

## Location-based Services as a Tool for Developing Tourism in Marginal Regions

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**Abstract:** Tourism is a key business sector for many geographically and economically marginal regions. The main form of tourism in these regions is nature-related tourism, consisting of activities such as hiking, fishing and various types of winter sports. The tourism resorts in marginal regions face the constant challenge of improving their tourist product to retain their position in the market while attempting to conserve the natural environment. In addition to the quest for pure excitement and adventure, the tourists of today expect better accessibility to information, services and nature. In response to this demand, a more widespread use of new information communication technologies, including mobile location-based services (LBS), is proposed in this paper. LBS have already been introduced to the tourism market, but mostly in urban areas. Adverse field conditions, inadequate availability of relevant data sources and high development costs are among the most common obstacles to the adoption of LBS in marginal regions. However, we conclude that LBS have the potential to add significant value to local tourism products and even create new business activities.

### Introduction

Tourism differs from most other fields of business in the sense that it can be carried on in geographically and economically marginal regions. This is especially true of Finland and other Nordic countries, where the economic and political significance of tourism for regional development has increased considerably in recent years, to the extent that in some regions it has become a crucial economic policy factor. In these regions tourism essentially forms the main business on which other business sectors

depend. The tourism industry is commonly looked on as having a favourable impact on economic and social development, introducing new, external sources of monetary income and opportunities to work in the regional economy and its operational cycle. For this reason, large public and private investments are being targeted nowadays at the development of tourism in the various regions of Finland (Butler & al. 1998; Saarinen 2003).

In the most marginalized regions in Finland, the natural environment, tranquillity and unique culture are considered to be among the most important tourist attractions,

which offer the possibility for leisure-time activities such as hiking and fishing, and winter sports such as skiing and snowmobile safaris. As tourism is a demand-driven industry, tourism destinations have to constantly develop and improve their services in order to provide value to the tourist and retain the competitive advantage over other destinations. In nature areas, however, this involves a trade-off between more efficient use and access to the environment and the conservation of its natural condition and attractiveness. On the one hand, tourism consumes landscape, while on the other hand, it needs unspoilt nature to preserve its attractiveness (IFN Bulletin 2001).

As one of the possible tools to address the problem of the trade-off, the more widespread utilization of new information communication technologies has been proposed. The rapidly evolving technologies, especially mobile technologies with positioning capability, facilitate the development of new applications and services for travellers. They are expected to provide a means to respond to some of the emerging trends concerning nature tourism to marginal regions, such as the demand for better access to information and services, the need for improved guidance and safety, and generally increased environmental awareness of the tourists (Aichholzer & al. 2003).

This article is organized as follows. The first section covers some of the basic aspects pertaining to mobile location-based services and tourism. This is followed by the introduction of a research project that aims to study the topic presented in this paper, as well as a short and non-comprehensive review of related research efforts under way. The next two sections deal with different business models and implementation

challenges with the emphasis on technological constraints. Finally, the possible implications of location-based services on tourism and regional development are discussed in the concluding section.

## **Location-based services for tourism**

The widely adopted term location-based services (LBS) refers to information services that are accessible through a mobile handset and based on the current geographic location of the mobile device. The geographic location of the device is determined by using a separate positioning service, nowadays most commonly involving the use of the satellite-based Global Positioning System (GPS). The conventional application areas of LBS include mapping, tracking, routing and logistics, electronic yellow pages, data collection and public safety (Beaulieu & Cooper 2001; Maguire 2001; Veijalainen & al. 2001; Zipf & Malaka 2001). The common denominator of these applications is the use of a positioning capability as a value-adding factor.

The mobile technology is maturing and spreading and nowadays such enabling technology is widely available. New mobile terminals are enhanced with multimedia capabilities, faster data transfer, cameras, GPS, wireless links, etc., and their share of the market is increasing rapidly. Despite the popularization of the technology, it is not yet being efficiently utilized, and the related business models are in their early stages. However, tourism is among the first industry taking advantage of LBS. The main reason for this is that tourism can intrinsically benefit from the use of mobile technology, that

provides new services to travellers on the move. In fact, the supply of mobile services with specific relevance to the traveller has been developed rather well. The primary functions of LBS for tourism are usually regarded as being the localization of persons, objects, and places, routing between them, search for objects in proximity such as restaurants, shops, hotels, or points of interest, and information about travelling conditions, such as traffic-related data. Currently, mobile services facilitate the reservation of last-minute trips, rental cars, and hotels; and they provide information about changes and delays of flights and trains, offer guides on restaurants, events, and sightseeing opportunities at the destination (Eriksson 2002; Berger & al. 2003).

Most LBS for tourism have been designed for use in urban settings or along a road network with the purpose of making routing easier in built-up areas, and improving access to different services, such as restaurants, pharmacies, museums, banks or ATMs. The special requirements of services used in nature areas - without a proper road infrastructure and other basic facilities - make it difficult to duplicate the existing service concepts in these areas.

Due to the fact that virtually all tourists travelling to destinations in marginal regions are mainly seeking adventure and excitement provided by nature, the main focus of services supporting this purpose is to enable better accessibility to nature, which denotes guidance, delivery of up-to-date information about the surrounding environment, and safety related services, such as the ability to send emergency messages with accurate position information. In addition to these three aspects, tourism destinations have to face the increasing challenges of sustainable tourism, which not only pertain to the

sustainable use of the environment but also to the increased environmental awareness among the tourists. LBS can be considered a novel way of responding to the increased demand for real-time information about the environment. Another possibility for LBS is as a steering tool to protect delicate areas, which checks the volume of visitors and their movement in the area (Dias & al. 2004a). For example, LBS applications can be used to direct tourists away from the most vulnerable areas.

### **The MINNE project**

In an effort to study the integration of technologies to promote new ways of developing sustainable tourism in peripheral areas, the multidisciplinary project “Mobile Environmental Information Systems and Services” (MINNE) was launched in 2002 as a collaboration between researchers from different backgrounds. The general objective of MINNE is to study and develop technologies, methods, models and business solutions for information management utilizing mobile internet technologies. The application domain is mobile sustainable travel and related environmental services. In MINNE, the application domain is approached from the viewpoint of multi-channel adaptive service provisioning and mobile data collection (Antikainen & al. 2004).

The research includes general-level topics such as positioning and location-based information utilization, community services, mobile learning, environmental measurement and sensors, management of information in multi-channel settings and mobile data collection, management and distribution in

vehicles and transportation. In the initial phase of the project, the emphasis has been on reviewing, analyzing and evaluating the technological and business possibilities of LBS applications. In a later stage, the main focus of the project will be to develop a generic location-aware environmental information service for use on a smart phone. This service is designed for implementation mainly in botanical gardens, natural parks and other nature tourism destinations.

### Tourism industry partners

The project is being carried out in collaboration with some of the most important regional tourist resorts. The resorts represent a set of different types of tourist areas and destinations with different needs and requirements regarding the possible implementation of LBS (Figure 1, Table 1). The research project serves as a framework for investigating the specific type of needs, requirements and feasibility of implementing LBS at each of the resorts, as well as for research into relevant business models and availability and applicability of different types of technologies.

Currently the most active study resort is the Rokua tourism area consisting of a formation of scenically unique eskers, originally moulded during the Ice Age. However, the unique natural environment, mostly comprised of barren forest types, cannot support large numbers of tourists and still remain attractive and in its natural state. The lichen heaths found in the area become damaged easily, exposing the fine-grained esker sand beneath (Hynönen 2004). The need to protect the physical environment

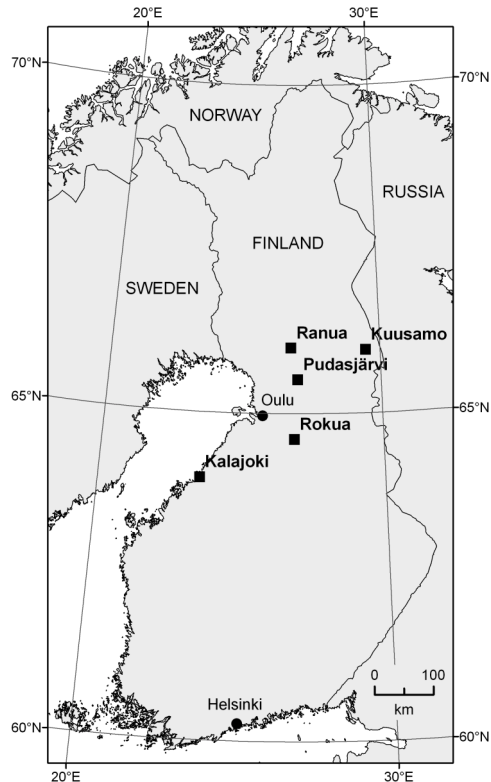


Figure 1. The location of the collaborative tourism resorts.

in the face of a large number of tourists visiting the area, leads to the assessment of new ways of using the route data along with other environmental data in location-based mobile applications that can ensure a more sustainable use of the environment for recreational purposes.

With regard to the potential benefits that LBS may have to offer to tourism services and sustainable tourism, the Rokua tourism area is a case in point. In spite of the current focus on Rokua, however, a goal of the project is to construct general models and concepts for the implementation of LBS in different tourist resorts in Northern Finland.

Table 1. The collaborative tourism resorts and their expected potential for LBS, as classified to four categories: information, guidance, safety and services contributing to environmental protection.

Name	Type	High season	Information	Guidance	Safety	Environmental protection
Kalajoki	coastal resort, large beach	summer	moderate	high	low	low
Kuusamo	downhill skiing center, national park	winter	high	very high	very high	high
Pudasjärvi	downhill skiing center, national park	winter	high	high	high	moderate
Ranua	zoo	summer	very high	moderate	low	low
Rokua	rehabilitation center, unique landscape area	summer	moderate	very high	high	very high

This is possible because, to a large extent, the resorts do not compete for the same segment of the tourism market.

## Related projects

Some related research projects aimed at developing LBS for tourism in peripheral natural areas, are or have been in progress. Among the best examples are the Hypergeo and the WebPark projects (Mountain & Raper 2000, 2001), funded by the EU 5<sup>th</sup> Framework Programme Information Society Technologies (IST), which study the potential of location-based services in tourism and professional use. The Hypergeo established expertise in tourism-related use and the expertise is now being utilized in the current WebPark project. The

WebPark project (Mountain & al. 2003; Dias & al. 2004b) is developing personalized, location-aware and timely access to national parks' information systems for mobile devices. They both share many characteristics with the ReGeo project, which aims at developing a decentralized tourist information system based on multimedia and geodata. Test areas include national parks in Austria and the Czech Republic, a landscape park in central Poland, and a nature park in Germany (Almer & al. 2002).

In Finnish Lapland, the Aurora Borealis Testing Lab Programme is studying the integration of new technologies as part of the regional tourism expertise. The focus of testing is on the applications' functionality, usability, and revenue-generation model. The mobile testing programme is the first testing that operates in genuine conditions using real users and concentrating on tourism

and experience services. The applications include a service that helps tourists to traverse the countryside along the chosen route, an application package that comprises of a real-time monitoring system of vehicles based on positioning technology and its application for snowmobiles increasing safety and customer satisfaction, and the "Pocket Resort" service offering ski resort visitors a mobile service using current information on the resort's services, events and weather, as well as providing guidance services using location technology maps (A World First... 2003).

In addition to the aforementioned projects, several tourism-related research projects have been launched particularly in the member countries of the European Union with a special emphasis on utilizing the potential of mobile location-based services in the development of tourist industry. In most cases the services are designed for urban settings (Blechschiemied & al. 2003; Schmidt-Belz & al. 2003), but there are some projects that seek to use LBS in promoting tourism especially in rural and mountainous areas, including the projects like PARAMOUNT (Löhnert & al. 2001), CRUMPET (Poslad & al. 2001), and TourServ (Schmidt 2001). With the increasing importance of tourism for regional development, the number of projects studying the development of technology and integration of different data sources in tourism is likely to continue growing in the future.

## **Business models**

Due to the failure of mobile services to meet the expectations that many business

analysts had of the growth and revenue potential of the telecommunications industry at the turn of the decade, business models pertaining to LBS have been under critical scrutiny. Several approaches to business models for mobile applications and tourism have been assessed in detail (Andersen 2002; Berger & al. 2003; Pääjärvi 2004), and will not be covered here. There are, however, some characteristics that distinguish LBS from regular mobile services. First of all, one of the characteristics of LBS is that its value chain is extremely complicated as it involves a large number of stakeholders. These include network operators, mobile device manufacturers, positioning technology providers, service providers and developers, and consumers (Andersen 2002; Nokia 2004). In the case of a tourism resort operating in a marginal region, the complicated value chain inevitably forms a substantial threshold to investing in LBS, as no actor alone is able to create an end-to-end solution (Pääjärvi 2004).

Even more importantly, while regular mobile services for tourism serve mostly as an additional channel for information dissemination and thereby conform to already well-established business models, location-based applications represent a new and innovative type of service, that require careful consideration by the tourism industry with regard to expectations concerning the earning logic and revenue-generation (Eriksson 2003).

As with any new enabling technology or application area, the actual benefits yielded by it may easily be exaggerated and subject to misconceptions, which may lead to the formulation of unfeasible business models. LBS are no exception to this (Rao & Minakakis 2004). From a practical point of view, the uncertainty as to what kind of



services the consumers really want to use, and what they are ready to pay for, are some of the most challenging factors for business model assessment. Some studies concerning the user preferences of LBS specific relevance to tourism have been conducted in the past few years. According to the results, people generally prefer simple and non-intrusive services, where the user maintains control over the information content. Among the most important features are basic services, like maps for orientation purposes, security-related information, and transport information while on the move. This is quite obvious, as the benefits of LBS are most apparent in the transport phase and at the destination, when the traveller may no longer be able to rely on the information he or she has gathered in the planning phase of the trip (Edwardes & al. 2003; Krug & al. 2003; Schmidt-Belz & al. 2003).

Considering that most of the conventional services on the internet are free, it is fairly difficult to justify the potentially high and unpredictable pricing of many LBS for tourism. Although the results of some user surveys indicate that consumers are willing to pay for mobile services, either by pay per use or subscription modes, in most cases it is not feasible to expect the services to generate enough direct cash flow to recoup all the development and maintenance costs, even in the long term. Consequently, LBS should be considered a way to provide added value to the tourism product as a whole. In this respect, the main task is to ensure that the services are developed in a way that they provide true utility to the user, i.e. the value of the service should be higher than the effort made to use the service. A well-designed package of services providing

improved access to tourism services, more in-depth information provision and interaction with the environment, and safety, is bound to enhance customer satisfaction and increase demand and use of other tourism services in the region.

## Implementation challenges

The successful implementation of LBS must be able to overcome some key challenges, which include the provision of useful and revenue-generating services, smooth integration with different technological systems and high value of data (Kivera 2002). While the new technologies promise benefits and added value, they also raise challenges concerning usability, accessibility over different devices, trustworthiness and interactivity (Werthner & Ricci 2004). Additional challenges relate to the collection and usage of location information, physical quality of devices and the overall market situation.

## Technological development

The enabling technology has been evolving rapidly, however this has led to application development from a technology-centric perspective driven by the vendors of technical equipment (Eriksson 2002). Due to the rapid progress in technology the development of common standards has tended to lag behind. As a result, the wide variety of mobile handsets, operating systems, data formats, and limitations in user interfaces, for example, makes it difficult to

create generic LBS that could run on any device and be seamlessly connected to the data sources of different providers.

### **Positioning technology**

Although positioning technology involves a smaller number of confusing alternatives than the other technological components of LBS, positioning can in many cases become a constraining factor. The two main options for receiving location information on a mobile device are the satellite-based GPS and positioning based on the mobile network (provided that the device is connected to a mobile network). They have pros and cons and to date there has been no clear indication by the mobile industry as to which technology is preferable for LBS. While GPS enables fairly accurate positioning everywhere in the world, it requires the use of a separate receiver device and does not work indoors or in places where the sky view is obstructed by tall buildings, mountains or dense vegetation. Network-based methods, in turn, require no external devices and thereby a positioning service is readily available to all the devices connected to the network. This positioning method, however, is very imprecise which makes it unsuitable for services requiring location information with an accuracy of at least tens of meters.

### **Devices fit for field use**

Besides adequate technical performance, devices intended to be used for LBS in nature resorts, have to be strong enough to

stand substantial variation in temperature, moisture, drop-shocks, vibration, and dust. In addition to these, battery capacity and the luminous intensity of the display affects the usability of mobile handsets in field conditions. Reliability is an important factor especially in areas where the availability of safety-related services have a central role in facilitating more casual wandering in nature. In the current situation, though, most of the mobile devices aimed for the consumer market are not rugged enough to withstand the rough field conditions.

### **Data sources**

The availability of relevant data may vary significantly between different resorts. In the context of LBS for nature tourism, relevant data can be considered as referring basically to up-to-date data about routes (both roads and walking paths), topographic data, information about the most essential tourist services in the area as well as information about various points of interest. Although route and geographic information is usually provided by public organizations, data related to services and sights are generally privately owned and subject to confidentiality restrictions. Furthermore, data usually comes in a variety of different and proprietary formats, which leads to incompatibility problems. Integrating different data sources into a single interface and service is probably one of the most challenging tasks in the development of LBS for any field of industry, and often requires tailor-made data integration instead of the utilization of generic LBS platforms.



### Privacy and security

Privacy and security concerns are issues often raised in conjunction with LBS. The current regulations concerning the use of personal positioning information are often considered incomplete and confusing. In terms of personal privacy, much depends on the actual delivery mode of the services, i.e. whether the services are activated by the user (“pull mode”) or triggered without a specific request for the services (“push mode”) (Easton 2002; Hjelm 2002). Another aspect of privacy and security issues concerns different corporate and organizational data sources that can become exposed to new security risks if incorporated into an LBS system.

### Market volume

One of the biggest challenges for developing LBS and adopting them in practice in marginal tourist resorts is the limited volume of the market. LBS are complex systems that require a relatively large investment on product development, data integration and technical infrastructure. With limited revenue prospects, it is difficult to attract big business to invest in LBS for regional tourism industry. For this reason, the development of LBS for tourism in marginalized areas hinges considerably on local efforts and risk investments.

### Conclusions: Expected impact on tourism and regional economy

Location-based services are undoubtedly becoming an increasingly important area of interest for different industrial and organizational sectors. The tourism industry is among the first to seek benefits provided by LBS. By providing an ability to navigate more easily and safely in an unfamiliar environment and to look for services and sights of interest, LBS have indeed already proved their potential for providing added value to tourism.

Regardless of the fact that most of the implementations of LBS in tourism to date have been in urban areas, LBS have a significant potential for marginal regions as well. In fact, it is in these regions that the true added value of mobility can be realized. As described earlier in this paper, the significance of LBS for tourism in marginal regions is at least three-fold. Firstly, LBS can be utilized to improve accessibility, information and service provision, and safety, which in itself benefits both the tourists and the tourism resort. Secondly, LBS can be considered as a tool for steering the movement and behaviour of tourists in such a way that the balance between the use of natural environment and its protection is optimized. This is also relevant to the general understanding of the need for more sustainable tourism in terms of both environmental and social aspects. Thirdly, while the content development for LBS for tourism is to a large extent dependent on local activity and investments, the development of LBS may actually help

create information intensive jobs in the marginal regions.

The main challenges, however, lie in the usability and reliability of the technology, database interoperability, and the willingness of the tourism industry to invest in a business whose direct revenue potential remains uncertain. The technological challenges are mainly attributable to the rapid and uncoordinated development of mobile handsets and data transfer technologies which have somewhat overshadowed the importance of quality content for mobile services. However, the advances in the technological performance of mobile handsets are an essential enabling factor for LBS.

A more serious problem relates to the availability, interoperability and quality of tourism-related data sources. This essentially calls for the need for agreement on copyright and quality standard issues of data and, particularly, the adoption of common data exchange formats. Due to the numerous efforts needed to define common standards for LBS, the situation is likely to improve significantly in the near future.

Finally, the fact that mobile services in general seldom produce revenue - at least from the content provider's point of view - investing in LBS requires a strong commitment and ability to perceive the value adding role of LBS in the tourism business. On the other hand, a tourism product which embraces the benefits of new technology can be expected to bring opportunities to tourism resorts operating in marginal regions so as to gain a crucial competitive advantage over those resorts sticking only to the core business. LBS should not be expected to provide enough direct cash flow to compensate for all of the implementation costs, but should be

seen as a value-adding part of the tourism product, with the added advantage of promoting safe and sustainable tourism.

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