Turun yliopisto
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LOCATION-BASED MARKETING: CONCEPTS, TECHNOLOGIES AND SERVICES

Master´s Thesis
in Information Systems Science

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Table of contents

List of figures

List of tables

List of abbreviations

BTS	Base Transceiver Station
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
LBS	Location-based Services
LBA	Location-based Advertising
LBSN	Location-based Social Networks
LBG	Location-based Games
MLBC	Mobile Location-based Couponing
MLP	Mobile Location Protocol
Open LS	Open Location Standard
WPS	Wireless Positioning System

1   INTRODUCTION

1.1   Background

Many of us have received irritating messages in the wrong time and place on our mobile phones when we were not expecting them. Majority of these advertisements we receive might be completely irrelevant to our current preferences and needs. Location-based marketing techniques use the current spatiotemporal context of the receiver to overcome this drawback. Location-based marketing is a two-way channel, in one side customers seeking most relevant marketing information and promotions on the other side, companies are seeking ways to provide highly customized marketing experience to their customers. They need considerable amount of information about their customers such as their spatiotemporal context, preferences, social profile, search histories and demographics.

Location-based marketing can be viewed as a set of services that are utilizing advancements in modern positioning technologies and smartphones to deliver geographically tailored, context-aware relevant marketing messages to customers. Smartphones are equipped with state of the art hardware and software. Thanks to advancements in positioning technologies along with unique business models of smartphones, they are able to track and deliver user's location information in real time. Customers place reliance on their mobile devices as a valuable source of information. According to research conducted by PEW research center, 74 per cent of adult smartphone users get some information about their current location (PEW Research Center 2014).

According to BIA/Kelsey forecast, spending on mobile location-based marketing will reach $ 10.8 billion which express 52 per cent of all mobile advertisement spending (BIA/Kelsey 2013). Location-based marketing realm comprise many different innovative services and techniques varying from a simple text message sent to customers passing by a store to more complex applications running on smartphones such as location-based social networks, local search applications and location-based shopper applications that are used for indoor marketing strategies. Location-based social networks motivate people to "consumption of places" by providing other users tips and recommendations (Tussyadiah 2012). Location-based games are employed to enhance brand awareness, and customers are asked to do certain tasks. These tasks will lead to venue selection, interaction and communication.

Customers are exposed to these varieties of services according to their current context. Customers who are passing by a department store will receive offers that motivate them to go inside. As soon as they walk inside, indoor marketing services are in place to enhance their in-store experience. In this master thesis, we explain how location-based marketing transforms according to context of the user to provide most suitable marketing messages to the right persons at the right time.

1.2   Research Methods

Main research question in this master's thesis centers on:

"What services, technologies and products are available for companies to do location-based marketing."

Location-based marketing techniques can create extensive value by delivering marketing messages to targeted ready-to-purchase customers. Ecosystem of location-based marketing is changing very fast, and new services and technologies are introduced to the market continuously. Research in location-based marketing is still in early stage and under investigation. Many of research works conducted so far focus on a particular aspect of location-based marketing such as a particular service or technology, this makes the location-based marketing landscape to look incomprehensible and confusing. There is a gap for academic research that puts all these incoherent pieces together to deliver a complete comprehensible picture of location-based marketing realm.

As an exploratory research that suits studying the novel phenomena such as location-based marketing, this master's thesis intends to gain a familiarity with this new phenomenon and create the groundwork for future research. The main objective of this research is to arrange different location-based technologies in some categories according to shared characteristics.

Although the industry has introduced many location-based marketing technologies and services, they have strong roots in prior academic research works. Both academic and non-academic literature have been reviewed, and academic roots of today's innovative services have been identified to some extent. Underlying academic research has been supported by state of the art equivalent examples from industry.

This master's thesis has an exploratory nature as location-based marketing is a new phenomenon and is in very early phase of extension. Academic knowledge about location-based marketing is very scarce and fragmented. Exploratory research is a research used for phenomena that are not clearly investigated. Exploratory research happens before being able to create a conceptual framework or demonstrate an explanatory relationship clearly. It suits when the objective of the research is obtaining understanding or new insights of a new concept (Shields and Rangarajan 2013). Fisher (2007) argues that semi-structured research tools need to be pursued in exploratory researches where researchers are not sure what they will discover.

In this research, literature review is used for two purposes. First, the literature review has been employed to create a background knowledge for location-based marketing that presents previous research works and underlying concepts such as location-based services, positioning technologies, and context. Second, literature review has been used as a research methodology where it is used as the population for data collection and analysis. We need to differentiate between literature review usage in the research process and as a research methodology (Hart 2001).

The aim of this research is to provide a comprehensive overview of different types of location-based marketing phenomenon with a literature review. This extensive overview of the current state

of location-based marketing will lead to classification of different types of location-based marketing. This categorization as the main outcome of the thesis can be used as a mean to increase understanding of LBM and improve current knowledge on location-based marketing services, technologies, and infrastructures.

To provide the most extensive overview as possible, various sources were employed. We started by conducting a literature review from various sources such as books, academic journals, conference papers and commercial websites. This process resulted in the identification of general characteristics of location-based marketing and its background technologies and services. Afterwards, we proceeded by analyzing what we have found in the literature review.

Several databases were used for finding the related publications such as EBSC host, Proquest, Google Scholar and University of Turku library database. The term "location-based marketing" results in only 812 publications which present how scarce academic publications in this field are. Keywords were not limited to location-based marketing, and other keywords such as mobile marketing, location marketing, social networks and location-based services were used as well. Many of the achieved documents were not useful, because they did not argue any location-based marketing methods. On the other hand, Internet resources such as marketing campaigns and available use cases were used to support the findings from the literature.

Location-based marketing methods differ in several ways such as the content of marketing messages sent to users, the spatiotemporal context of the audience, underlying positioning system and the overall purpose of marketing initiatives. These four factors were used as differentiating factors to classify marketing methods that share similar characteristics. For instance location-based games in many cases are used to lead the customer to business locations, and location-based social networks enable users to read the contents created by other users. Indoor marketing initiates tend to target customers which are inside the shop while proximity marketing initiates motivate people to put step inside the shop.

Location-based marketing landscape was classified to seven different categories. Although marketing initiates that fall under each category share many characteristics, at the upper level each category is mainly employed to convey different marketing messages and target different audiences.

In chapter 7 we take a look at LBS services and products are offered by Finnish SMEs. We have investigated 16 Finnish SMEs' products and services offered by these companies have been identified and explained concisely. The main source of data collection was companies' websites, in case there was no information about the products and services, companies were contacted by email to provide additional information. Finnish LBS market has been segmented to different categories that show a true picture of areas of expertise in Finnish LBS market.

1.3   Research Outline

Figure 1.2 presents the outline of this master's thesis; this study starts with an introduction to location-based services. Location-based marketing is one of location-based services application, for understanding location-based marketing one should first become familiar with location-based services definition, components, standards, and architecture.

Chapter 1

Introduction
Introduction, Research Methods, Contribution

Chapter 2

Location Based Services
Definition, Components, Standards, Architecture

Chapter 3

Positioning Technologies
Indoor Positioning Technologies, Outdoor Positioning Technologies

Chapter 4

LBS Applications

Chapter 5

Location Based Marketing/Advertising
Definition, Context, Mobile Marketing Features, Push vs Pull Strategies

Chapter 6

Location Based Marketing Categories

Chapter 7

A Survey of Finnish SMEs' LBS Products and Services

Chapter 8

Conclusion

Figure 1.1 Outline of the thesis

2 LOCATION-BASED SERVICES

2.1 Definition

There is no commonly accepted definition for location-based services in literature. The term "location-based services" was found in the literature in 1998 for the first time (Buczkowski 2012). Different academic researchers and practitioners defined LBS using different characteristics. Below are some different definitions for location-based services:

"Location-based Services are information services accessible with mobile devices through the mobile network and utilizing the ability to make use of the location of the mobile device." (Steiniger et al. 2011).

"Location-based services (LBS) are the delivery of data and information services where the content of those services is tailored to the current or some projected location and context of a mobile user." (Brimicombe et al. 2009).

"Location-based Services (LBS) is an information or entertainment service, accessible with mobile devices through the mobile network and utilizing the ability to make use of the geographical position of the mobile device." (Roebuck, 2011).

"Location-based Services are IT services for providing information that has been created, compiled, selected, or filtered taking into consideration the current locations of the users or those of other persons or mobile objects." (Küpper 2005).

Put all these different definitions together, location-based services can be presented as a set of services that are utilizing capabilities of modern mobile devices and mobile networks bundled under one name. The main purpose of location-based services are delivering geographically tailored, context relevant data, and information services. Different types of location-based services are categorized under different categories such as person-oriented or device-oriented, push/ pull strategies and direct or indirect profiles (Dhar 2011).

As depicted in Figure 2.1, LBS are the result of aggregation of three different technologies developed over time (Brimicombe 2002): New information and communication technologies, Internet and GIS/spatial databases. Although GIS and LBS have been originated differently and for different users, they share some characteristics such as analyzing spatial functions (Steiniger 2011). Advent of smart phones equipped with powerful computing capability and ubiquitous wireless Internet coupled with the development in positioning systems give LBS an inimitable

potential. Current innovations by big companies such as Google and Facebook are indication of developing of future services based on location information (Rafferty 2011).
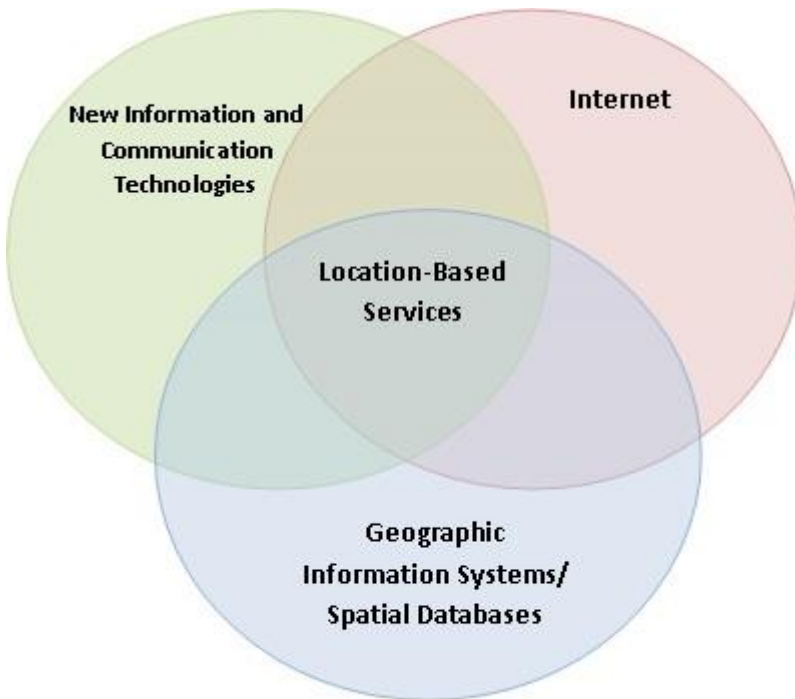
Figure 2.1 LBS are the result of aggregation of three different technologies (Brimicombe 2002)

Technical feasibility of location-based systems and marketing strategies are the main drivers of LBS (Dru & Saada 2001). Although nowadays there are excessive amount of different applications and services ranging from navigation services to location-based games, but very early application of location-based services introduced in Japan and in some US networks in 2001 in the form of location tracking (Ficco et al. 2010).

LBS took much longer to materialize than it was predicted beforehand (Dhar 2011). Lack of established business models for exploiting the increasing number of users (Malm 2012), lack of information about user attitudes, technological limitations and integration problems accompanied by shortcomings in sustainable business models (Rao & Minakakis 2003) are among the reasons for the delay in development and adoption of location-based services. According to Malm (2012) location-based services revenue in Europe is expected to grow dramatically at a compound annual growth rate of 25 per cent from €735 million in 2013 to reach €2.3 billion by 2018 (Figure 2.2).
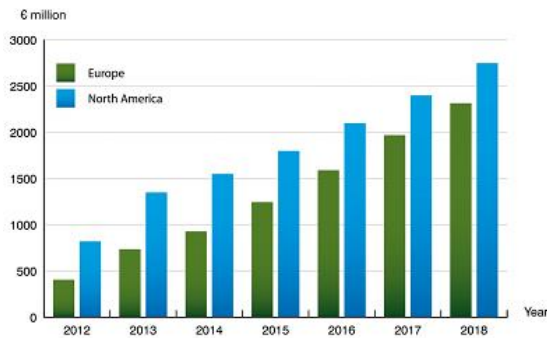
Figure 2.2 Location-based Services revenue forecast (Malm 2012)

Malm (2012) depicts that advertising is the main source of revenue for "consumer based location-based services". Table 1 compares three segments of location-based services in terms of revenues and active users.

Table 1 Ranks of three LBS application in terms of revenues and users (Malm 2012)

	Social Networking and Entertainment	Mapping and Navigation	Local Search
Rank in terms of users	1	2	3
Rank in terms of revenues	1	3	2

Today, LBS applications vary from location-based augmented reality to location-based marketing applications. Businesses that are willing to offer their products and services to the target market are recommended to apply location-based services. They will find geolocation applications affecting promotional activities positively.

2.2   Components

There are many components involved in developing of location-based services. Steiniger et al. (2011) proposed five basic components of LBS:

- Mobile Devices: a portable device that allows user to request information. Mobile devices has evolved from a simple set with limited functional capabilities to multifunctional devices. There are several drawbacks for mobile devices such as

memory size, battery life and processor capabilities (Almasri 2008). The amount of yearly shipped mobile devices has exceeded computer and automobile (Clarke 2001). 4.55 billion people are expected to use mobile phones worldwide from which 1.75 billion are smartphone users which presents 22.5 per cent growth from 2013. Smartphone refers to a mobile phone equipped with state of the art hardware and software (Emarketer 2014 a). Smartphones are a general requirement for using location-based services.

- Communication Networks: enable transmission of data between users, data providers and content providers. Communication networks exchange service request and requested information between users and service providers (Steiniger et al. 2011). The level of accuracy in locating a user is the central factor in network design.

- Positioning Systems: determine position of mobile devices using outdoor or indoor positioning technologies. Depending on location-based application needs, and the geographical location of the user, different combination of positioning technologies are used. For example, Bluetooth, Wi-Fi and NFC (Near Field Communication) can be used for finding the exact location of users who are inside a building. On the other hand technologies such as GPS (Global Positioning System) and Cell ID can be used (Lehman 2011) as soon as they go outdoors. Chapter 3 reviews indoor, outdoor and hybrid positioning technologies that are currently in use in a nutshell.

- Service and application provider: software and services which receive the query and disseminate back any useful tailored, context relevant information to the user.

- Data and Content providers: service providers usually do not store all the requested information. Location information and geographical data are requested from mapping service providers such as Google. Types of data needed for providing location-based services depend on the type of requested services.

Network service providers keep location data. This data can subsequently be used for developing customized services for their clients. They can also establish a strategic partnership with content providers. Operators offering mobile Internet services collect a set of useful information from users ranging from demographics to real time spatiotemporal information. This information is a very valuable source for providing contextual advertising and applicable when operators are trying to choose right audiences.

Figure 2.3 LBS Components

As the sixth component, (Buczkowski 2012) adds "user" to above components. User is a person who is seeking added value by utilizing mobile devices and related infrastructure and receives necessary information on the move. Users are now creating and sharing increasing amount of user-generated media contents (Multisilta et al. 2009).

All above components are needed for delivering a high-quality location-based services. Risks associated with using different new technologies can be decreased by establishing open standards. Those standards would facilitate interoperability among different positioning technologies and multiple vendor's location-based services. Standards are needed to guarantee integrating between all actors involved in providing of location-based Services such as data, software, and hardware providers (Ficco et al. 2010). Standards can be considered as the seventh component needed in delivering location-based components (Figure 2.3).

2.3   Standards

As an attempt to develop LBS standards, Ficco et al. (2010) proposed a two-tier open standard architecture for detecting location information in heterogeneous networks. It allows positioning technologies to be added without unnecessary changes to existing architecture.

Two organizations that play important roles in developing of LBS standards are Open Mobile Alliance (OMA) and Open Geospatial consortium (OGC). OMA is the key enabler of mobile

service specification standards that support the creation of the interoperable end to end mobile services. MLP (Mobile Location Protocol) is one of standards developed by OMA (Open Mobile Alliance). It allows location-based applications to interconnect with wireless networks irrespective of their interfaces (CDMA, GSM, etc) and positioning methods. It enables the exchange of location data between LBS applications and location services in wireless networks (Dhar 2011).

OGC is also an international standard organization consisted of more than 400 worldwide organizations collaborating for development of open standards for location-based and geospatial services.OGC has developed OpenLS that addresses interoperability problems by defining interfaces that allow service providers to provide their applications (Dhar 2011). It specifies open interfaces to core location-based services such as directory services, gateway service, geocoder service, presentation service, etc.

Internet Engineering Task Force (IETF) has developed Geopriv, a protocol for transmission of location information through Internet. Geopriv assesses security and privacy issues of representation and transmission of location information (Tschofenig 2006).

Table 2 Standards and protocols for delivering location-based services (Adapted from Dhar 2011)

Protocols and Standards	Descriptions
MLP	• A network independent application level protocol for acquiring the position of mobile stations • Acts as an intermediate between location server and location service • Determines core set of capabilities a location server must be able to do
Open LS	• Addresses interoperability problems by defining interfaces which allow service providers to provide their applications • Defines open interfaces to core location-based services such as directory services, gateway service, geocoder service, presentation service
Geopriv	• A protocol for transmission of location information through Internet

2.4   Architecture

Location-based services bring an additional source of revenue for mobile operators which can be acquired from investments on already in use infrastructures (Rao & Minakakis 2003). Basic architecture of a location-based service consists of a mobile device equipped with a PDE (Positioning Determination Equipment), mainly a GPS receiver at one side and a mobile network interface connected to a GIS/Spatial server which contains geographical data over mobile wireless network on the other side (Almasri et al. 2008).
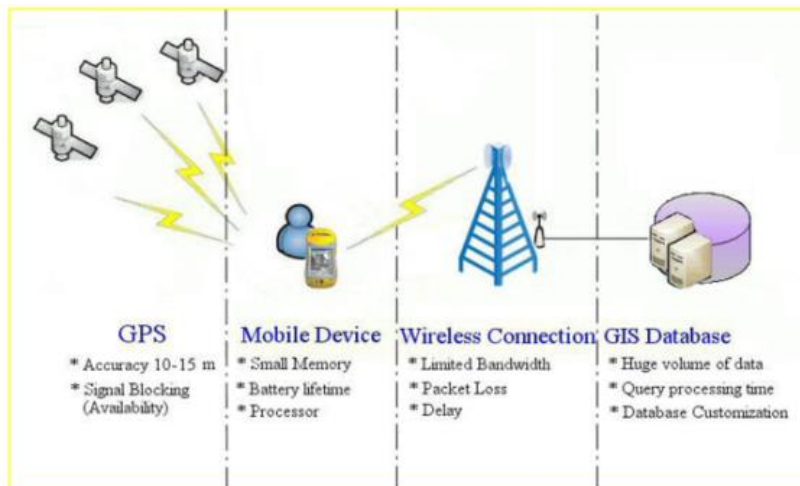
Figure 2.4 General LBS Architecture (Almasri et al. 2008, 1)

Location-based services can be realized as a three-tier model including application layer, middleware and positioning layer. Positioning layer is responsible for locating a mobile device which is equipped with a receiver. To implement location-based services as good as it is possible to be a middleware comprising main characteristics of the application should be designed (Dhar 2011). It is needed to aggregate all varying technologies, protocols, frequencies and location accuracy (Rao & Minakakis 2003). Middleware significantly reduces the complexity of service integration and interoperability of location data between networks (Spiekerman 2004).
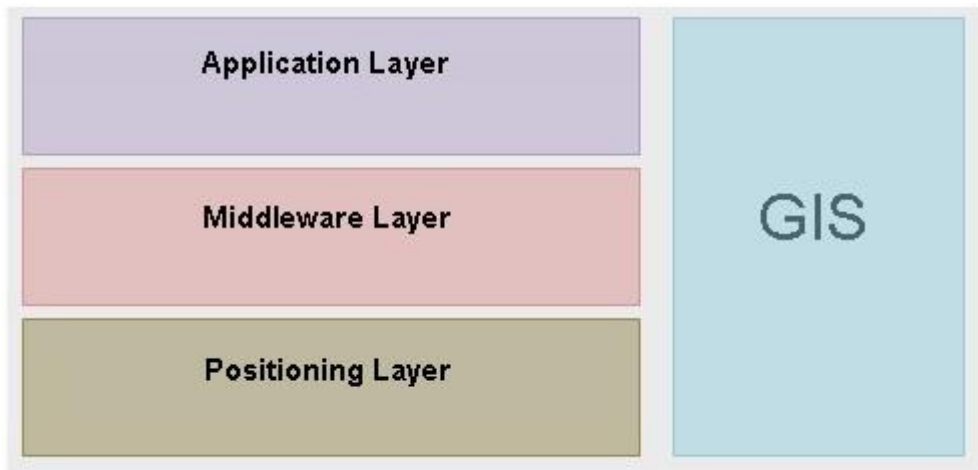
Figure 2.5 General LBS Communication Model (Spiekerman 2004)

Location-based services vary by their requirements for accuracy, response time, privacy and device capabilities. Some services demand very accurate location information, for satisfying these services more accurate technologies such as Bluetooth and 802.11 are required (Ficco et al. 2010).

3   POSITIONING TECHNOLOGIES

3.1   Introduction

There are several technologies in use for locating a mobile device. These technologies allow location-based services to be aware of their geographical context. Recent developments in positioning technologies have improved the accuracy of location information. Positioning technologies differ in accuracy and implementation cost, depending on whether implementation scenario is indoor or outdoor it needs different positioning technologies (Ficco et al. 2010).

Hybrid positioning systems combine several positioning technologies to provide a reliable location information whether the mobile device is indoor or outdoor. The best way to locate a mobile device is to use the combination of all technologies. When the user is inside a building technologies such as Bluetooth or Wi-Fi positioning system can be used. As soon as user leaves the covered area technologies such as GPS and Cell ID can be employed (Lehman 2011). This section reviews indoor, outdoor and hybrid positioning technologies currently in use in a nutshell.

According to (Rao et al. 2000), three aspects need to be thought about very carefully when choosing a positioning technology: the range of coverage and scalability of application, the level of quality of services, and a general alignment between overall costs and revenues.

3.2   Cell ID

Mobile devices connect to GSM network via Base Transceiver Stations (BTS); each BTS has a unique id and as long as devices can receive career signals they can be located. As an alternative outdoor positioning method for GPS. In Cell ID method mobile device is simply located using the ID of BTS that is serving the user at the time of locating. This ID is transmitted to the location-based application, whereas the real corresponding location can be find based on that ID.

The accuracy of Cell ID method depends on the area that BTS covers. Cells in urban area are small but dense, a cell coverage area may range from a hundred meters in the urban areas to several kilometers in rural areas. In urban areas with very high buildings where GPS capabilities are limited, the Cell ID can be used as an easy but imprecise alternative. Cell ID accuracy depends on cell sizes, it may vary from 100 meters to several kilometers.

3.3   Enhanced Cell ID

The accuracy of Cell ID is shifting to the next level by using the ID of multiple BTS stations. In this method, the current position of mobile device is calculated by estimating the distance from at

least three BTSs. The most widely used methods in enhanced Cell ID are AOA (Angle of Arrival), TDOA (Time Difference of Arrival) and TOA (Time of Arrival) (Treveisani et al. 2004).
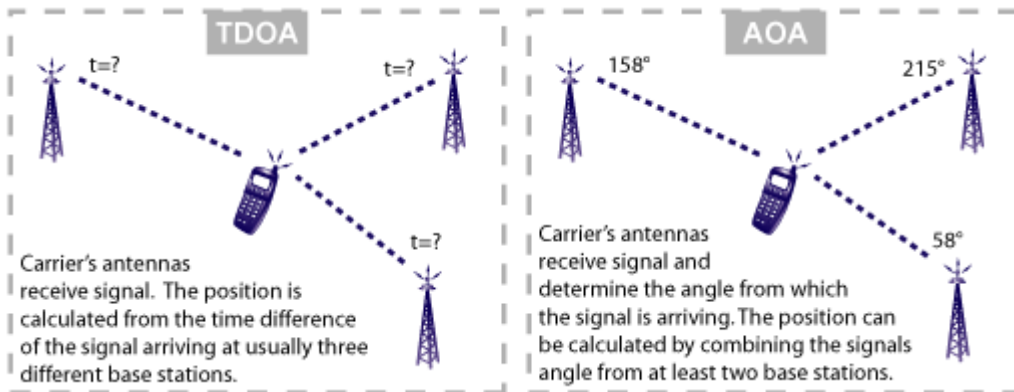
Figure 3.1 Using TDOA and AOA to determine location (Neun et al. 2007, 19)

3.4 Global Positioning System (GPS)

Global Positioning System is a satellite-based system launched in 1970s by US department of defense. It originally consisted of 24 satellites (Steiniger 2011, Chang et al. 2002). GPS is still one of the most popular technologies because of the high accuracy it offers. Today almost all mobile devices are equipped with GPS receivers (Dhar et al. 2011). Position of mobile device is determined by calculating the difference in time the signal takes to reach mobile device from three different satellites. GPS is the most accurate positioning system yet it has some disadvantages such as too much time to find the satellite (time to first fix), very high power consumption and being useless indoor. The accuracy of positioning is not high in places where there are many high buildings, it highly depends on the number of satellites that are visible and are not shadowed in the location of mobile device.

3.5 Assisted GPS

In assisted GPS method, BTS (Base Transmission Station) is equipped with GPS. BTS provides information about visible satellites to GPS receivers in mobile devices. Assisted GPS improves one of the major disadvantages of GPS technology, by speeding up positioning technology the power consumption and Time to First Fix will be reduced. AGPS (Assisted GPS) provides more accurate positioning information than GPS by combining the actual position of BTS and GPS approximation.

3.6   Wi-Fi Positioning System

Wi-Fi positioning system is one of the positioning techniques mostly used in areas where GPS is unavailable such as indoor locations. Wi-Fi positioning system is very similar to Cell ID. Each Wi-Fi access point creates a small spot, MAC (Media Access Control) address of access points are accessible through a reference database and each MAC address corresponds a real physical location.

Determining mobile devices' location anonymously using wireless positioning system is almost a part of every cell phone terms of services agreement (Zahradnik 2011), yet all phones allow the user to turn off location services. When a mobile device detects a Wi-Fi signal, user location is calculated based on Wi-Fi signal strength with the accuracy of approximately 3 to 10 meters indoor and 20 to 30 meters outdoor. Some big companies such as Google used to collect Wi-Fi information by wardriving. Wardriving is an act of locating Wi-Fi access points while driving. Nowadays they use Android phones, iPhones and Windows phones to collect that data (Vaughan-Nichols 2011).

Recent development in internetworking between 3G system and wireless networks allows wireless Internet service providers to utilize wireless networks such as IEEE 802.11 and Bluetooth for positioning purposes. Big companies such as Google and Apple have assembled massive databases. These databases contain information about the location of access points that correlating with GPS location of cell phones, SSID (Service Set Identification) and MAC address of access points (Zahradnik 2011). These databases need to be constantly updated to maintain updated information. In most cases, WPS will be combined to other outdoor positioning systems such as GPS in order to deliver more accurate and efficient location data.

According to Gao et al. (2011), accuracy in Wi-Fi method depends on two things: density of the area under access point coverage and available positioning algorithm. Sometimes the position of mobile devices is determined by using devices that we are already aware of their location. When mobile devices get close to or connect to a real word artifact with recognized geographic position their location information can be delivered to location-based applications. In Section 6.3.2 an approach proposed by (Rashid et al. 2008) has been explained in which Bluetooth servers locate devices that are in proximity of the server.

3.7   iBeacon

iBeacon implements Bluetooth low energy (BLE) technology that consumes less power compared to classic Bluetooth to bring location-based information services to iOS devices (Ranger 2014). iBeacon allows an iOS smartphone or other mobile devices to do some actions when they reach in proximity of a Beacon and enable them to become aware of their exact position. Beacons are

small signaling devices which transmit Bluetooth, when a smartphone approach to the vicinity of a beacon, the signals transmitted by beacon is received by the application installed on the phone.

iBeacon tracks customers while they are walking inside a store and delivers offers to their iPhones. iBeacon networks need to be set up, software can track users when they reach proximity of small signaling devices (beacons) installed on shelves. On the other hand, shoppers need to install applications such as Epicourion and Shopkick that support tracking technologies (Kharif 2014).

Beacons don't perform any action by themselves but transmitting signals, an application which responding accordingly has already been installed on the phone, that application monitors location and measure device proximity to a Beacon.

Virgin Atlantic launched one of the earliest trials of iBeacon at Heathrow Airport, passengers approaching the security channel will be notified to have their boarding pass ready to be scanned (Ranger 2014). Weve is a mobile commerce joint venture in UK supported by largest mobile operators such as EE, O2 and Vodafone that conducted another early launch of iBeacon in partnership with Eat, a chain of London based sandwich shops (Moth 2014). Major league baseball incorporated iBeacon feature to its Ballpark application for the 2014 season. Spectators can check in into one of 20 stadiums which host the league and benefit special offers (Moth 2014).

To ensure the quality of positioning, there might be different positioning technologies in use. Due to limitations of positioning techniques in indoor areas, moving from the outdoor to indoor places demands a cooperation between different positioning technologies.
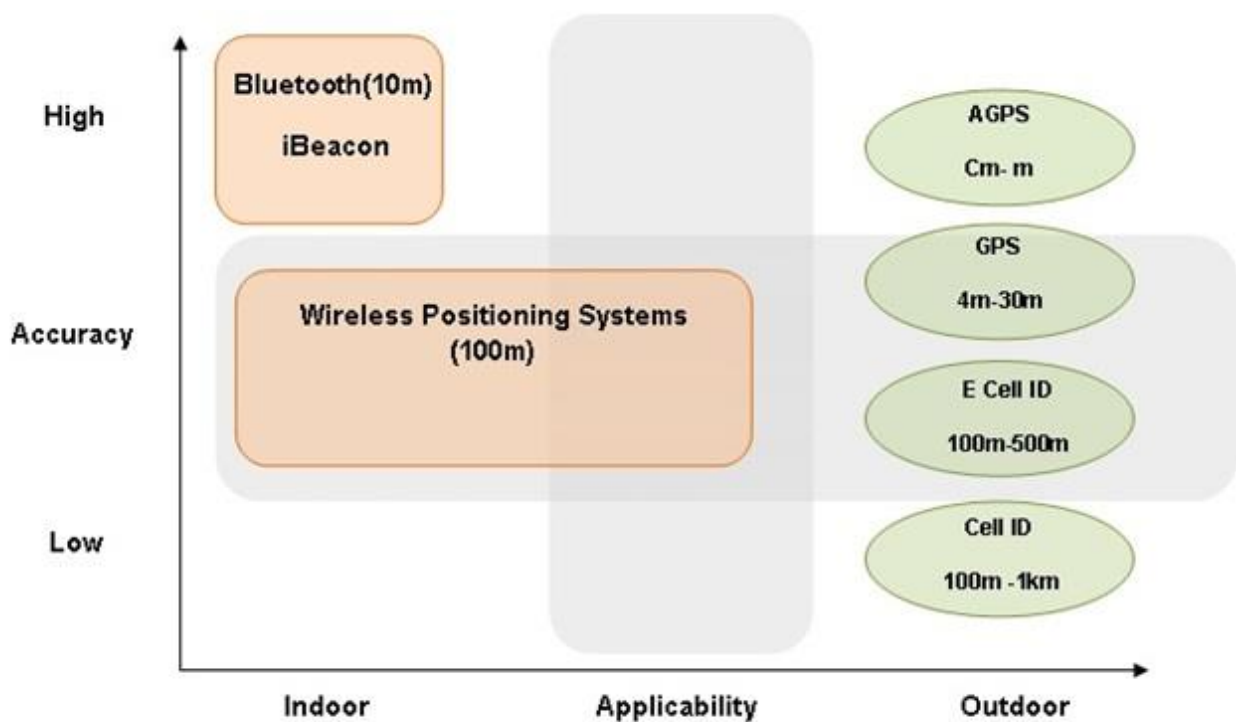
Figure 3.2 Accuracy and application of positioning methods (Adapted from Neun et al. 2007)

Hybrid positioning systems utilize multiple positioning technologies in order to succeed in dealing with problems caused by poor coverage of outdoor positioning systems such as GPS. For instance, wireless positioning systems supplement GPS in indoor places and dense urban area where the coverage of GPS is very poor. Figure 3.2 compares the accuracy and application of positioning methods.

Some location-based marketing solutions such as location-based social networks and location-based games are implemented completely independent of marketer's internal IT resources. There is no need for any extra infrastructure, the only thing businesses have to do is to claim an account in LBSNs (Location Based Social Networks). Unlike LBSN marketing, implementing an indoor marketing or proximity marketing solution is associated with purchasing and installing indoor positioning and other network facilities.

4   LBS APPLICATIONS

4.1   Introduction

According to Buczkowski (2012), only those services that receive their location information from wireless networks are considered as location-based services. Although there is a broad range of Location-based applications, but these services are overlapping in many cases. Many of these applications are developed for different purposes but can be used for marketing purposes. At the moment LBS can be classified into following categories (Steienger 2011, Dhar 2011):

- Emergency Services
- Navigation and Tracking Services
- Information and Directory Services
- Leisure and Social Activities
- Gaming
- Social networks
- Charging
- Augmented Reality.

4.2   Emergency Services

One of the classic application of location-based services is the capability of locating a user who is unaware of its exact location or is not able to unfold it because of an emergency condition (Strienger 2011). Examples are services that allow citizens to call out public emergency services such as police, firefighters and medical assistance teams. For finding the user quickly and precisely, there should be an accurate positioning system in place. US congress and European Union Commission have passed regulations that enforcing the positioning of emergency calls by telecommunication operators.

Grafetee is an application developed in Finland for smartphones that incorporate many other services such as Foursquare, Yelp, Flickr and Instagram into the application. Users can update their status and supplement it with texts and images. Grafetee as a bookmarking application allows users to bookmark real places and events, other users can leave notes and supplement these notes with geotagged information. The Police of Finland, Poliisi, utilized the application for public safety purposes, citizens can send updates to notify police of real-time happenings in the city. They can alert police about a dangerous situation or make a call by a simple tapping. Finnish police department will consistently observe the public feeds as well as an interactive map that show citizen reports (Goh 2012).

4.3   Navigation and Tracking Services

Navigation services locate the exact position of mobile users who need direction to a specific geographic location by means of positioning technologies. A navigation service allows mobile users to know their exact location as well as how to reach to a requested destination. Tracking service is relevant to both consumers and enterprise usages. One evident example can be tracking of corporate assets such as postal packages, field personnel, vehicles, so they know where their moving assets are located. Navfree is a GPS-based navigation application that alerts users when they get to the proximity of speed cameras. GPS navigators are available at 2D and 3D, user can find nearby points of interest quickly by using quick search features.

4.4   Information and Directory Services

Location-aware information services focus on providing tailored information to mobile users based on their spatiotemporal context and behavior. Shopping guides, tourist and travel information, and yellow pages are among the classic examples of information services. The domain of information offered by services is very broad ranging from useful tips about a local restaurant to finding nearest shopping malls, theaters, and gas stations. Information services also distribute information that has been generated by other users about different points of interests in geographical proximity of the user.

Tassa is an application deployed in Finland that identify mobile user's exact geographic location and provide related and trustworthy information. User is able to receive latest weather forecasts, nearest ATM machines, grocery stores and restaurants and their opening hours. The main source of revenue is the fee advertisers pay to be located in search results (tassa.fi).

Cabforce, another Finnish application provides tourists the ability to reserve taxis, minibus and limos in some European cities. Travelers can pay online with their credit cards. The pick time at the airport can be adjusted based on the flight arrival automatically (cabforce.com).

4.5   Charging Services

Mostly used by telecommunication operators, charging services dynamically charge a mobile user based on their geographical location. Users of a particular service can benefit from customized charging plan when they change their locations. Billing services allow users to define specific locations and pay different tariffs for each location.

4.6   Location-based Augmented Reality

Augmented reality services offer users to see the world through their mobile devices. These services identify the exact location of the user and supplement the real places with digital information about that place based on the angle of user's view. Computer-assisted augmented reality technologies provide very detailed description of places to user with the help of built-in sensors that collect physical surrounding data, audio, video, graphics and GPS data.

4.7   Leisure and Social activities

Location-based messaging services, friend finders that allow users to communicate and enhance social activities are classified under this group of services. Generally speaking, these applications aim to entertain users and in most cases pursue to enhance the quality of social life. For example, Yobongo is an iOS-based application that allows its users to communicate with people around them. Situationist is another example that allow users to meet nearby strangers in surprising ways (situationistapp.com); users select from a set of possible scenarios ranging from simple hugs to writing down the first impressions. Ditto is another application developed for iOS that allows users to share their plan for what they are going to do with their social friends and get tips and recommendations about their plans.

Location-based gaming, location-based social networks, and location-based marketing services are among other types of location-based services that will be explained in detail in following sections of this thesis.

5   LOCATION-BASED MARKETING/ADVERTISING

5.1   Concept

As depicted in Figure 5.1, integration of mobile marketing, contextual marketing and location-based advertising has created a new area named Location-based marketing (Li 2009). Location based-marketing is a two-way communications channel that offers context relevant marketing information and promotions to targeted customers as well as the capabilities offered to marketers such as trend prediction and acquiring user preferences (Rafferty 2011).
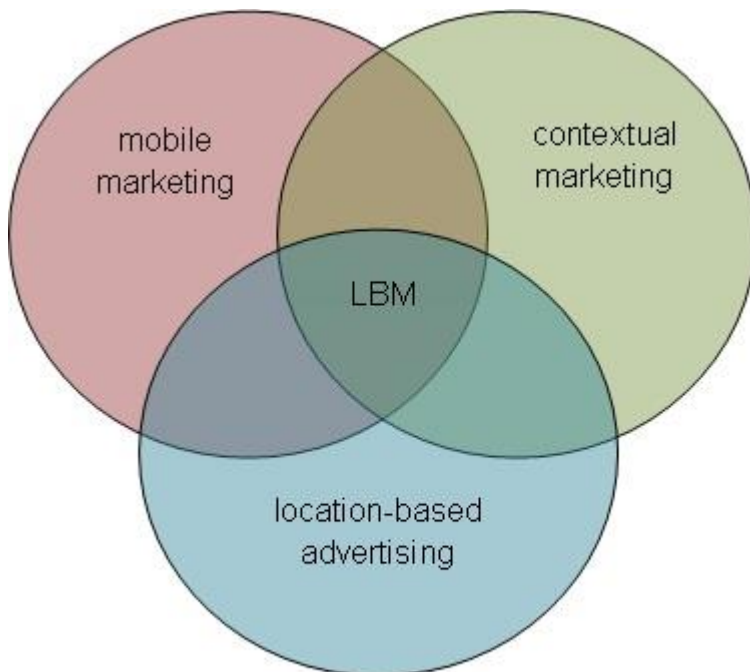
Figure 5.1 LBM as the aggregation of mobile marketing, contextual marketing, location-based advertising (Li 2011)

Location-based marketing simply implies embedding a piece of information in a place that is most probably useful. LBM inherits the contextual characteristics of location-based services and mobile devices to create a novel marketing channel that targeting customers based on their current contexts. LBM as a new field is still in its infancy comprising not only location-based advertising but also other aspects of marketing such as product/services development.

Bruner et al. (2007) defines location-based advertising as"marketer controlled information specially tailored for the place where users access an advertising medium ". Location awareness has enabled mobile marketing to provide personalized, context relevant information to customers. Mobile location-based advertising is an instance of horizontal market in which mobile location has

been added as a new value to already existed advertising services to materialize a horizontal market (Dhar et al. 2011).
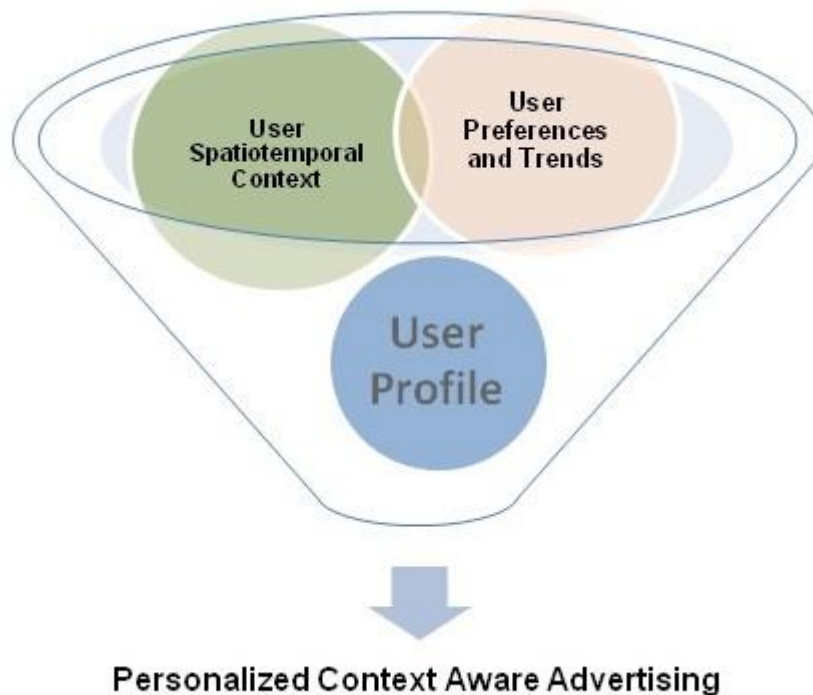
Figure 5.2 Allocating highly personalized context-aware advertisements to customers

Mobile as a media inherited many features of Internet. Nowadays most of the location-based marketing initiatives are based on smartphone model (Buczkowski 2012). Before the advent of smartphones, most of the location-based advertisings were based on text and multimedia messages and mobile services. Smartphones with their unique business models which allow users to purchase software free of charge or by paying a small amount of money together with ubiquitous wireless Internet created the foundations of location-based marketing. Developments in mobile services have facilitated collection of customer's information such as location. Businesses also often find themselves when they have to choose between localized or globalized advertising approaches. If they choose localized approach they may find their online campaigns efficient, mobile location-based advertising helps business to survive among their competitors and attract customers.

5.2   Context

The most effective factors which affect customer's behavior can be divided into three categories (Chang & Huo 2011):

- Content
- Context
- User preferences.

Context can be defined as any information used for characterization of an object situation. Variety of classification of contexts has been proposed in the literature, for example, (Küpper 2005) categorized them into primary contexts and secondary contexts. Primary contexts consist of time, location, identity, and activity. He further subdivides these contexts to secondary contexts that include personal, spatial, social, spatial, technical and physical. Nivala et al. (2003) also classified nine different types of contexts as depicted in Figure 5.3.
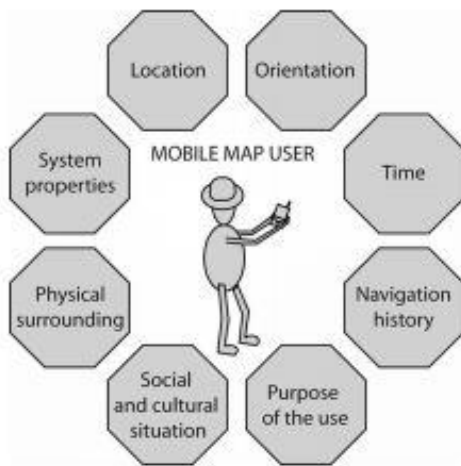
5.3 Different types of Contexts (Nivala et al. 2004, 3)

A context-aware system uses context to tailor information based on user task (Dey 2001). Location-based services are aware of the context, and this feature distinguishes them from traditional Internet-based media. They provide a two-way communication channel where service providers can use users' actual context to deliver context relevant, tailored information based on users' needs.

Adomavicius and Tuzhilin (2011) propose three dimensions of contextual information necessary to deliver customer experience in marketing: spatial (where), temporal (when) and technological. Current location of objects is one of the most important factors which affecting personalization of information. This knowledge of the exact location of the user will be used for delivering relevant, timely and engaging marketing messages, it allows information and services to be location-relevant or location-aware.

According to Rao & Minakakis (2003) depending on where, when, how, with whom and why customers are navigating in a physical space, their needs will vary. LBS decrease the confusion customers confront, improve consumption experience via delivering a high-quality service. In

order to be effective and valuable, the most customized ads need to be offered to right users at the right time.

Customers consider the up-to-date spatiotemporal information as the major value of mobile location-based context-aware advertising. The purpose of targeted advertisement is increasing the effectiveness of advertising by ensuring right people at the right time will receive them.

Location-based services need to adapt themselves to new contexts, this adaption takes place at four different layers (Reichenbacher 2001):

- information level
- technology level
- user interface level
- presentation level.

The content of information delivered to the user can be adapted based on user preferences. Consider a user who is approaching an Italian restaurant and has already determined Italian food as one his preferences, contents are filtered based on his preferences and he receives information about Italian restaurants nearby. If the user spends a number of hour in Italian restaurant per week, it can be categorized as someone who enjoys Italian food. This type of classification can be used by recommender systems integrated to location-based services to promote the relevance of information. Adaption can also happen in response to changes in social, location and time context (Steiniger 2011, Burrell et al. 2002). For example, user tips about different places are pushed to Foursquare users while they are passing those places.

5.3   Mobile Operators Role

Mobile operators manage the starting point of the mobile web experience. Close relationship among the mobile operators, content providers and advertisers is needed to provide a mobile marketing experience to customers. As the number of operator's increases very rapidly in numbers, the need for multimedia mobile services multiplies and wireless technologies becoming more popular Ficco et al. (2010). Therefore, location-based services find themselves as a crucial principle in operator's marketing strategy (Rao & Minakakis 2003). Mobile advertising will be a significant source of revenue for mobile operators, they establish profitable business models with content providers that lead to significant revenue. They are seeking new methods to increase their market share by developing new LBSs.

Three possible business scenarios of location-based services are proposed by Unni and Harmon (2003):

- Network service provider dependent scenario: In this business scenario location data are generated and owned by mobile operators, these data are used to provide location-based services.

- Network service provider assisted business scenario: In this scenario selling of time and data usage is the main source of network service provider's revenue. They do not necessarily own location data, these data can be accessible for free or a given rate.
- Network service provider independent: In this scenario transporting of LBS data is the main source of revenue generation from location-based services.

All stakeholders take action to acquire a larger share of mobile advertising market. Mobile operators are unwilling to share their resources with advertisers (Wilken & Sinclair 2009). They have very close relationship with customers and try to reinforce this relationship as their main strategy. One of the most profitable areas of expertise is local search advertisement.

Bernstein global wealth management (2007) identifies four methods through which operators and search providers deliver local search advertisements:

- banners.
- paid placement: business pay search providers to be displayed higher between search results.
- initial placement: advertisements are placed between structured directories.
- sponsored listing: advertisers display advertisements based on the contents of the user search.

5.4   Targeting Customers

Many of marketing researchers have listed factors which affect customer behavior. Barnes (2002) declares factors which decisively affect customer behavior such as social norms, user motives, mode, time and location and personal characteristics. Last progress in context-aware services, in our case location, as well as ubiquitous Internet enable marketers to target customers based on their spatiotemporal context. Besides delivering marketing messages, LBM allows analyzing of location-based data in order to identify customer trends (Buczkowski 2012). Mobile advertisement need to be related to customer's preferences and interests at the time of display. Chang & Huo (2011) address three main issues that need to be considered by marketers when generating and propagating marketing messages, an advertisement allocator adjust ads based on these criteria in addition to user profile and location information:

- How to show the mobile ads?
- When to show the mobile ads?
- Which potential mobile ads will be clicked by subscribers?

Location-based advertising improves consumer perception through increasing the relevance of advertisements to real customer needs and attitudes (Ateljevič & Martin 2011). In addition to immediate access to product information, location-based advertisements offer customized information based on individual needs, desires and preferences (Barwise and Strong 2002). Users

can determine their preferences and areas of interest. These features introduce LBM as a new platform for advertising that can be easily customized by advertisers and users. Context awareness and mobility features of mobile devices are combined to location-based services by advertisers to reach targeted marketing.

5.5   Push vs. Pull Strategies

Push types strategies suit companies which have a fixed relationship with customers, those customers have already accepted to receive such messages. Push methods are also referred to as permission-based marketing (Li & Du 2012). Risk of overuse and spam continue to make all players nervous. Messages can potentially become intrusive and irritating unless they achieve the permission of the user in advance.

Another type of mobile advertisements are pull-based in which information are sent based on customer's request (Barwise & Strong 2002). Pull marketing is suitable for businesses with simple, time limited and context-related advertisement (Li & Du 2012). Advertisers can send targeted advertisements to users who already subscribed to location-based services, these advertisements range from discount advertisements of certain products and services based on current location of customers to information about nearby places.

Customers are involved in the process of pull-based advertising. In pull method, user pulls his preferences of products and services. Advertisers filter their messages based on predetermined preferences, this process of customization causes advertising to be less intrusive.

5.6   Mobile Marketing/Advertising Features

5.6.1   Concept

According to research conducted by VanBoskirk (2011), more than 40 per cent of marketing professionals have used some form of mobile marketing. Marketing can be defined as "The process by which companies create value for customers and build strong customer relationships in order to capture value from customers in return" (Kotler et al. 2011 pp 5) .

Boone et al. (2011) differentiate between concepts of advertising and marketing. Advertising is concerned with the promotion of services and products while marketing is the overall process of value making for customers. According to BIA/Kelsey report (BIA/Kelsey 2013) total mobile advertisement spending in US is forecasted to grow from $3.2 billion in 2012 to reach $16.8

billion in 2017. 38 per cent of total US mobile advertisement spending belongs to locally targeted advertisements (Figure 5.4).

Figure 5.4 Mobile Ad spending (BIA/Keleys 2013)

Mike Wehrs, president of mobile marketing association define mobile marketing as " a set of practices that enables organizations or physical persons to communicate and engage with their customers in an interactive and relevant manner through any mobile device or network." (Ružić et al. 2012). The essence of this definition is based on two issues:

1. Mobile marketing comprises a set of practices.
2. Mobile marketing fosters social interactions such as establishing relationships and provoking activities between organizations and other members.

Okazaki and Barwise (2012) define mobile advertising as advertising transmitted via mobile handsets or targeted to mobile users. Increasing the availability of mobile Internet allows advertisers to bypass mobile operators and use it as an alternative way to connect customers directly (Gray 2006). 3G technology has enabled advertisers to move beyond text-based SMS messages to embrace an array of alternatives that are delivered at high speed. It provides advertisers the possibility of one to one location-sensitive direct marketing communication (Wilken & Sinclair 2009).

Marketers are constantly searching for new technologies in order to target customers more efficiently. Assumptions of marketers about their strategies has changed due to the developments in Internet and convergence of web and mobile technologies (Sultan et al. 2005). The ubiquitous Internet enabled by mobile networks in addition to developments in social networks has brought new communication channels to engage more customers. Customers are accessible by businesses, and also can share their experiences with other customers. Adding the context to this equation offers contents that are relevant to user's location, preference, and opinions.

Chang & Huo (2011) list some characteristics of mobile marketing such as:

- high penetration rate
- personal communication device
- individually addressable
- multimedia and interactive capabilities.

5.6.2   *Mobile Marketing Potential*

Mobile marketing is a whole new marketplace (Levins 2007). It makes benefits of many attractive characteristics of mobile devices such as: Portability, personalization, context and location awareness, mobility and wireless Internet (Dhar et al. 2011). Business owners view mobile devices as a tool that offer various forms of communication through which they can communicate to customers (Sultan et al. 2005). They communicate to customers by delivering content as well as receiving feedback at the same time.

Smartphone is a desired platform for marketers (Li & Steinberg 2006) because mobile users are reachable at any time in approximately any place. Mobile phones are viewed as highly personalized devices (Tsang et al. 2004) that simplify more accurate targeting and tracking (Bauer et al. 2005). All these appealing characteristics of mobile devices impose them on businesses as a suitable platform for advertising. These advertisements can be customized based on user's profile and preferences. Customers are also allowed to determine the type of advertisements they would prefer to receive on their devices.

Smartphone usage is growing rapidly in the mobile market. With the fast growth in the number of smartphone users coupled with advanced technological capabilities, advertisers can expand targeted marketing strategies. According to Emarketer report (Emarketer 2014 a) global smartphone users will reach 2.5 billion in 2017 that corresponds to a nearly 50 per cent share of all mobile users.

Smartphone Users and Penetration Worldwide, 2012-2017

	2012	2013	2014	2015	2016	2017
Smartphone users (billions)	1.13	1.43	1.75	2.03	2.28	2.50
—% change		68.4%	27.1%	22.5%	15.9%	12.3%	9.7%
—% of mobile phone users		27.6%	33.0%	38.5%	42.6%	46.1%	48.8%
—% of population		16.0%	20.2%	24.4%	28.0%	31.2%	33.8%

Note: individuals of any age who own at least one smartphone and use the smartphone(s) at least once per month
Source: eMarketer, Dec 2013

166980   www.eMarketer.com

Figure 5.5 Global smartphone users and penetration (Emarketer 2014 a)

Mobile advertising is crucial for mobile industry, and operating systems providers have developed platforms for programmers to embed advertisements in their applications. iAd, Apple's advertising platform and AdMob, a leading global mobile advertising network are two mobile

advertising platforms that allow application developers to embed ads into their application directly.

5.6.3   Obstacles

Sainsbury (2006) has listed some obstacles of mobile advertising market such as outdated technology, slow networks, complicated pricing mechanism and power relationship between various players. Changes in mobile marketing are driven by developments in some parallel technologies and each player in mobile advertising market has their business logic and purposes. For example, content providers consider mobile marketing as a way to reach a large number of customers.

For delivering a high quality LBM service various technologies, platforms and applications ranging from mobile applications to different types of servers need to be interconnected and integrated into the wireless network infrastructure (Koutsopoulou et al. 2007). Dhar et al. (2011) address some challenges that harden taking full advantage of location-based advertising such as price of transmitted data, limitations of small screens and limited bandwidth.

5.6.4   Mobile Marketing Categories

According to Bernstein Global Wealth manageent (2007), currently most of the mobile based advertisement sent by mobile operators to mobile devices are falling under one of these following four categories. First category is "on deck" advertising that refers to banner advertisements that are displayed on mobile web pages. Second category is general mobile web advertising where publishers share their advertising inventory with their partners. Third category is "opt-in" SMS advertising that enables customers to explicitly confirm to put their phone numbers in the list in order to receive promotional text messages.

Forth category is local search. Local search is a subset of mobile search that enables users to enter search entries in search boxes embedded in operator mobile portal or other search engines. There are also some websites such as Getlisted.org that estimates how efficient the presence of your business in major search engines is. Among billions of Google queries per day 20 per cent of enquiries are related to location (Quelch & Jocz 2012). Depending on the location of the mobile users search results can be refined. Users can continue search process by using local structured directories or through answering more specific queries.

Contents of structured directories change based on the user current location, there might be different local businesses under the same category in different places. Search providers can also use search histories to further customize and personalize search results.

According to (Lin et al. 2013) four types of information is collected from users to better filter and customize advertisements and search results.

1. Keywords that are used by customers for locating special promotions, the system can predict needs of users and reduce the range of search.

2. Contextual data that can be collected from users in real time such as (time, location, weather).

3. Consumer demographics is the third source of information which are highly useful in location-based services.

4. Behaviors and feedback of customers help marketers to improve advertising strategies.

According to Emarketer (Emarketer 2014 b), US mobile search spending is forecasted to reach $28.4 billion or 85.9 per cent of total US digital search market (Figure 5.6).
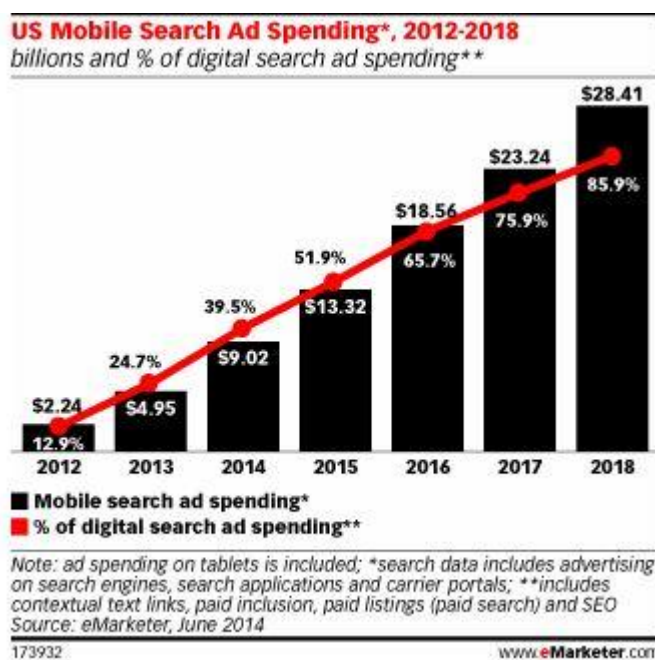
Figure 5.6 US Mobile search Ad spending (Emarketer 2014 b)

Advertisements shown on interactive maps with geotagging capabilities can be defined as a fifth category. Geotagging capabilities also allow users to find their point of interests on an interactive maps and supplement that map with other layers of information.

Geotagged data in the form of reviews about places and images are incorporated to online maps. Customers experience a unique level of control over what they see and read on their mobile devices through ubiquitous interactivity offered by mobile Internet networks. In this type of icon-based advertising, advertisers pay to have a clickable icon on the top of the maps in navigation applications (Bernstein Global Wealth Management 2007). Some application providers may unify user preference and search history to further customize the advertisements.

In map-based advertising location information are complemented with other location-dependent information such as offers from restaurants, shopping malls and entertainment venues. Imagine a user who is driving on the road, as he reaches in proximity of the advertisers he can have real time disposal at information about them (Keikhosrokiani et al. 2012).

Local search and interactive map advertisements are examples of location-based advertising. There are many applications that integrate the characteristics of local search and interactive map advertisements at the same time. Yelp Mobile is an application that integrates characteristics of local search and interactive map advertisements enabling users to search for the nearest point of interests. Users can refine search results and see them on an interactive map. Search results can be filtered based on price, distance to current location of the user, opening hours of the venue and other general features (Figure 5.7).
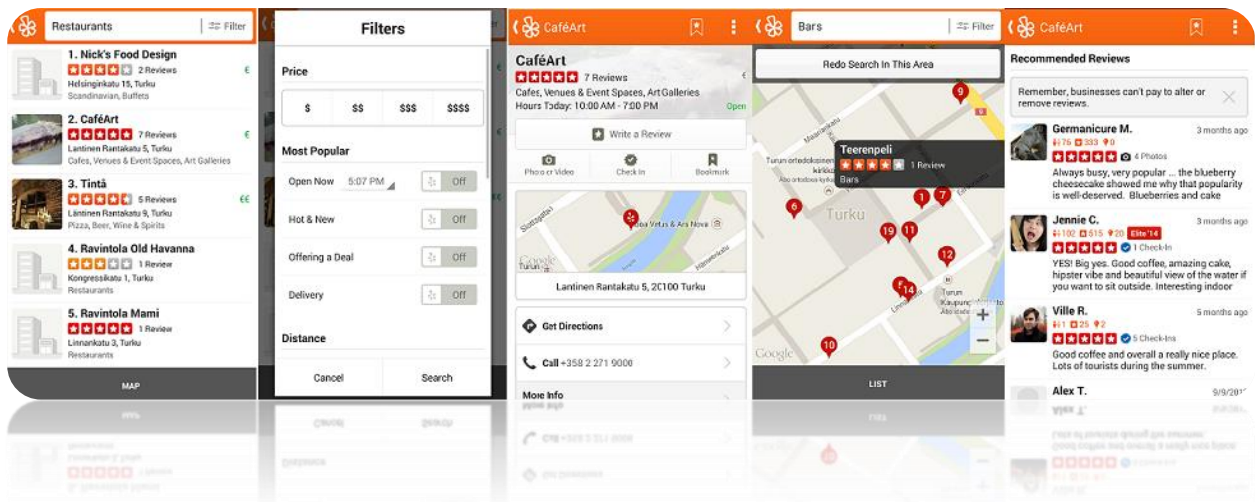

Figure 5.7 Yelp Mobile search results (image taken by author)

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6 LOCATION-BASED MARKETING CATEGORIES

6.1 Location-based Social Networks

6.1.1 Concept

Location-based social networks (LBSN) can be defined as the social networks which integrate user-generated contents such as status, pictures and blogs with geographic information. Attaching location information allows users to become aware of their friends location as well as sharing their own. Some social network sites (SNS) have reinforced themselves with location-based technologies. On the other hand, some new location-based social networks such as foursquare are formed exclusively based on location-based concepts and technologies (Sui & Goodchild 2011).

There are two methods for sharing location information in LBSN (Elwood et al. 2009). First, "geotagging" (Turner 2006), in geotagging location information is attached to a digital artifact. An example can be what is currently happening in Facebook or Twitter, people supplement their pictures or tweets with location information. Second method of location information sharing is "geosocial networking" (Roick & Heuser 2013), people share their activities along with their location in a specific time. For example, Foursquare users share their whereabouts with their social network by checking in different places. Many of these applications have gaming capabilities to motivate users to share their locations and encourage consumption behavior (Tussyadiah 2012). Marketers can use available interpersonal networks in social networks to promote their goods and services.

Sui & Goodchild (2011) categorized location-based social networks in three major groups:
- Social check-in sites (e.g., Foursquare)
- Social review sites (e.g., Yelp)
- Social scheduling /event sites (e.g., Meetup).
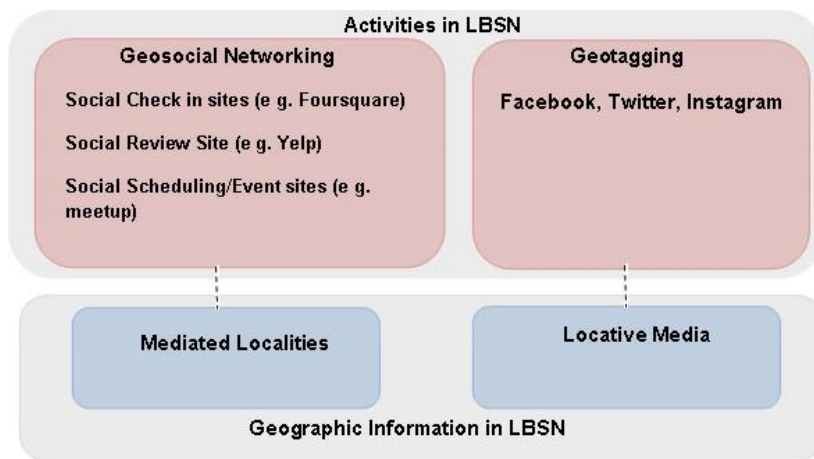
Figure 6.1 Activities and Corresponding geographical Information in LBSN

Tang et al. (2010) mark a difference between two major types of location-based social networks, purpose-driven and socially-driven. Purpose driven social networks are networks where people share their current location to imply some meaning to someone. On the other, hand there are social driven social networks where social expression motivates the user to share their geographical information.

Buzkofski (2012) also categorize location-based social networks by taking into consideration the devoted functionality of services:

- Location-based social networks
- Location referring services
- Location-based social networks with geotagging functionality.

6.1.2   LBSNs as the marketing mediums

Increase in the number of mobile social networks has been mainly driven by significant number of social media platforms' users and growth in the number of smartphone owners. Location-based social networks are a valuable source of information about customers. They allow marketers to gain more knowledge about their customers through studying their behavior and lifestyle such as where when and how often they check-in to different places. Location-based social networks also provide some demographic and psychographic information about customers to marketers. In marketing management, context has been understood as an important aspect influencing customer's decision. Smartphones are equipped with sensors, mostly GPS receivers which continuously retrieve their geographic location and attach it to other information such as preferences, social context, and temporal context. This process would lead to enrichment of the user-generated contents with location as a new layer of context.

Internet provides some new competitive opportunities via the employing of mobile marketing strategies. It is worthy of note that technological progress and the applications enabled by these advancements play a key role in creating competitive advantage in modern business operations. Developments in broadband wireless Internet technologies along with advances in web 2.0 shifted the way information is created on the web. These developments led to increasing interest in location-based social networks marketing. Local business started to utilize LBSN to promote their products and services and use it as a "platform of social connections and competitions" (Tussyadiah 2012). Social network sites attracted millions of users and the role of these users has changed over time. They are not solely consumers of Internet content anymore, Tascott (2011) proposes the term "prosumer" for the new role of users. Users can distribute and browse geographic data on the web, big names such as Google employ the user-generated contents to enhance their services (Roick et al. 2013).
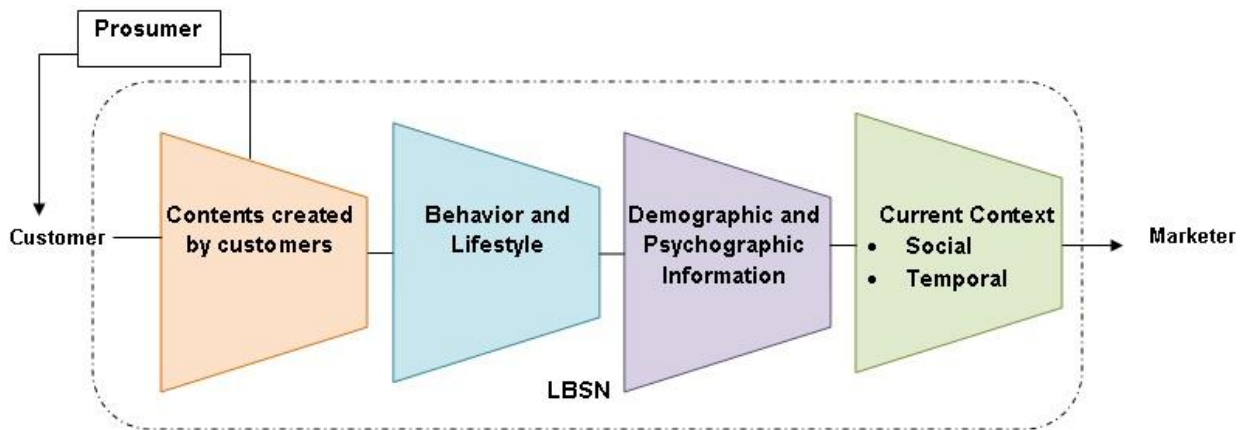
Figure 6.2 Location-based social networks are the valuable source of information for marketers

According to Emarketer (Cohen 2011), number of people who are using social networks through their mobile phones will increase from 23.8 million in 2009 to more than 79 million in 2015, figure 3.6 in the next page shows the number of US mobile social networks users. Location-based social networks are a new channel of information and promotion of own content. In addition to sharing the location of user, location-based applications with thousands of users bring up the social element as a benefit. As soon users receives the real-time relative information about their preferences on their devices they can create their own content and spread it over other users (Wilken & Sinclair 2009).
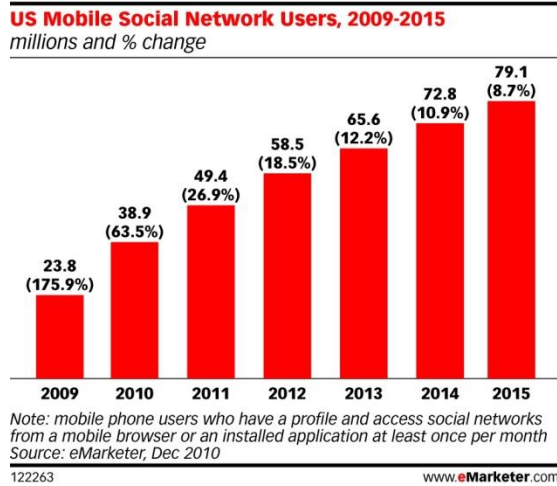
Figure 6.3 US Mobile Social Network Users (Cohen 2011)

Businesses that derive advantage from location-based social media are mainly those with physical existence (Datamonitor 2011). Most of the time customers use the applications that provide user-generated appraisal about different places (Figure 6.4). Location-based social networks applications motivate people to "consumption of places" by sharing their negative or positive experiences and recommendations (Tussyadiah 2012). For example, Foursquare provides social recommendations through tips. Around two-thirds of users post tips on Foursquare (Techcrunch 2011), customers tend to consider the opinions and behaviors showed by a large number of people and are influenced by others beliefs (Leenders 2002). Many businesses that are Foursquare's users as well use tips to promote their goods and services (Vasconcelos et al. 2012).

Figure 6.4 Customers share their experience by leaving tips and recommendations (image taken by author)

Some smartphone applications combine location-based technologies to gaming features. For example, Foursquare and SCVNGR reward users for special accomplishments, in addition to being an LBSN, Foursquare features itself as a mobile game at the same time. Tussyadiah (2012) believes incorporating context relevancy and gaming features into one package can stimulate loyalty behavior of customers. Users are exposed to different marketing stimuli from different venues such as connection-based rewards, competition-based rewards, and system rewards. The higher the customers perceive rewards the more willingness they have to be loyal to the business.

Murphy USA, a gas retailer company, launched a campaign on Whrrl LBSN. Customers could check-in when they are in one of Murphy's gas station and win instant prizes ranging from free drinks to daily fifty dollars gas voucher. The campaign was very successful in attracting new customers, 40 per cent of customers checked in for the first time into a Murphy's gas station (Quinton 2011).
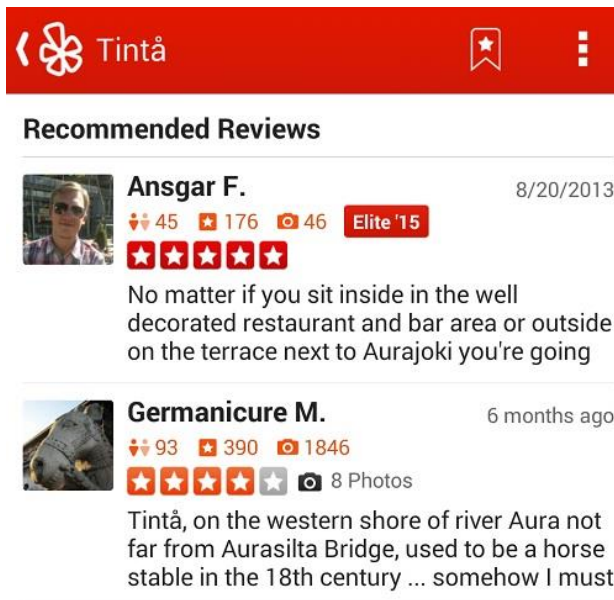
6.1.3   Foursquare

Check-in-based LBSN such as Foursquare propagate themselves as an interactive, entertaining tool by which a user can explore whereabouts in a city. The gamification characteristics such as achieving the target number of visits or accomplishing a set of tasks are referred as the commercial gamification aspects. These aspects are blended to LBSN and transform shopping malls, restaurants, and bars to places where customers can explore in order to find prizes and points (Brown 2014). According to numbers available on Foursquare website, the total number of users are 50 million people with one million check-ins per day who have checked-in over 6 billion totally. Over 1.9 million businesses have claimed their locations officially.

Check-in is the action referring to expressing a visit to a place on one of the location-based social networks. As users visit a certain number of unique venues or visit especial places, the service awards them virtual badges. These badges raise the level of customer engagement and promote the game aspects of service. Foursquare simplifies the interaction between customers and brands by awarding virtual badges dedicated to those brands (Humphrey et al. 2011). A person who has visited the location more than others is rewarded the title "Mayor". Swarm special is rewarded to a group of people who check in together into a venue. "Newbie" special is rewarded to people who check-in into a venue for the first time. In this way, smartphones work as loyalty cards, customers who check in into venues are rewarded loyalty points that are stored in their mobile phone.

Exact position of a user is determined through GPS technology or wireless positioning system. As soon as locating the user is done nearby points of interest is delivered by application, user can select venues to check in. Previously visited places are distinguished as favorite places and place

on top of the nearby places. Users can write in comments and tips, take pictures or update their status and syndicate it to other social networks such as Facebook or Twitter.

On May 2014, Foursquare broke itself down to two different applications by introducing Swarm and new Foursquare application. Users check in through Swarm, but other information such as tips, offers, photos and venue information are still reachable at Foursquare. Swarm hosts the gaming and social characteristics of Foursquare with main focus on friends circle of the user. Some gamification aspects such as "badges" and "Mayor" are not available anymore. Instead of removed features Foursquare has introduced some new aspects such as"Neighborhood sharing ", Stickers and "Mayor 2.0". "Neighborhood sharing" allows users to share their general location in terms of distance from friends or approximate neighborhood. With Mayor 2.0 users compete with their friends but not with a total stranger as it was in the previous version. A person who has been in a venue more than others is awarded a crown sticker, therefore, each place can have more than one mayor. Other stickers can be attached to check-ins to express how users are feeling or what they are doing.
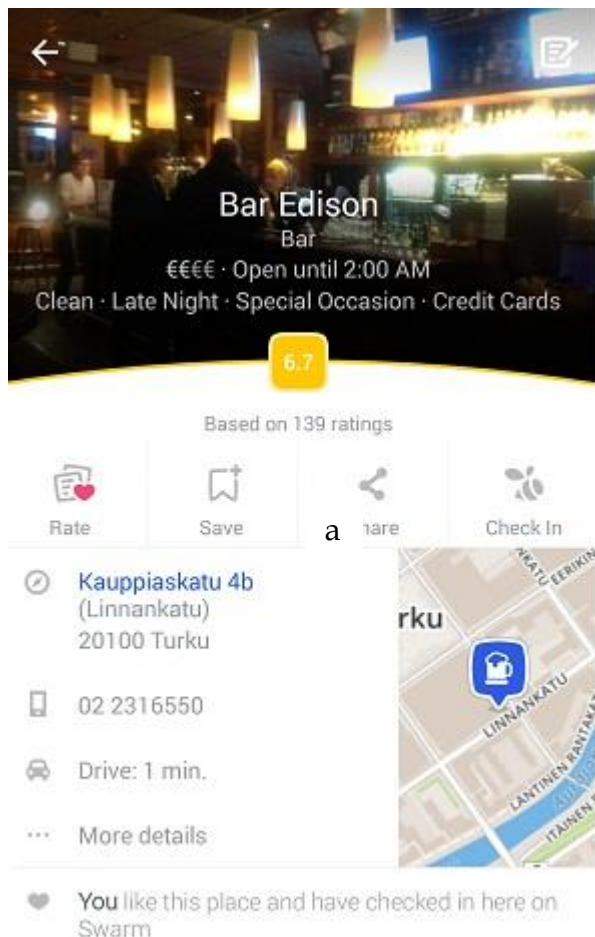
Figure 6.5 A venue page in Foursquare (image taken by author)

6.2 Location-based Analytics

Not as a marketing method but a tool that supports marketing initiatives, use of location-based analytics enable businesses to monitor customer behavior and motivate them by special offers. Companies such as Foursquare use the number of check-ins in a particular business as a milestone to analyze the competitiveness of a particular business and popularity of a place (Noulas et al. 2011). User tips and reviews have the potential of affecting information sharing and business marketing (Vasconcelos et al. 2012).

6.3 Location-based Gaming

Location-based gaming is defined as a form of a game that is designed to be played on a moving device and game experience alters based on the geographic location of the device (Lehmann 2011). Location-based games require a player to go to real places in the real world and do specific tasks (Matyas 2007). Lehmann (2011) proposes four patterns which are used in the certain type of location-based games:

- Search and find: user has to find a certain location or a certain object. Main idea behind this pattern is to encourage people to reach a certain destination in the real world.
- Follow the path: this pattern is very similar to search and find but the focus is on the route user travel to reach the destination.
- Chase and catch (Misund et 2009): in this pattern the goal is to hunt a moving object in the real world. The destination is constantly changing, mobility of the object makes it more challenging.
- Change of distance: the main goal is to get closer or distance from a certain location or object.

Figure 6.6 Graphical presentation of game patterns (Lehman 2011, 2)

As argued in LBSN marketing, many LBSNs offer gaming features to their users, yet there are many location-based applications designed specifically for gaming purposes. Buczkowski (2012) identifies two main streams of location-based games used for marketing purposes:

- location-based games specifically designed for gaming.
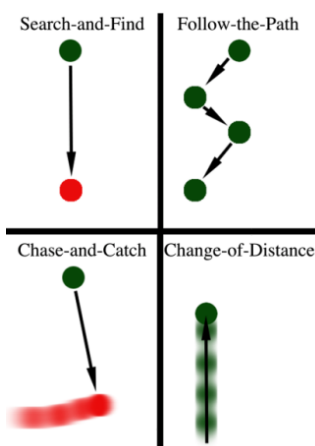- using gaming features of location-based social networks.

In LBG marketing, people are rewarded with tangible or intangible rewards for their accomplishments. One possibility to use LBGs for advertising purposes can be showing advertising banners related to geographic location of players. Local businesses can promote their services and products by offering discounts to players who are near to their shop. Another possibility is to ask users to accomplish a certain mission (e.g., hunting an object in the real world) or to reach the venue (Tussyadiah 2012) in order to earn some rewards. These tasks eventually will lead to venue selection, interaction, and communication. Different marketing stimuli might yield different results for customers that are in different social network structures and have different consumption situations (Tussyadiah 2012).

SCVNGR is a location-based gaming platform that serves both customers and enterprises, many businesses have partnered with SCVNGR to motivate customers walk inside their locations. Businesses can create highly customizable challenges. Customers will be rewarded by points or real world prizes when they do those challenges. AT&T launched a location-based marketing campaign with SCNGR which rewards people who do certain tasks in more than 50 locations from a simple gift card to 20 per cent discount of any accessories (Van Grove 2010).

McDonald's China teamed up with Rovio, a Finnish game developer to launch a location-based marketing campaign. Customers can benefit from promotions and unlock special contents while they are eating. These rewards vary according to the branch they are inside. Customers also can vote for their favorite branches through the application (Hutching 2012).

6.4   Indoor Marketing

Location-based marketing services are less appealing to businesses without any physical presence. Some CPG (Consumer Packaged Goods) brands have come to the conclusion that a physical presence offers customers brand experience and enhance brand differentiation (Datamonitor 2011). Location-based mobile apps can be used to enhance customers in store experience, delivering targeted promotions when they reach proximity of certain products increase the time they spend in store and unplanned spending. Customers check in and enter a list of products they wish to buy and see related promotions to that products. Upon entering the store, a relevant persuading message, coupon or offer can be sent to customers to motivate them for purchasing.

Mobile marketing enables marketers to deliver messages that invoke customer's attention with a high degree of relevancy as they approaching point of purchase. Location-based shopping services mobile apps are mainly developed to motivate customers to walk into stores. Shoppers

are rewarded with points by checking in or simply for just coming into stores. Additional points are awarded for purchasing or writing tips and comments.

According to Datamonitor report (Datamonitor 2011), 55 per cent of companies rated shopper marketing as their main marketing investment intending to increase the investment five per cent annually. There are some shopper applications such as Checkpoint and Shopkick that motivate customers to go inside stores and look at products in the shop in order to find deals and coupons. Indoor marketing methods can be utilized to send a message to customers based on their shopping preferences just before the point where purchasing takes place. Relevant advertisements in a relevant surroundings or conditions will cause a higher level of engagement (Parsons 2007, Storey 2007). Location-based advertising connects advertisers to customers at critical spatiotemporal points such as points of purchases.

Luff and Heath (1998) define the concept micro mobility as"the way in which an artifact can be mobilized and manipulated for various purposes around a relatively circumscribed area ". Micro mobility is characterized by two issues that allow shop owners to provide value added information to customers that exactly fit their current context: 1. Boundaries of location is clear and exact where it is obvious when they are inside and outside the store. 2. The mission is relatively explicit, find products and buy them.

Hosbond & Skov (2007) designed a context-aware shopping trolley. Customer can specify the list of products. Products are displayed on the screen mounted on top of the trolley. Shopping list is updated when a product is picked up and placed in the trolley. System offers an indoor map showing the physical location of shelves and products. As customers move inside, the store shopping list will be reordered based on the proximity to the products (Figure 6.7).

They also developed a personal shopping assistance system which includes a trolley equipped with a mobile PC and barcode reader. Customers can evoke their pre-defined shopping list by passing their shopping card through the barcode reader. System is already aware of the location of every products, it can locates the trolley when customers stand near the shelf, collect one product and scan its barcode. System provides relevant advertisements, offers and information by analyzing the behavior of customers and their shopping history. Service allows business owners to deliver advertisements at the right time and right place to the right customer.
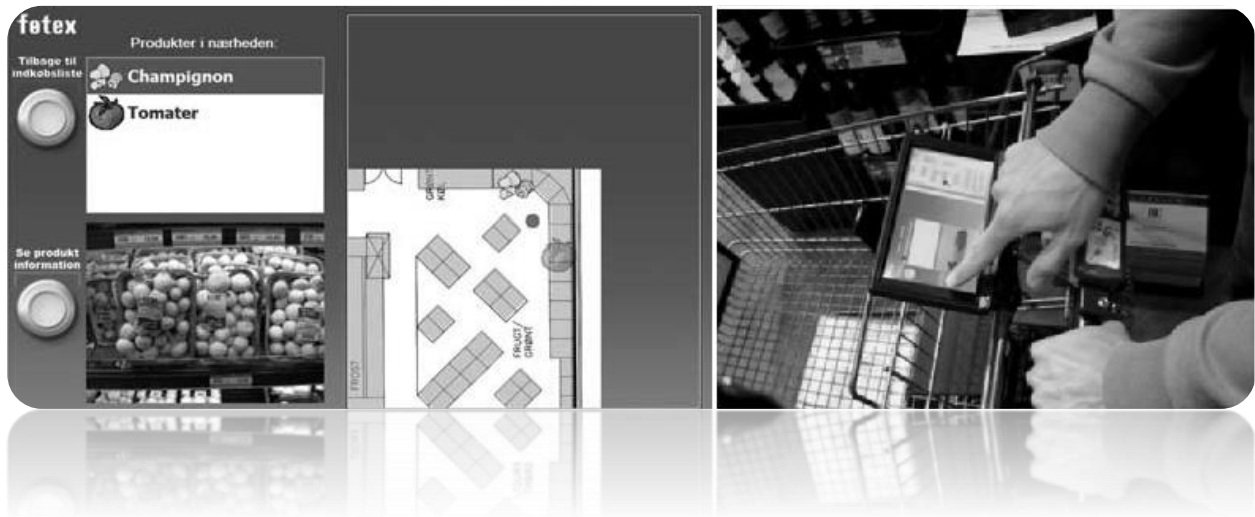
Figure 6.7 the visual presentation of products from the shopping list and their exact location.
(Hosbond and Skov 2007, 71)

Shopkick is a customer loyalty application which reward prizes to customers who enter the shop. Customers can use Shopkick when they are inside a store or shopping mall to acquire points and discover special offers and rewards (Figure 6.8). Merchants can pay Shopkick a small commission based on the number of people who walked into the store or on users' purchases.

There is an in-store small beacon that emits signals, once the signal is detected by smartphone the application installed on the smartphone realizes that the user is inside the store. Customer can earn more prizes by doing simple tasks such as going to a dressing room or scanning barcodes (Figure 6.8). Points collected by customers can be exchanged for some goods such as DVDs and Facebook credits (Constine 2010). American Eagle is using Shopkick in 100 stores. When Shopkick users come into one of the American Eagle stores, they are sent messages notifying them about special offers such as offers of jeans (Lunden 2014). Figure 6.8 presents Shopckick steps from locating the users and finding nearby shops to rewarding points based on the accomplished tasks by them.

Figure 6.8 Shopkick steps (Ask 2010)

Until February 2014 Shopkick rewarded shoppers with 25 million dollars and brought 800 million sales to its partners. 35 million customers walked into participating stores and scanned 70 million products (Grant 2014).

6.5   Proximity Marketing

6.5.1   Concept

Geographical and information barriers between customers and business owners have been eliminated by location-based advertising. Customers easily receive advertiser's offers when they are in vicinity of businesses (Bruner and Cumar 2007). Panderea et al. (2010) define proximity marketing as "distributing localized wireless advertising contents to interested users based on their location". Unlike other location-based marketing types which utilize geographic coordinates obtained from GPS, in proximity marketing mobile devices are located from device interaction with objects of known location (Rashid et al. 2008). Prevalent positioning systems in proximity marketing are wireless technologies such as Bluetooth, NFC and Wi-Fi (Meghanathan 2011).

Panderea et al. (2010) propose an architecture for proximity marketing that is composed of client and server application to distribute information about special offers to 802.11 enabled users who pass by a shop. Location of mobile devices is obtained by using a Wi-Fi fingerprinting approach which measures the intensity of the received signal. As soon as the location of devices are obtained, server sends an SMS containing advertising content to users. Users can install an application on their mobile devices that enable them to set their preferences therefore they receive advertisement tailored to their needs.

Rashid et al. (2008) proposed a location-based advertising solution based on Bluetooth technology for distributing highly localized advertising information contents. Bluetooth location-based systems are a suitable choice for indoor proximity detection and targeting users in a specific location. Devices equipped with Bluetooth can be located with the accuracy of fifteen meters, to increase the accuracy between 3 to 10 meters it can be supplemented with fingerprinting techniques (Humphrey & Laverie 2011). The system can broadcast advertising messages at an accuracy of 10 meters to any Bluetooth-enabled user. Figure 6.9 presents the architecture of the system.
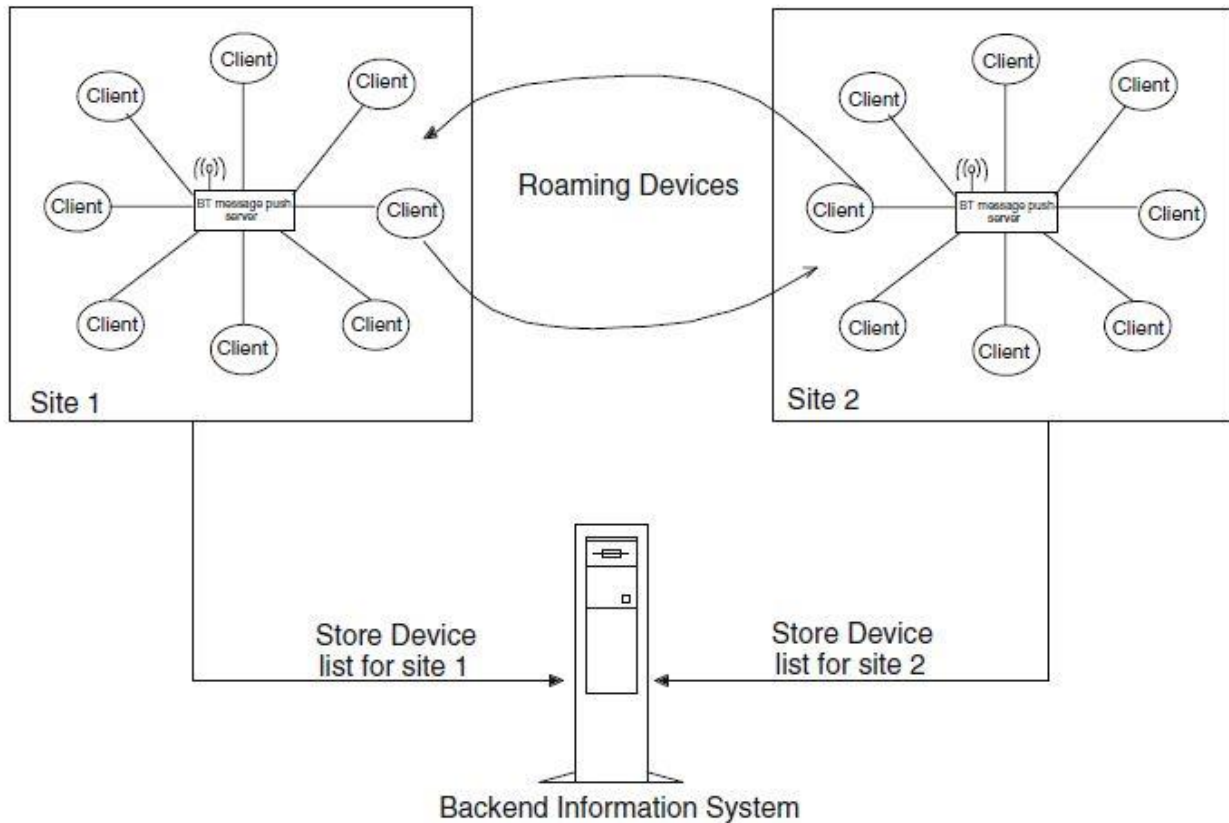
Figure 6.9 Location-based architecture proposed by (Rashid et al. 2008, 6)

Since the range of Bluetooth devices is very short (from five to 100 meters), the accuracy of positioning depends on the class of devices. Among all of the different range classes two of them are most popular (Bluetooth Technology Website):

Class one: range up to 100 meters (Most of the time 20 to 30 meters).

Class two: range up to 30 meters (In most cases five to 10 meters).

Keikhosrokiani et al. (2012) designed an application that asks about user preferences and interests, then collects promotions and advertisements relevant to user's desires. Those advertisements are sent via MMS/SMS while user is passing by advertiser's venues. Positioning can also be done through GPS or AGPS, precise location information will be transmitted to servers via mobile network that is responsible for transmitting data between clients and server. GPRS is used to transmit the normal data whereas the multimedia data (voice, video) can be transmitted efficiently with 3G (Keikhosrokiani et al. 2012). As soon as the server receives the location data, available promotions and offers near to that location will be sent to the user through MMS/SMS.

Macy's, a chain of department stores has partnered Google proximity marketing platform, nearby, to let its customers where to find the items they are looking for. Customers can use the platform to find if the items are in stock in nearby branches (Rodriguez 2014).

6.5.2   Geofencing

The advent of mobile devices equipped with GPS receivers made it possible to utilize proactive LBS that constantly track the geographical position of the device. These services trigger an action as soon as a previously defined location event occurs (Bareth et al. 2010). Main point is to discover relevant locations where the customers might be receptive to deals.

Geofencing can be defined as a set of predefined virtual boundaries around a physical location (Buczkowski 2012) that confine the location-based services to a well-defined physical area. This area varies from a small shop to a large shopping mall (Sheth et al. 2009). In geofencing, the mobile device receives event configurations from one or several application servers and then starts a positioning process in the background. As soon as one of the events occurred, mobile sends a report to the respective application server (Kupper et al. 2011). Usual location events are entering and leaving the place or staying inside or outside a region (Bareth et al. 2010).

Unlike the conventional LBS where users initiate a service by sending their position to a server, the next generation of LBS work with publish/subscribe Model. In publish/subscribe model users subscribe for a service that proactively pushes information to them as soon as location event triggers. Geofencing is supported by SUPL 2.0, a protocol that supports triggered services. Mobile devices periodically send location updates to the server, when user enters a geofenced area an event would trigger. Client that uses location-based services is notified by entering inside or leaving a geofenced region. Consider a use case that a restaurant wants to provide some discounts only to customers sitting inside the restaurant and none from the outside. As soon as customers come inside the venue a location event is triggered, and available offers notify customers.

There are several examples of location-based marketing/advertising campaigns employing the combination of background tracking and geofencing to keep their customers informed about available benefits and discounts. AT&T has developed a location-based advertising service in Chicago based on Geofencing. Using this service advertisers can deliver coupons to customers who enter or leave their geofenced area (Quelch & Jocz 2012).

Geofencing offers an easy way for delivering information at right time at the right place to people who might need it (Bareth et al. 2010). Background tracking continuously tracks the location of mobile whether the device is standby or running a service (Kupper et al. 2011). Therefore, the device is always aware of its location and may transfer its location to a remote server when device enters or leaves a geofenced area.

AT&T has introduced a cloud-based mobile marketing platform named messaging toolkit. This platform enables small-to medium-size businesses which otherwise may not have enough bandwidth to independently launch and customize mobile marketing campaigns and deliver their offers, promotions and updated products' information to customers. The service can be accessed through a web portal. It offers a unified solution which incorporates several different platforms into one service. This messaging toolkit can collect customer's feedback as well and deliver alerts and notifications to customer communities (Channel Insider 2011).

6.6   Mobile Location-based Couponing

Mobile location-based couponing offers couponing services customized based on the user's location and the degree of proximity to a store (Lonthoff et al. 2007). There are many innovative examples of MLBC working successfully with the help of positioning technologies. Due to much and various information dispatched to people, attracting more customers requires a great deal of efforts. In the search of another medium, mobile phones are qualified for couponing purposes.

Traditional mass distribution of messages through mobile networks is suffering from lack of addressing the customer's need. Unlike the traditional method, in location-based couponing system, businesses can target specific groups of customers based on their needs. Location-based services also inform people about nearby shops and bring current offers and coupons as the shopping incentives to customer's notice.

Customers determine their preferences as soon as they login to the system and will receive customized coupons based on their preferences. Company profile has the geolocation coordinates matched with a real specified location. Integration of ePOS with mobile web services allow marketers to match customer's data against the type of coupon they use to investigate their behavior and degree of responsiveness to different marketing campaigns (Datamonitor 2011).

Lonthoff et al. (2007) specify several feasible scenarios based on the actors who are involved in mobile location-based couponing and their goals.

Scenario 1: Positioning is not the main concern of the brand. Shops are large enough that can be found without the help of positioning systems even if the position is not determined exactly.

Scenario 2: Information sent to recently arrived visitors, again there is no need for very accurate positioning system. Knowing from which direction they are entering is enough to offer available coupons at nearby.

Scenario 3: Large number of shops located together in a restricted area such as shopping malls. Business owner work together or have a common mechanism for planning and maintaining marketing activities. Shops can draw more attention and attract more customers. Positioning must be accurate and need to be supported by indoor positioning methods.

Scenario 4: One shop is responsible, and it should not cover long range. Shop owners want to make their shop known to customers nearby. They must be able to enter the shop immediately.

Groupon application enables users to meet an excessive amount of deals and discounts in their local areas, users can search for local deals and see the exact location of deal on the map. Groupon qualifies customers to purchase products and services at a reduced price level when a critical number of customers are ready to buy at that price.
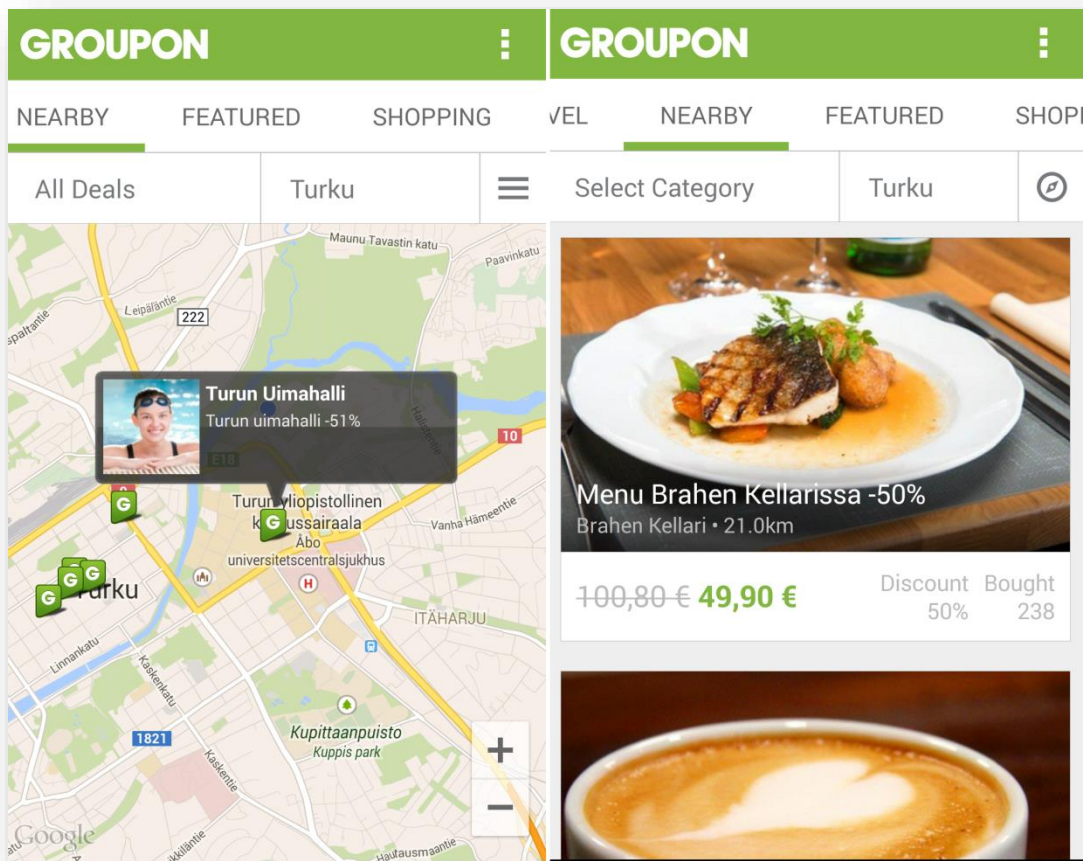
Figure 6.10 Groupon: Local deals and coupons (Image taken by author)

One newly opened restaurant in London launched a campaign in partnership with Groupon to promote 8£ coupons with real value of 20£. Merchant set the target to 400 but at the end of the campaign 3600 coupons were sold (Groupon 2012).

7 OVERVIEW OF FINNISH LBS PRODUCTS AND SERVICES

7.1 Introduction

Providing of location-based services requires partnership between many actors, in this chapter we take a look at LBS services and products are offered by Finnish SMEs. We have investigated products and services offered by 16 Finnish SMEs. Products and services offered by these companies have been identified and explained concisely. Some Companies were chosen based on a directory published by TEKES (2007), the Finnish funding agency for innovation that lists companies that are active in location-based services value chain. As there are a lot of new startups that develop numerous innovatie mobile applications we excluded them in this study. Products and services offered by big companies are also excluded from the study as they are more or less the same all over the world. The main source of data collection was companies' websites, in case there was no information about the products and services companies were contacted by email to provide additional information. This report helps readers to become familiar with Finland LBS market and better position their business in a value chain.

Location-based services incorporate location information to business processes. Many business processes in an enterprise are relying on location information especially in sectors with distant workers or moving assets. These businesses need to monitor their personnel constantly and assign a new job to them. As discussed in previous chapters, the revenues from location-based services are forecasted to increase considerably. The major areas of expertise in Finnish SMEs are software, hardware and mobile applications. The companies studied in this chapter can be segmented by the type of technologies they are concentrating on such as satellite-based positioning systems (GPS family), network-based positioning systems (GSM networks) and indoor positioning devices.

Although the term LBS is associated with mobile applications but location-based services are not limited only to mobile application. Every service that utilize location information or every device that collect or process location data stand as LBS products. Participants in Finnish LBS market can be divided into two major groups. Companies that are concentrating on manufacturing hardware products and companies that have focused on the development of software solutions.

7.2   Results

7.2.1   Hardware

Location information is the fundamental part of any location-based service, obviously many of the products and services in location-based ecosystem are related to obtaining and processing location information. Some Finnish SMEs, mainly hardware producers, are concentrating on manufacturing electronic devices that obtain and distribute location information. These series of products comprise three main categories such as GNSS hardware, GSM-based positioning technologies and indoor positioning facilities.

Most prevalent implementation of GNSS hardware in Finnish market is GPS family technology. GNSS receivers receive and process the signals emitted by the satellites. Some Finnish companies in our sample offer GNSS receivers, two of them have been engaged in European space projects for a long time. GNSS receivers in most cases are incorporated to network-based positioning systems to form a hybrid positioning system. Finnish companies also complete their production line by producing some network-based positioning systems. For example, 4TS Oy has developed a GSM positioning technology that complements GPS. Using this technology, customers can monitor their assets indoor as well as places where there is a good coverage for outdoor positioning systems.

Twelve companies out of sixteen, offer at least one form of positioning systems. Positioning systems offered by Finnish companies comprise a wide variety of products ranging from GPS chipsets to small beacons. Ten companies produce at least one outdoor positioning system or network-based positioning system. Number of companies offering indoor systems is much less than those offering outdoor positioning systems, only four companies manufacture indoor positioning devices from which only two concentrate solely on indoor positioning systems: IndoorAtlas and Ekahau.

Beacons and wireless tags are two indoor positioning products offered by Finnish SMEs. For example, in our sample one company manufactures beacons to locate people in indoor locations where GPS is unavailable. These beacons report to an alarm center that is equipped with GPS technology. Another Finnish SME in our sample produces Wi-Fi tags, these tags are attached to moving assets transmitting location information.

It is worthy to note that some Finnish SMEs offer patented methods but not necessarily physical products. For example, IndoorAtlas provides cloud-based indoor positioning services. IndoorAtlas offers a patented technology that uses earth magnetic field to locate mobile devices with the accuracy of 1-2 meters, just as lobsters using earth magnetic field when they are migrating across the oceans. Nowadays almost all smartphones have a magnetometer, and users only need to upload indoor map and then make a magnetic field map of the building by simply walking through it. Every place has its unique magnetic fingerprint; IndoorAtlas uses that

fingerprint to locate the mobile device. They also offer an SDK (Software Development Kit) that enable software developers to design location-based applications for both iOS and Android operating system.

Another example is a wireless real-time location system (RTLS) developed by one Finnish company. RTLS enable enterprises, especially hospitals to locate their assets, people and staff in real-time using current Wi-Fi infrastructure. Location information of people and assets are automatically updated, and their position can be reported to other systems and people.

7.2.2   *Software Solutions*

Another major area of expertise is software products. As discussed before, location-based services are not limited to mobile applications but any solution that use or analyze location data or accomplish business processes that are heavily related to location data.

Eleven Finnish SMEs in our sample offer at least one form of software from which five companies develop these software to supplement their hardware products, not as independent software solutions. GNSS application is the most common software offered by these companies. Another six companies develop software solutions from which only three companies offer software products solely. Most prevalent software solution offered by these six SMEs are location-based enterprise solutions. Only one company develops location analytics solutions, and only one company offers its location-based enterprise service over the cloud.

Location-based enterprise software comprises wide variety of solutions such as fleet management, natural resource management, distant workers management and location intelligence software. These solutions can be used in different sectors such as the forest industry, transportation and warehouse management.

The most popular software product in our sample companies is distant workers management solutions. Three companies out of five companies that specialize in software products develop at least one asset management software. For example one Finnish SME has developed a location-based ERP that gives a very clear view of employee's position and their tasks at a given time. Enterprise customers can perform control tasks simply from a web browser.

Location-based services in many cases are designed to meet the local demands. For example, due to high importance of forestry and timber transportation in Finland, some software companies have developed solutions that fulfill the requirements needed by wood transportation and forestry companies. TransForce™ is a solution for managing and monitoring road transportation, and it consists of a web-based application for monitoring and allocation jobs to vehicles.

Only one out of sixteen Finnish SME in our sample develops a location analytics solution, Ekahau Vision™ is a location analytics software with forensic capabilities that has all the characteristics of a business intelligence software. It visualizes moving objects and people on a map created based on actual floor plan.

7.3   Discussion

Location-based products, whether they are software or hardware complement each other, software solutions are incomplete without positioning systems that feed them with proper location data. Positioning technologies are the most popular products offered by Finnish companies in our sample, three-fourths of studied companies are offering at least one form of positioning technology. Outdoor positioning technologies such as GNSS hardware and GPS receivers are the most common hardware product in our sample. Due to limited availability of satellite-based positioning systems there is an interest among Finnish SMEs to invest in the development of hybrid positioning systems that incorporate both networked-based and satellite-based technologies.

An ordinary person spends considerable amount of its time indoor, in places such as office, airports and shopping malls. Because of the unavailability of satellite signals in such buildings there is no coverage for outdoor positioning systems. As a result there should be some indoor positioning devices that collect and provide location data and navigation software that visualize the actual location of objects and people on a map.

Indoor positioning market is still in its very early phases in Finland. The number of companies that offer indoor positioning products are much less than those manufacturing outdoor positioning systems. Indoor positioning hardware in Finnish market is limited to beacons and Wi-Fi tags and only one software company in our study provides indoor navigation software. It seems that there is a gap for indoor navigation application in Finnish market. Finnish companies can fill this gap by investing in both hardware and indoor navigation software.

Our study shows that hardware products are more popular than software solutions in Finnish market. Location-based enterprise applications, especially workforce management and transportation management, are gaining popularity in Finnish market. It is worthy of note that development of LBS software solution are completely in accordance with national needs. For example, forestry and timber transportation management solutions have a high popularity in the market.

One of the fast growing areas belongs to location analysis where location information is used for predictive analysis purposes and obtaining business insights from location data. As mentioned before only one company in our sample provide location analytics solutions. Location analytics has many different applications, by using locations analytics techniques business can exert more efficient control over their business location and identify their most profitable location. There must be a serious attention to location analytics between Finnish software firms.

Table 3 summarize the location-based services and products offered by Finnish SMEs. Taking a look at this table one can see the areas of expertise in Finland's market and the scattering of products and services between these areas. Obviously location-based services ecosystem is constantly changing, companies and services in the above list may change areas of activity or introduce new services. For this reason this list needs to be updated from time to time.

Table 3 Finnish SME's Areas of expertise

Companies	Positioning Technologies	GNSS Hardware	Indoor positioning Technologies	On-board mobile computers/displays	Telematics Hardware	GNSS Applications	Location-based Enterprise Solution	Location Analytics	Cloud-Based Services	Smartphone apps
4TS Oy	√				√	√				
Arbonaut Oy						√	√			√
Aplicom Oy	√		√	√		√				
Atlas Indoor			√							√
Benefon Oyj	√		√							
Ekahau Oy			√				√	√		√
Fastrax Ltd	√	√								
Fifth Element Oy							√		√	
GSSS Oy	√				√					
Karttakeskus							√			
Indagon Oy	√				√	√	√			
Positron Oy	√	√								
Mobisoft Oy		√		√		√				
Navicore Ltd						√				
Space Systems Finland		√	√		√					
Suunto Oy	√									√

7.4   Limitation

In this chapter, we studied a sample of Finnish SMEs that comprised of only sixteen companies. Our study may not provide a complete, true picture of the Finnish market. One study can be conducted with a larger sample of Finnish firms. The more companies, the more realistic is the picture of Finnish LBS landscape.

We excluded Finnish SMEs that offer mobile applications from our study. Due to the diversity of the application area of smartphone application, there must be a study that investigates

newfound mobile applications and their business models. Location-based advertising, social networking, location-based games and local search application are among the most popular and profitable services.

Our study lacks to identify the main drivers of the Finnish LBS market and their market share. There is a need for a report that use both primary and secondary information such as inputs from current players in the market. That study can conduct a SWOT-analysis of key participants in Finnish market.

8 DISCUSSION AND CONCLUSION

8.1 Summary

Location-based services can be presented as a set of services bundled under one name with the purpose of delivering geographically tailored, context relevant data and information services which are utilizing capabilities of modern mobile devices and mobile networks. Positioning systems determine position of mobile devices using outdoor or indoor positioning technologies. Depending on the location-based application needs, and the geographical location of user, different combination of positioning technologies can be used.

Integration of mobile marketing, contextual marketing and location-based advertising has created a new area named location-based marketing (Li 2011), a two-way communication channel that offer context relevant marketing information and promotions to targeted customers. Location-based marketing simply implies embedding a piece of information in a place that is most probably useful. In this study, we arranged location-based marketing landscape to 7 categories.

As mobile web traffic is increasing dramatically, advertisers try to reach their customers using this media. Among billions of Google queries per day 20 per cent enquiries are related to location (Quelch & Jocz 2012). Depending on the location of the mobile users, search results can be refined. Businesses can pay to place their business higher in search results or directories.

In map-based advertising location information are complemented with other location-dependent information such as offers from restaurants, shopping malls, and entertainment venues. A user who is driving on the road is exposed to constantly changing icons on the map as he gets to the proximity of places.

Location-based social networks (LBSN) can be defined as the social networks which integrate user-generated contents such as status, pictures and blogs with geographic information. Marketers can use available interpersonal networks in social networks to promote their goods and services. Location-based social networks applications motivate people to "consumption of places" by sharing their negative or positive experiences and recommendations (Tussyadiah 2012).

Location based games require the player to go to real places in the real world to do specific tasks (Matyas 2007). Local businesses can promote their services and products by offering discounts to players who are near to their shop. Another possibility is to ask users to accomplish a certain mission (e.g., hunting an object in the real world) or to reach the venue in order to earn some rewards. These tasks eventually will lead to venue selection, interaction and communication.

 Thanks to proxim marketing, customers easily receive advertiser's offers when they are in the vicinity of businesses. Proximity marketing can be defined as a channel that distributes localized wireless advertising contents to interested users based on their location. Unlike other location-based marketing types which utilize geographic coordinates obtained from GPS, in proximity

marketing mobile devices are located from device interaction with objects of known location using wireless technologies such as Bluetooth, NFC, and Wi-Fi.

Indoor marketing enables marketers to deliver messages with high degree of relevancy that invoke customer's attention as they approach point of purchase. Indoor marketing techniques can be used to enhance customers in store experience. Delivering targeted promotions to customers when they reach proximity of certain products increase the time they spend in store and unplanned spending.

Mobile location-based couponing offers couponing services customized based on the user's location and the degree of proximity to a store (Lonthoff et al. 2007). Unlike traditional mass distribution of messages through mobile networks which suffering from lack of addressing the customer's need. In location-based couponing system, businesses can target a specific group of customers based on their needs.

8.2   Conclusion and possibilities for further research

Back to our research question, we have now a clear understanding of LBM methods, their characteristics, brief academic background, and state of the art examples. In this study we arranged location-based marketing landscape to seven categories.

Classifying LBM into these seven categories does not mean that they are not overlapping. Nowadays almost all LBM applications are supplemented by local search and interactive map advertising capabilities. In this way, these two categories are seen as the classic samples of location-based marketing that were prevalent even before the advent of smartphones.
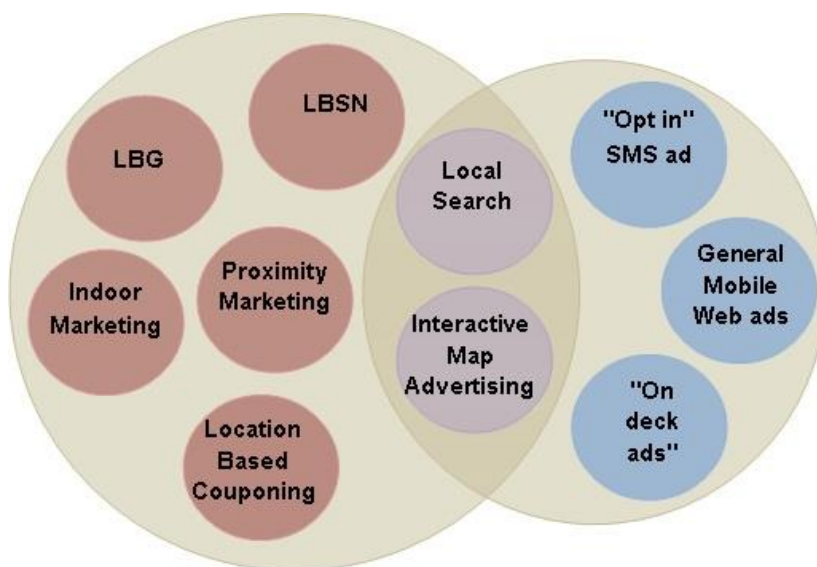

Figure 8.1 Location-based marketing and classic mobile marketing

Use of location-based analytics enables businesses to monitor customer behavior and motivate them by special offers. Companies such as Foursquare use the number of check-ins in a particular business as a milestone to analyze the competitiveness of a particular business and popularity of a place (Noulas et al. 2011). User tips and reviews have the potential of affecting information sharing and business marketing (Vasconcelos et al. 2012).

All location-based marketing methods are context aware, maybe the main mission of location-based marketing is to tailor any marketing activity based on users' context, especially spatiotemporal context. This context awareness was unachievable with the advances in smarthphone, ubiquitous Internet and positioning methods.

Users are pervasively involved in location-based marketing process, any change in the users' context might lead to a change in location-based marketing method. People at different context are exposed to different LBM methods. Sometimes change in context, and therefore change in marketing method might happen as fast as putting a leg in front of another, consider a customer who walks inside a store. As soon as he/she come inside he/she is exposed to a new marketing method.

Figure 8.2 Customers are exposed to different location-based marketing methods at any given time/place

Some location-based marketing solutions such as location-based social networks and location-based games are completely implemented independent of marketer's internal IT resources. There is no need for any extra infrastructure, the only thing businesses have to do is to claim an account in LBSNs. Unlike LBSN marketing methods, implementing an indoor marketing or proximity marketing solution is associated with purchasing and installing indoor positioning and other network facilities.

Each category has a principal attribute that can describe its essence to an adequate extent. A comprehensive, adequate solution could be one that aggregates all these attributes under one umbrella. A solution that transforms according to user context and preferences, on the other hand, enables marketers to know more about their customers. This comprehensive solution can be a location-based social networks supplemented by serious gaming characteristics, local search capabilities and intractive maps. Local search and interactive maps offer most dynamic search results based on user's search profile, spatiotemporal context, and preferences.

Now, it is time for venues to play their role to benefit from proximity marketing. The proposed solution must apply hybrid positioning methods and a positioning process in the background. As soon as entering to a geofenced area, customers are able to benefit from highly localized marketing messages. We are now behind the shop doors, and the solution is incomplete unless we equip it indoor marketing features such as downloading indoor maps and capability of interacting with indoor positioning devices such as beacons.

Location-based marketing is still in early phases of investigation, and both industry and academia are trying to promote their services. Location-based marketing services must be in close touch with customers. Thanks to the big data technologies, user preferences and their social profile are greate sources of information which reveal customers trends and make marketers able to customize their messages to a high extent.

Another area of research could be around the location-based business models. Due to enormous spending on location-based marketing and its multi-player nature, every player must optimize its business models to increase its market share in this fast growing market.

8.3   Contribution

This study contributes to the current available literature on location-based marketing in four ways:

1. Organising the realm of location-based and context-aware marketing. Different technologies and services have been categorized and titled. Current state-of-the-art services are linked to the underlying prior academic research.

2. Helping practitioners to gain knowledge about innovative location-based marketing techniques and to choose the most proper one according to their marketing strategy. This master thesis is organized in a way that introduces location-based marketing in detail to a non-academic reader. Characteristics of context aware marketing with special attention to spatiotemporal context and information needed to target customers efficiently has been discussed.

3. This research gives an especial attention to location-based social networks and location-based games. LBG describes how gamification aspects blended to social media can act as a marketing channel. Another area of especial attention is the new concept of indoor

marketing, building blocks of a successful indoor marketing solution such as indoor positioning technologies have been discussed.

4. Chapter 7 enables readers to become familiar with Finnish LBS market and better position their business in the value chain. Location-based services ecosystem is constantly changing and need to be updated from time to time.

8.4   Limitations

One of the major limitations of our study was that our proposed framework in this research needs to be tested empirically, for example business owners and marketers can be interviewd to know if they really apply these methods practically as their marketing methods.

As the location-based marketing is a new phenomena, the methods discussed in this master's thesis may evolve over time. One of the subjects that was not covered in this research was location analytics. Location analytics techniques study the behaviour of customers, for example their check-ins patterns, to provide useful insight to business owners and marketers.

Our focus in this study was on categorization of location-based marketing methods. Technologies used by businesses to integrate these methods to underlying business processes were not covered in our study. For example server-side programs that are needed to implement location- based marketing and join them to legacy systems need to be investigated in detail.

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