knowledge about the customer at the level of the tourism destination. In practice, this goal was achieved by a joint definition of measurement indicators by industry partners, which in turn, significantly facilitates the interpretability of analysis outcomes. Thus, from a governance perspective, stakeholders are in equal possession of valuable knowledge resources, what likely implies a "*changing of the rules of the game*". In that way, the sharing of data bases and the use of information based on previously agreed measurement indicators and methods of *Business Intelligence* (Pyo, 2005; Höpken et al., 2011) can, indeed, be seen as a significant improvement of the preconditions for the development of coherent and sustainable destination strategies. Although, in its present version, the DMIS prototype mainly considers customer-based data, it is planned to also integrate supplier-based data sources from the entire digital eco-system of the destination Åre, including information on products, processes and collaboration partners extracted from sources (web-sites) in the form of product profiles and availability information (booking engines). Thus, valuable knowledge about suppliers' service potential (property status), the complementarity of destination offers (on the base of market basket analyses), and their evaluation through tourists' feedback will be gained. Finally, also information about the consumption of natural resources, the quality of life and the tourism awareness of residents will be integrated in DMIS in order to conduct indicator-based sustainability assessments at the level of the destination.

Destination governance, understood as the management of social and resource-based networks (Scharpf, 1978; Kooiman, 1993), puts the focus on the exchange of resources between highly interdependent actors (Rhodes, 1997; Nordin & Svensson, 2007), comprising local and external destination stakeholder groups. For this purpose, the use of the proposed DMIS application will hopefully lead to a significant enhancement of commonly shared knowledge bases, which, in turn, is a necessary prerequisite for governance processes at the level of tourism destinations. Indeed, the openness and scalability of this knowledge architecture supports inter-firm collaboration without any centralized governance at the destination. More specifically, in its present version, the DMIS prototype comprises web-search, booking and feedback data (e.g. survey-based, user-generated content) from the Destination Management Organization, Åre Destination AB, and the major destination operator, Ski Star Åre, conducting cable cars and ski-lifts, but also offering accommodation and ski rentals. However, also small - and medium-sized accommodation suppliers, like Tott Hotel Åre and Copperhill Mountain Lodge Åre, are constantly providing their customer-based data to DMIS through a semi-automated process of extracting, loading and transforming data into the homogenous and centralized destination Data Warehouse. Privacy issues are especially secured through a responsible data handling process: technically, sensitive customer data is stored to a minimal extent and access to such data is handled as restrictive as possible.

Following this trust keeping mechanisms, each stakeholder can visualize only analysis results regarding its own data compared to aggregated, thus, fully anonymized data. Nevertheless, at a first sight, it could mean the equaling out of existing knowledge resources, thus, a decrease of valuable differences in knowledge resources among destination actors. In practice, however, it is likely to have the effect that destination stakeholders might vary their understanding and, thus, further improve their skills of interpreting available data about changes in the economic, social, ecological, cultural, political and technical environments. Finally, DMIS might also positively affect the distribution of power at the destination as well as the readiness to engage in learning networks.

Nevertheless, besides the instrumental (i.e. *explicit*) knowledge provided by the DMIS, tacit knowledge could still remain being unequally distributed, thus, being a future source of unequal power relationships. And still, other resources, such as formal power relationships and capital, could impede emerging processes of sustainable development at the level of tourism destinations, thus, potentially limiting the impact of the DMIS. These examples of complications surrounding the shared and fact-based point of departure, particularly serve to highlight the importance of the ongoing process surrounding the implementation of the DMIS at the leading Swedish tourism destination of Åre. The implementation and anchorage of DMIS is, indeed a delicate process in which some agreement on the role of the knowledge infrastructure for destination governance processes is preferable. While individual stakeholders may use data for improving their own activities somewhat independently of others, their relationship is more interdependent at the strategic destination level, what calls for more integrated and coordinated knowledge application processes.

To conclude, given that the destination is aware of these potential complications and, thus, treats them appropriately, the DMIS is a step forward towards a knowledge-driven, and, thus, likely sustainable process of destination development where customer-based data is bound to improve integrated innovation and coordinated adaptation processes.

Notes:

[1] Macbeth (2005) further proposed an anthropocentric and an ethics platform of thinking to interrogate the morality of positions taken in research, policy, planning, development, and managerial decision-making, and, thus, integrates ethical norms in knowledge production processes (Smith & Duffy, 2003).

[2] Business Intelligence is an umbrella term which comprises 1) data identification and preparation, 2) database modelling and the population of a data warehouse, and 3) the application of (explorative) Online Analytical Processing (OLAP) and (explanative) data mining (DM) techniques, respectively (Larose, 2005; Hastie et al., 2009). DM comprises: Classification (for example artificial neural networks [ANN], decision tree analysis, association rule induction, K-Nearest Neighbour techniques), Estimation and Prediction (such as multivariate statistics, ANN), Clustering (for example k-means, hierarchical; Kohonen Networks) and Association rules (particularly for market basket analyses).

[3] E.g. during Tatcher's and Reagan's cabinet the share of the financial sector of the UK and the US GDP grew from 5% up to 30% (Scherhorn, 2011, p. 67). However, since productivity grew faster than wages, shortfalls in demand were compensated by increasing total debt levels by both, the public and the private sectors, like households, banks and firms. As a consequence, after the burst of the financial bubble in 2007, national debts are higher than ever, both in the US and the EU. Indeed, neoliberal growth policy considers a gain of government spending as much more pressing than the redemption of public debts.

[4] It is important to note, that sustainable development can emerge only when the Right of Property is socially and environmentally responsible (Scherhorn, 2011, p. 87).. Interestingly enough, already today §17 of the EU-charter of fundamental rights says: "The use of property may be regulated by law in so far as is necessary for the general interest.", thus, the institutional preconditions for sustainable development are given in principle.

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References

Ali, A. (2009). *An Investigation into Information and Communication Technologies-Based Applications for Sustainable Tourism Development of Destinations.* Retrieved February 11, 2012, from eTheses: http://etheses.qmu.ac.uk/150/1/150.pdf.

Back, A., Enkel, E. & V. Krogh, G. (2007). Knowledge Networks for Business. New York: Springer.

Baggio, R. (2008). Symptoms of complexity in a tourism system. *Tourism Analysis, 13*(1), 1–20.

Balasubramanian, D. (2006). Sustainable tourism development A Compilation and Analysis of Expert Views. Retrieved September 15, 1012, from University of Wisconsin Stout: http://www2.uwstout.edu/content/lib/thesis/2005/2005balasubramaniand.pdf.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99-120.

Bell, S. & Morse, S. (2001). Breaking through the glass ceiling: who really cares about sustainability indicators? *Local Environment, 6*(3), 291-309.

Berno, T. & Bricker, K. (2001). Sustainable tourism development: the long road from theory to practice. *International Journal of Economic Development, 3*(3), 1-18.

Bloom, J. Z. (2004). Tourist market segmentation with linear and non-linear techniques. *Tourism Management*, *25*(6), 723-733

Bornhorst, T., Ritchie, J .R. & Sheehan, L. (2010). Determinants for DMO & destination success: an empirical examination, *Tourism Management, 31*, 572-589.

Botsman, R. & Rogers, R. (2011). What's Mine is Yours: The Rise of Collaborative Consumption, London: Harper Collins.

Bramwell, B. & Lane, B. (2003). Interpretation and sustainable tourism: the potential and the pitfalls. *Journal of Sustainable Tourism, 1*(2), 71-80.

Bramwell, W. & Lane, B. (1993). Sustainable tourism: an evolving global approach. *Journal of Sustainable Tourism, 1*(1), 1-5.

Breakey, N. (2005, November 21). *Tourism Destination Development- Beyond Butler.* Retrieved July 02, 2012, from University of Queensland: http://espace.library.uq.edu.au/eserv/UQ:158161/Breakey_Full_thesis.pdf.

Britton, S. (1982). The political economy of tourism in the third world. *Annals of Tourism Research, 9*(3), 331-358.

Buckley, R. (2012). Sustainable rourism: research and reality. *Annals of Tourism Research, 39*(2), 528-546.

Buhalis, D. (2006). The impact of ICT on tourism competition. In A. Paptheodorou (ed.), *Corporate rivalry and market power: competition issues in the tourism industry* (pp. 143-171). London: IB Tauris.

Burman, C. (2002). Wissensmanagement als Determinante des Unternehmenswerts, *Zeitschrift für Führung und Organisation*, *71*(6), 334-341.

Butler, R. (1993). Tourism development in small islands: Past influences and future. In D. Lockhart, Drakakis-Smith & J. Schembri (Eds.), *The Development Process in Small Island States* (pp. 71–91). London: Routledge.

Butler, R. (1999). Sustainable tourism – a state of the art review. *Tourism Geographies, 1*(7), 7-25.

Chekalina, T. & Fuchs, M. (2009). An assessment of survey-based brand metrics for destinations. In L. Dioko & L. Xiang (Eds.), 3rd *International Conference on Destination Branding & Marketing* (pp. 130-141). Macau.

Chekalina, T. (2012). *A Value Co-Creation Perspective on the Customer-based Brand Equity Model for Tourism Destinations*. Licentiate Thesis 73. Department of Social Sciences, Mid-Sweden University.

Cho, V. & Leung, P. (2002). Knowledge discovery techniques in database marketing for the tourism industry, *Journal of Quality Assurance in Hospitality & Touri*sm, *3*(3), 109-131.

Choi, H. & Sirakaya, E. (2006). Sustainability indicators for managing community tourism. *Tourism Management, 27*(6), 1274-1289.

Chu, F. L. (2004). Forecasting tourism demand: a cubic polynomial approach. *Tourism Management, 25*(2), 209–218.

Cilliers, P. (1998). *Complexity and Postmodernism: Understanding Complex Systems.* London: Routledge.

Coles, T., Hall, C. M. & Duval, D. T. (2006). Tourism and post-disciplinary enquiry. *Current Issues in Tourism*, *9*(1), 4-5.

Collins, A. (1999). Tourism development and natural capital. *Annals of Tourism Research, 26*(1), 98-109.

Craik, J. (1995). Are there cultural limits to tourism? *Journal of Sustainable Tourism, 3*(2), 87-98.

Daly, H. & Farley, J. (2011). *Ecological Economics*. Washington DC: Island Press.

Dolnicar, S, Crouch, G. & Long, P (2008). Environment-friendly tourists: what do we really know about them? *Journal of Sustainable Tourism, 16*(2), 197-210.

Dolnicar, S. & Leisch, F. (2008). Selective marketing for environmentally sustainable tourism. *Tourism Management, 29*(3), 672-680.

Dwyer, L. & Kim, C. (2003). Destination competitiveness: determinants and indicators. *Current Issues in Tourism Research*, *6*(5), 369-417.

Dwyer, L., Forsyth, P. & Rao, P. (2000). Sectoral analysis of price competitiveness of tourism: An international comparison. *Tourism Analysis, 5*(1), 1–12.

Dymond, S. (1997). Indicators of sustainable tourism in New Zealand: a local government perspective. *Journal of Sustainable Tourism, 5*(4), 279-293.

Farrel, B. & Twining-Ward, L. (2004). Reconceptualizing tourism. *Annals of Tourism Research, 31*(2), 274-295.

Farrell, B. & Twining-Ward, L. (2005). Seven steps towards sustainability: tourism in the context of new knowledge. *Journal of Sustainable Tourism, 31*(2), 109-122.

Farsari, Y. & Prastacos, P. (2001). Sustainable tourism indicators for mediterranean established destinations. *Tourism Today, 1*(2), 103-121.

Farsari, Y., Butler, R. & Prastacos, P. (2007). Sustainable tourism policy for Mediterranean destinations: issues and interrelationships. *International Journal Tourism Policy, 1*(1), 58-78.

Fernandez, J. & Rivero, M. (2009). Measuring tourism sustainability:proposal for a composite index. *Tourism Economics, 15*(2), 277-296.

Fuchs, M. & Höpken, W. (2005). Towards @destination: a data envelopment analysis based decision support framework. In A Frew (ed.), *Information and Communication Technologies in Tourism 2005* (pp. 57-66). New York: Springer.

Fuchs, M. & Höpken, W. (2009): Data mining in tourism (In German: „Data Mining im Tourismus"), *Praxis der Wirtschaftsinformatik*, *270*(12), 73-81.

Fuchs, M. & Höpken, W. (2011). E-Business Horizons in the Tourism Industry. In K. Sidali, A. Spiller & B. Schulze, (eds.), *Food, Agriculture and Tourisms – Linking Local Gastronomy and Rural Tourism* (pp. 140-160). Berlin: Springer.

Fuchs, M. & Weiermair, K. (2004). Destination benchmarking - an indicator-system's potential for exploring guest satisfaction. *Journal of Travel Research*, *42*(3), 212-225.

Fuchs, M. (2004). Strategy development in tourism destinations: a data envelopment analysis approach. *Poznan Economics Revie*w, *4*(1), 52-73.

Fuchs, M., Chekalina, T. & Lexhagen, M. (2011): Destination Brand Equity Modelling and Measurement – A Case from Sweden, In: R. H. Tsiotsou &, R. E. Goldsmith (eds.), *Strategic Marketing in Tourism Services* (pp. 95-116). Emerald.

Fuchs, M., Höpken, W., Föger, A. & Kunz, M. (2010). E-business readiness, intensity, and impact – an Austrian DMO study. *Journal of Travel Research*, *49*(2), 165-178.

Fuchs, M., Peters, M. & Weiermair, K. (2002). Tourism sustainability through destination benchmarking indicator systems - the case of alpine tourism. *Tourism Recreation Research*, *27*(3), 21-33.

Fuchs, M., Scholochow, Ch. & Höpken, W. (2009). e-Business adoption, use and value creation. *Information Technology and Tourism*, *11*(4), 267-284.

Gössling, S. (2009). Carbon neutral destinations: a conceptual analysis. *Journal of Sustainable Tourism, 17*(1), 17-37.

Gössling, S., Hall, C. & Weaver, D. (2009). *Sustainable Tourism Futures: Perspectives on Systems, Restructuring and Innovations.* New York: Routledge.

Gräbner, D., Zanker, M., Fliedl, G. & Fuchs, M. (2012). Classification of customer reviews based on sentiment analysis. In M. Fuchs, F. Ricci & L. Cantoni (eds.), Information and Communication Technologies in Tourism (pp. 460-470). Wien, New York: Springer.

Grant, R.M. (1996). Toward a knowledge-based view of the firm. *Strategic Management Journal*, *17*(2), 109-122.

Gretzel, U. & Fesenmaier, D.R. (2004). Implementing a knowledge-based tourism marketing information system: the Illinois tourism network. *Journal of Information Technology & Tourism*, *6*(2), 245-255.

Hall, C. (2011). Policy learning and policy failure in sustainable tourism governance: from first- and second-order to third-order change? *Journal of Sustainable Tourism, 19*(4-5), 649–671.

Hallin, C. A. & Marnburg, E. (2008). Knowledge management in the hospitality industry: a review of empirical research. *Tourism Management, 29*(2), 366-381.

Hansen, J. (2007). Global Warming, Tipping Point Near. In *4th Assessment Report of the Intergovernmental Panel on Climate Change* (AR4 IPCC). Geneva.

Hardy, A. & Beeton, R. (2001). Sustainable tourism or maintainable tourism: managing resources for more than average outcomes. *Journal of Sustainable Tourism, 9*(3), 168-192.

Hastie, T., Tibshirani, R. & Friedman, J. (2009). The Elements of Statistical Learning – Data Mining, Inference and Prediction (2nd ed.). New York: Springer.

Höpken, W., Fuchs, M. & Lexhagen, M. (2013a). The knowledge destination – applying methods of business intelligence to tourism. In J. Wang (ed.), Encyclopedia of Business Analytics and Optimization (in print). Pennsylvania: IGI Global Publisher.

Höpken, W., Fuchs, M., Höll, G. Keil, D. & Lexhagen, M. (2013b). Multi-dimensional data modelling for a tourism destination Data Warehouse. In L. Cantoni & Ph. Xiang (Eds.), Information and Communication Technologies in Tourism 2013 (in print). New York: Springer.

Höpken, W., Fuchs, M., Keil, D. & Lexhagen, M. (2011). The knowledge destination – a customer information-based destination management information system. In R. Law, M. Fuchs & F. Ricci (Eds.), Information and Communication Technologies in Tourism 2011 (pp. 417-429). New York: Springer.

Hunter, C. (1997). Sustainable tourism as an adaptive paradigm. *Annals of Tourism Research, 24*(4), 850-867.

Ioannides, D. (2001). Sustainable development and the shifting attitudes of tourism stakeholders: toward a dynamic framework. In S. McCool & R. Moisley (Eds.), *Tourism, Recreation and Sustainability: Linking Culture and Environment* (pp. 55-76). Wallingford: CABI.

Jackson, T. (2009). *Prosperity without Growth: Economics for a Finite Planet*. London: Taylor & Francis.

Jafari, J. (2001). The scientification of tourism. In V. Smith & M. Brent (Eds.), *Hosts and Guests Revisited: Tourism Issues of the 21st Century* (pp. 28-41). New York: Cognizant Communication Corporation.

Jafari, J. (2003). *ReVista Winter 2002.* Retrieved August 2012, from Tourisms Landscape of Knowledge: http://www.fas.harvard.edu/~drclas/publications/revista/Tourism/jafari.html.

Johnston, R. & Tyrrell, T. (2005). A dynamic model of sustainable tourism. *Journal of Travel Research, 44*(2), 124-134 .

Jovovich, D. & Ilich, T. (2010). Indicators of Dustainable Tourism. Retrieved September 20, 2012, from Serbian geography union: http://www.sgd.org.rs/publikacije/glasnik/2010_1/16.Jovicic%20D.,%20Ilic%20T.%20e.pdf.

Kasper, W. & Vela, M. (2011). Sentiment analysis for hotel reviews. *Computational Linguistics-Applications Conference* (pp. 45–52). Katowice, Poland, 10/2011.

Kimball, R., Ross, M., Thronthwaite, W., Mundy, J. & Becker, B. (2008). *The Data Warehouse Lifecycle Toolkit* (2nd ed). Indianapolis: Wiley & Sons.

Ko, T. (2005). Development of a tourism sustainability assessment procedure: a conceptual approach. *Tourism Management*, *26*(3), 431-445.

Kooiman, J. (1993). *Modern Governance: New Government-Society Interactions*. London: Sage.

Krippendorf, J. (1986). Tourism in the system of industrial society. *Annals of Tourism Research 13(4)*, 517-532.

Larose, D. T. (2005). *Discovering Knowledge in Data*. New Jersey: John Wiley & Sons.

Law, R. (1998). Room occupancy rate forecasting – A neural network approach. *International Journal of Contemporary Hospitality Management, 10*(6), 234-239.

Levin, S. (1998). Ecosystems and the biosphere as complex adaptive systems. *Ecosystems, 1*(5), 431-436.

Liu, B. (2008). Web Data Mining (2nd ed.). New York: Springer.

Liu, Z. (2003). Sustainable tourism development: a critique. *Journal of Sustainable Tourism, 11*(6), 459-475.

Lu, J. & Nepal, S. (2009). Sustainable tourism research: an analysis of papers published in the Journal of Sustainable Tourism. *Journal of Sustainable Tourism, 17*(1), 5-16.

Lundie, S., Dwyer, L. & Forsyth, P. (2007). Environmental-economic measures of toursime yield. *Journal of Sustainable Tourism, 15*(5), 503-519.

Macbeth, J. (2005). Towards an ethics platform for tourism. *Annals of Tourism Research, 32*(4), 962-984.

Magnini, V., Honeycutt, E. Jr. & Hodge, S. (2003). Data mining for hotel firms: use and limitations. *Cornell Hotel and Restaurant Administration Quarterly, 44*(Dec.), 94-105.

Max-Neef, M. (1995) Economic growth and quality of life: a threshold hypothesis. *Ecological Economics, 15*(1), 115-118.

Maxton, G. (2011) *The End of Progress, How Modern Economics Has Failed Us*. London: Wiley & Sons.

McDonald, J. (2009). Complexity science: an alternative world view for understanding sustainable tourism development. *Journal of Sustainable Tourism, 17*(4), 455-471.

McDonough, W. & Braungart, M. (2002). *Cradle to Cradle. Remaking the Way We Make Things*. Toronto: Douglas & McIntyre.

McGrath, M. (2006). System archetypes as a learning aid within a tourism business planning software tool. Proceedings of the 20th ANZAM (Australian New Zealand Academy of Management) *Conference on "Management: Pragmatism, Philosophy, Priorities"*, 6-9 December 2006.

McKercher, B. (1999). A chaos approach to tourism. *Tourism Management, 20*(4), *20*, 425–434.

Miller, G. (2001). The development of indicators for sustainable tourism: results of a Delphi survey of tourism researchers. *Tourism Management, 22*(4), 351-362.

Miller, G. & Twining-Ward, L. (2005). *Monitoring for a Sustainable Tourism Transition: The Challenge of Developing and Using Indicators.* Wallingford: CABI Publishing.

Min, H., Min., H. & Emam, A (2002). A data mining approach to develop the profile of hotel customers. *International Journal of Contemporary Hospitality Management*, *14*(6), 274-285.

Morales, D. R. & Wang, J. (2008). Passenger name record data mining based cancellation forecasting for revenue management. *Innovative Applications of O.R.*, *202*(2), 554–562.

Moscardo, G. (2007). There's no such thing as sustainable tourism: innovation through challenging assumptions. *Inovations for sustainable tourismor Sustainable Tourism* (pp. 138-147). Flagstaff: BEST EN VI Think Tank.

Mowforth, M. & Munt, I. (2003). *Tourism and Sustainability: Development and New Tourism in the Third World.* New York: Routledge.

Murphy, P. & Price, G. (1998). Tourism and sustainable Development. In T. Theobald (ed.), *Global Tourism* (pp. 167-189). Oxford: Butterworth-Heinemann.

Nepal, S. (2008). Tourism-induced rural energy consumption in the Annapurna region of Nepal. *Tourism Management*, *29*(1), 89-100.

Nordin, S. & Svensson, B. (2007). Innovative destination governance. The Swedish ski resort Åre. *Entrepreneurship and Innovation, 8*(1), 53-66.

Olmeda, I. & Sheldon, P.J. (2002). Data mining techniques and applications for tourism internet marketing. *Journal of Travel & Tourism Marketing*, *11*(2/3), 1-20

Pallante, M. (2005). *La Decresita Felice. La Qualitá della Vita non dipende dal PIL*. Rome: Editori Riuniti.

Pechlaner, H., Smeral, E. & Matzler, K. (2002). Customer value management as a determinant of the competitive position of tourism destinations. *Tourism Review, 57*(4), 15-22.

Pitman, A., Zanker, M., Fuchs, M. & Lexhagen, M. (2010). Web usage mining in tourism – a query term analysis and clustering approach. In U. Gretzel, R. Law & M. Fuchs (Eds.), Information and Communication Technologies in Tourism 2010 (pp. 393-403). New York: Springer.

Pyo, S. (2005). Knowledge map for tourist destinations. *Tourism Management, 26*(4), 583-594.

Pyo, S., Uysal, M. & Chang, H. (2002). Knowledge discovery in databases for tourist destinations. *Journal of Travel Research*, *40*(4), 396-403.

Randers, J. (2012). *2052 - A Global Forecast for the Next Forty Years*. Vermont: Chelsea Publishing, White River Junction.

Razumova, M., Rey-Maquieira, J. & Lozano, J. (2009). Is environmental regulation harmful for competitiveness? The applicability of the Porter hypothesis to tourism. *Tourism Analysis, 14*(3), 387-400.

Reed, M., Fraser, E. & Dougill, A. (2006). An adaptive learning process for developing and applying sustainability indicators with local communities. *Ecological Economics, 59*(4), 406-418.

Reinsberg, C. & Vinje, L.-T. (2010). *Characterizing environment friendly tourists*. Master Thesis. University of Stavanger: The Norwegian school of Hotel Management.

Rhodes R. A. W. (1997). *Understanding Governance: Policy Networks, Governance, Reflexivity and Accountability*. Philadelphia: Open University Press.

Ritchie, R. J. B. & Ritchie J. R. B. (2002). A framework for an industry supported destination marketing information system. *Tourism Management*, *23*(2), 439-454.

Roberts, S. (2004). Sustainability contributions: An exploratory analysis of the small tourism enterprise in Tobago. *Unpublished manuscrpit, Brunel University*.

Roberts, S. & Tribe, J. (2008). Sustainability indicators for small tourism enterprises – an exploratory perspective. *Journal of Sustainable Tourism, 16*(5), 575-594.

Russell, R. & Faulkner, B. (2004). Entrepreneurship, chaos and the tourism area lifecycle. *Annals of Tourism Research, 31*(3), 556-579.

Sambamurthy, V. & Subramani, M. (2005). Information technologies and knowledge management. *Management Information Systems Quarterly, 29*(1), 1-7.

Sausmarez, N. (2007). Crisis management, tourism and sustainability: the role of indicators. *Journal of Sustainable Tourism, 15*(6), 700-714.

Scharpf, F.W. (1997). *Games Real Actors Could Play: Actor-Centered Institutionalism in Policy Research*. Boulder: Westview Press.

Scherhorn, G. (2011). Die Politik entkam der Wachstumsfall. Ein Bericht aus dem Jahr 2050. In H. Welzer & K. Wiegandt (Eds.), *Perpsektiven einer nachhaltigen Entwicklung – Forum für Verantworung* (pp. 64-102). Frankfurt am Main: Fischer Verlag.

Schianetz, K. & Kavanagh, L. (2008). Sustainability indicators for tourism destinations: A complex adaptive systems approach using systemic indicator systems. *Journal of Sustainable Tourism, 16*(6), 601-628.

Schianetz, K., Kavanagh, L. & Lockington, D. (2007a). The learning tourism destination: the potential of a learning organization approach for improving the sustainability of tourism destinations. *Tourism Management*, *28*(3), 1485-1496.

Schianetz, K., Kavanagh, L. & Lockington, D. (2007b). Concepts and tools for comprehensive sustainability assessments for tourism destinations: a comparative reviewe. *Journal of Sustainable Tourism, 15*(4), 369-389.

Sharpley, R. (2010). *The Myth of Sustainable Tourism.* Retrieved 08 11, 2012, from In CSD Working Papers Series *4:* 1-14 2009/2010: http://www.uclan.ac.uk/schools/built_natural_environment/research/csd/files/CSD_Working_Paper_4_Sustainable_Tourism_Sharpley.pdf

Shaw, G. & Williams, A. (2009). Knowledge transfer and management in tourism organisations. *Tourism Management*, *30*(3), 325-335.

Sirakaya, E., Jamal, T. & Choi, H. (2001). Developing indicators for destination sustainability. In D. Weaver, *The Encyclopaediaof Ecotourism*. Oxford: CABI International.

Smith, M. & Duffy, R. (2003). *The Ethics of Tourism Development*. London: Routledge.

Song, H., Veen, R., Gang, L. & Cheng, J. (2012). The Hong Kong tourist satisfaction index. *Annals of Tourism Research, 39*(1), 459–479.

Stabler, M., Papatheodorou, A. & Sinclair, M. Th. (2010). *The Economics of Tourism* (2nd ed). New York: Routledge.

Stiglitz, J., Sen, A. & Fitoussi, J. P. (2009). *Report by the Commission on the Measurement of Economic Performance and Social Progress*. Retrieved from http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf.

Swarbrooke, J. (1999). *Sustainable Tourism Management*. Wallingford: CABI.

Tajeddini, K. (2010). Effect of customer and entrepreneurial orientation on innovativeness: evidence from the hotel industry in Switzerland. *Tourism Management, 31*, 221-231.

Teece, D.J., Pisano, G. & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509-533.

Telfer, D. & Sharpley, R. (2008). *Tourism and Development in the Developing World.* London: Routledge.

Thierstein, A. & Walser, M. (2000). *The Sustainable Region: A Model for Action.* Berne; Stuttgart; Vienna: Series of works published by the Institute for Public Services and Tourism Contributions to the Regional Economy, 1.

Trainer, T. (2006). *Renewable Energy can not Sustain a Consumer Society*. New York: Springer.

Twining-Ward, L. & Butler, R. (2002). Implementing STD on a small island: development and use of sustainable tourism development'indicators in Samoa. *Journal of Sustainable Tourism, 10*(5), 363-387.

Tyrrell, T. & Johnston, R. (2008). Tourism sustainability, resiliency and dynamics: towards a more comprehensive perspective. *Tourism and Hospitality Research, 8*(1), 14–24.

UNWTO. (2004). *Indicators of Sustainable Development for Tourism Destinations: a Guidebook*. Madrid: World Tourism Organization.

UNWTO. (2008). *Tourism Highlights 2008 Edition*. Retrieved 07 10, 2012, from (Facts & Figures Section): www.unwto.org

Urry, J. (2000). *Sociology Beyond Societies: Mobilities for the 21st Century*. London: Routledge.

Vereczi, G. (2004). Indicators to mesure sustainable tourism. *7th International Forum on Tourism Statistics.* Stockholm: WTO.

Visser, W. (2011). *The Age of Responsibility: CSR 2.0 and the New DNA of Business*. London: Wiley & Sons.

Vlahogianni, E. I. & Karlaftis, M. G. (2010). Advanced computational approaches for predicting tourist arrivals. In T. Evans (ed.), *Nonlinear Dynamics* (pp. 309-324). Vienna: InTech.

Walder, B., Weiermair, K. & Sancho Pérez, A. (2006). *Innovation and Product Development in Tourism. Creating Sustainable Competitive Advantage*. Berlin: Erich Schmidt Verlag.

Wall, G. (1997). Is ecotourism sustainable? *Environmental Management, 21*(4), 483-491.

Wang, Y. & Russo, S. M. (2007). Conceptualizing and evaluating the functions of destination marketing systems. *Journal of Vacation Marketing*, *13*(3), 187-203.

Weaver, D. (2006). Sustainable Tourism: Theory and Practice, Chapter 1. In S. Wahab & J. Pigram (Eds.), *Tourism, Development and Growth: The Challenge of Sustainability.* Routledge.

Weaver, D. & Lawton, L. (1999). *Sustainable Tourism: A Critical Analysis.* Gold Coast: CRC for Sustainable Tourism.

Weaver, D. & Oppermann, M. (2000). *Tourism Management.* Sydney: Wiley.

Weiermair, K. & Fuchs, M. (1998). On the use and usefulness of economics in tourism: a critical survey. *International Journal of Development Planning Literature*, *13*(3), 255-273.

Weiermair, K. & Fuchs, M. (2007). Productivity differentials across tourist destinations - a theoretical / empirical analysis. In P. Keller & Th. Bieger (Eds.), *Productivity in Tourism - Fundamentals and Concepts for Achieving Growth and Competitiveness* (pp. 41-54). Berlin: Erich Schmidt Verlag.

Wöber, K. W. (1998). Global statistical sources- TourMIS: an adaptive distributed marketing information system for strategic decision support in national, regional or city tourist offices. *Pacific Tourism Review*, *2*(3), 273-286.

Xing, Y. & Dangerfield, B. (2010). Modelling the sustainability of mass tourism in island tourist economies. *Journal of the Operational Research Society*, *62*(4), 1742-1752.

Zanker, M., Fuchs, M., Seebacher, A., Jessenitschnig, M. & Stromberger, M. (2009). An automated approach for deriving semantic annotations of tourism products based on geo-spatial information. In W. Höpken, U. Gretzel & R. Law (Eds.), *Information and Communication Technologies in Tourism 2009* (pp. 211-221). New York: Springer.

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