Location Based Services Marketing

Extracting and using location data for marketing

S H U G U O L I

KTH Computer Science and Communication

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Stockholm, Sweden 2011
Location Based Services Marketing

Extracting and using location data for marketing

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Location based services marketing -
Extracting and using location data for marketing

Marknadsföring med positioneringstjänster -
Extrahering och användning av positionsdata för marknadsföring

Abstract

The purpose of this master thesis is to identify the marketing value of location data. Three research questions regarding to the purpose are stated, what’s the meaning of long term location data? What’s the potential marketing value of the location data? And what’s the current situation of the mobile marketing environment?

To achieve this, firstly, gathering location based mobile services are used for tracking location data. Secondly is location tracking method and the data analysis method. Thirdly, Porter’s five forces model is used to discuss the location based marketing environment.

Based on these results, the significant marketing potential is found out. From the location data, the user’s working and living places can be found. Some specific place such as user taking public transportation could be identified with this result. Marketers can deliver more accurate advertising to the user by the location information. Finally the value creation model discussion for location based mobile marketing and different communication channels are discussed.

Overall, the thesis aim to contribute to a better understanding of media management in the location based mobile marketing communications for consumer market.
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1. Introduction

This chapter describes the background of the thesis study, and the problem of this topic. In the end of this chapter the objective and the research questions are proposed.

1.1 Background

Nowadays, mobile phone is regarded as an everyday device. Since most people have a mobile device, it became the most popular personal communication device for the consumers so far (Unni & Harmon 2007). From the early stage (Feldman 2000, Senn 2000) of mobile technology, many experts and pundits predicted the business boom in the mobile commerce field, even though, mobile commerce still didn’t achieve these predictions. International Data Corporation (IDC) forecasts that the total yearly mobile advertising spent in US is around $287 million (Furrier 2009). Still the potential of mobile advertising is just emerging. The ubiquitous Internet will open up huge opportunities for mobile services and mobile marketing. Furthermore, the substantial development in mobile and information communication technology, such as the rapidly increasing of the mobile bandwidth and the ubiquitous Internet accessibility, accelerate the development of mobile marketing communication. Thus, the marketing communication between customers and companies are more interactive. One of the most optimistic predictions predicts that by 2014 mobile advertising will be expected to hit $5.7 billion (Perez 2009). And until now, it’s still the sustainable driving force for the developing of mobile industry. There will be both opportunities and challenges in the mobile marketing field.

Given this new mobile marketing environment, the mobile media present the opportunity for marketers by the new possibilities to interacting with highly targeted customers. Mobile media makes it possible to communicate with the customers by delivering not only the content, but also the direct feedback, or even making the final transactions. The mobile media channel can communicate by traditional video, audio, graphic or text message. Furthermore, the attractiveness of mobile marketing is the potential of contextual marketing. Kenny and Marshall (2000) defined that the contextual marketing is using the contextual situation of the consumer to provide personalized relevant marketing information with the ubiquitous Internet in real time. In this regards, contextual marketing, especially the location awareness or location
based service opened up opportunities for mobile marketing to provide personalized, context-related information to specific target audience (Sultan & Bohm 2005).

The context awareness feature for mobile marketing is obviously motivated by the location based services. Location based services (LBS) could be defined by services which are using position information to improve or enhance the performance and functionality (Jagoe 2002). In this case, location based services includes navigation devices, emergence devices, and other specific devices. In this paper we focus on a personal used mobile device, which is in the sub category of LBS concept. Mobile device is one of the fastest growing consumer products. One of the evidences is that the yearly shipped mobile products amount is more than computers and automobile combined together (Clarke 2001). Location is one of the most significant solutions to meet the consumer’s needs for personalized marketing information. LBS provide a new tool for the marketers to attract more customers and enhance the brand value. The mobility taking advantages will not just enhance the old version of mobile commerce (Rao & Minakakis 2003). It’s revolutionary for the mobile marketing field. LBS create the potential for marketers to reach the individual customer and interactive with them in a new way. The companies who manage the ubiquitous internet will also gain more efficient to target the market segments (David & Marshall 2000).

Indeed, the combination of mobile marketing, contextual marketing and location based services bring a whole new area for media and marketing.

![Diagram](attachment:Location-based-Mobile-Marketing.png)

Figure 1. Location based Mobile Marketing.
In Figure 1, the overlapped part refers to Location based Mobile Marketing which is the research field which this paper focusing on. On one hand, the features of mobile marketing are flexibility, convenience and ubiquity (Keen & Mackintosh 2001). On the other hand, the distinct feature of mobile marketing is the user’s location, his/her situation and his/her mission (Paul May 2001). The location based mobile marketing accurately presents the features of mobile marketing. Combining the mobility and contextual with marketing, it creates more choices and freedom for the customers.

From 2008, the location based mobile services has grown dramatically and in a wide-range. Despite the 4% decline of mobile devices sales, Gartner (Perez 2009) predict the LBS market will grow from 41.0 million in 2008 to 95.7 million in 2009. The revenue will grow from 998.3 million in 2008 to 2.2 billion in 2009 as described in Figure 2.

<table>
<thead>
<tr>
<th></th>
<th>North America</th>
<th>Asia/Pacific</th>
<th>Japan</th>
<th>Western Europe</th>
<th>Middle East</th>
<th>Eastern Europe</th>
<th>Latin America</th>
<th>Africa</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>327.2</td>
<td>327.1</td>
<td>268.8</td>
<td>69.5</td>
<td>4.1</td>
<td>0.2</td>
<td>1.2</td>
<td>0.1</td>
<td>998.3</td>
</tr>
<tr>
<td>2009</td>
<td>713.7</td>
<td>607.4</td>
<td>524.7</td>
<td>303.5</td>
<td>22.7</td>
<td>13.6</td>
<td>12.7</td>
<td>2.8</td>
<td>2201.1</td>
</tr>
</tbody>
</table>

Figure 2. Consumer Location-Based Services, Revenue Forecast by Region, 2008-2009. (Sarah Perez 2009)

To investigate in location based mobile marketing field, Internet marketing will be a good benchmark to compare with. The diagram in Figure 3 shows the evolution of internet marketing from 1995 until 2002, the detailed figure is in the appendix Figure 24 (Todaro 2007).
The duration from the previous internet milestone in 1995 until Internet marketing begin in 2001, is six years for accumulation. And now, the situation of internet marketing could be considered as a mature developing stage. Compare with location based mobile marketing, it just has been tested with some ideas in 2000 (Bond 2001). But even now, it’s still rarely implemented in our daily life.

Despite the market potential, the research in the unique feature of location based mobile marketing is still in early stage and lack of information about user’s attitude (P. Mahatanankoon et al. 2005). A strong need for empirical research in this niche is articulated by practitioners and academics. The aim of this study is to contribute to a better understanding of media management with location based mobile marketing in consumers markets.

1.2 Objective and research questions

In fact, mobile advertising is widely used, but the content has not utilized the distinctive feature from mobile devices. Therefore, the present mobile marketing
strategy couldn’t count to cover the mobile phenomenon (Tähtinen 2005). Location based services have reached great attention in recent years, especially the ability to provide personalized information. To identify the user’s real time location is one of the largest promising features for mobile marketing. From the consumers’ perspective, it’s already realized that information can hardly become free without some form of marketing or advertising involved. However, the commercialization of the location based mobile services has been slowly, due to the low consumer awareness, lack of content, disturbing users and also privacy issues. Merisavo discovered that despite the promise of cost-effective and targeted communications offered by the medium, there is still surprisingly little research and empirical evidence on how mobile advertising actually works. (Merisavo et al. 2006)

After illustrated by the previous paragraphs, the main research question in this thesis is to determine: *What’s the marketing value of location data for marketers and consumers.*

To examine the real value for the consumer and marketer I divided the main question to the following three specific questions, see figure 4.

Figure 4. The specific research questions.
This chapter describes the theoretical studies and related works by other researchers. The theory in mobile technology, advertising and mobile marketing field, the related work focus on the privacy issue related in location based services, and mobile marketing.

2.1 Theoretical study

2.1.1 Mobile technology

The first launched mobile telephone service could be traced back to 1946 by AT&T in the United States (AT&T 2010). Until 1991, the first call over a commercial GSM (Global Standard for Mobile) phone was connected. Over the last few years, mobile technology has developed very fast, as shown in Figure 5.

![Development of mobile technology](image)

Figure 5. Development of mobile technology. (Wikipedia 2010)

With the development of 3G systems, the mobile phone was tightly connected to the internet. It’s possible to interactive more information with the ubiquitous internet. The
released iPhone and Google Android phones will change users’ mobile usage and behaviors. The media technology at the present stage can provide a solid foundation for mobile marketing developing. (Berg 2010)

### 2.1.2 Types of mobile advertisement

Barwise et al. (2002) defined six types of mobile advertisement which can serve for marketing strategy. They are brand building, special offers, timely media teasers, product/service or information request, competitions and polls/voting.

- **Brand building.** For example, in 2003, BMW created a Java mobile game “Formula BMW Racing” to gain innovative brand image by using mobile entertainment marketing. (Key Pousttchi, Dietmar G. Wiedemann 2006)
- **The special offers** in mobile marketing usually create awareness for the existing special offers. And sometimes they provide special promotion exclusively for the mobile service user. Take Foursquare as an example, they offer free beer to the “Mayor” when she/he is close to a specific location. The “Mayor” of a location is a user who checked in on Foursquare more than the other people at a 60 days period (Siegler 2010).
- **Timely media teasers** are used by media to encourage purchase or viewing.
- **Product/service or information request** included mobile telecom company’s promotion, such as the usage of 3G or mobile broadband or new service deal.
- **One of the recent examples** for competitions is “The Nets and Gowalla”. Gowalla dropped 250 pair virtual tickets near IZOD Center in the New York City area. Users picked up virtual tickets which were redeemable for real ones before the NBA game (VaynerMedia 2010).
- **Pulls and voting** are often used by some TV entertainment shows, such as Super Girl (contest). In 2005, the winner got 3,528,308 votes from mobile totally (Jakes 2005).

### 2.1.3 Features of mobile marketing

Marketing approaches can be evaluated in two dimensions, the level of consumer interactivity and the degree of location specificity of the media. TV, print and radio are considered as traditional media. They are lack the interactivity with the audience. And also, the location may be independent of the media channels. For example, the advertisement on a magazine can be read on subway or at home, etc. It doesn’t really react with specific location. But for billboards and retail advertising, are related to the consumer’s location, such as advertisement posters at supermarket. (Sultan F & Rohm A 2005)
Theory and related work

On the other hand, the new types of media are involved much more interactive with consumer. The web advertisement requires consumer’s interactive with “type” or “click”. For example, Google lists the advertisement depending on which keywords the user searched previously. Usually, the web-based advertisement doesn’t match with user’s location that much.

![Figure 6. A comparison of marketing communication approaches. (Sultan F & Rohm A 2005)'](image)

Compared with the traditional media, mobile marketing provides both consumer interactive and location dependence features. This unique value is the fundamentally difference to improve consumer experience. Figure 6 describes the comparison of marketing communication approaches. (Sultan F & Rohm A 2005)

According to Wen J. et al. (2004), there are some other specific features of mobile marketing, they are “always on”, location-awareness, convenience, customization, identifiablity. These features are not available in traditional media channels, and also hard to achieve on traditional internet and computer devices.

1. “always on”
   Mobile devices are initially designed to be “always on” and always portable. This provides possibility to engage in activities such as working, travelling, and social events. Also it will be available to gather the information through network connection.

2. Location-awareness
Theory and related work

Using GPS, cell tower positioning technology, and Wi-Fi positioning technology, mobile phone not only go with the user, but can also recognize the mobile phone’s position. This information in combination with other internet content will create a significant advantage for mobile marketing compare with other internet marketing. Location-awareness creates the availability to send and receive information related to a specific position.

3. Convenience

Communication facilities of the mobile marketing are the key of delivery convenience to the user. It’s not constrained by time and location. For example, when customers are waiting for public transportation, mobile marketing activities could possibly deliver favorite information. This improves the quality of the value transferred to the customer.

4. Customization

It’s personalized device. It’s possible to collect earlier purchasing history of the users, the current advertisement can be based on the previous habits.

5. Identifiability

Mobile phone has built-in IMEI (International Mobile Equipment Identity) code, and also mobile phone number is unique for the user. It can accurately identify a user. It is a private device.

2.1.4 Location Specific Information

Rao and Minakakis (2003) stated that “A key driver of LBS will be a degree of fit between the system’s technical feasibility and the overall marketing strategy guiding its usage.” According to the “system’s technical feasibility”, there are several options for mobile phones to track the current position. The technologies are briefly described in Table 1.

Cell identification also called as mobile phone tracking, cell tower positioning or Cell of Origin (COO). This paper uses cell identification to explain the method which using mobile phone and the communication with cell tower to positioning the location. Even if the mobile user has not dial a call, the mobile devices will communicate with the cell tower nearby. So the approximate location where the mobile phone, and thereby the mobile user could be tracked. For the location based services, it usually does not use triangulation, which calculates a user’s location based on the user's distance to three nearby towers. The cell tower technique will locate the user within about one kilometer. It shows the range of the tower that the user's mobile phone is connecting to. (Gohring 2007)
### Theory and related work

<table>
<thead>
<tr>
<th>Type</th>
<th>Methodology</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Identification (Cell ID)</td>
<td>Base station uses radio frequency signals to track mobile device</td>
<td>Relatively widespread infrastructure</td>
<td>Hard to get user’s exact location to a few meters</td>
</tr>
<tr>
<td>Global Positioning Systems (GPS)</td>
<td>24 satellite network to track GPS equipped mobile phone</td>
<td>Precision within five-meter range</td>
<td>Special device/chips needed, perform poorly in urban area</td>
</tr>
<tr>
<td>Wi-Fi positioning</td>
<td>mobile devices connect to Wi-Fi access points in order to get the precise locations of Wi-Fi</td>
<td>Wi-Fi signals offer a lot denser coverage in some places than cell towers</td>
<td>Special device needed, generally the coverage is not good</td>
</tr>
</tbody>
</table>

Table 1. Mobile positioning methods. (Reardon 2005)

Some location based services combine all the three mobile positioning method together. Using the advantage of Cell identification to get larger range of coverage and fast locate the user’s approximate position. When the users are going out with boat or out of urban place, GPS location technology is the priority choice. For the customers working in office building, Wi-Fi positioning method is a good way to maintain the positioning quality with less time and lower cost.

These technologies make it possible to reach timely personalized services with location awareness. It can also fetch the existing information from the consumer, for instant personal identity, financial situation, purchasing history and also the previous record location based information with purchasing behavior and situational context information in real time (Ramaprasad & Harmon 2007). Location specific information increases the understanding of a new environment. The related information combine with a particular location attribute make the information more relevant and unique. For example, when a student comes to KTH university, information about lectures and mobile marketing information around KTH is relevant for the users.


2.2 Related work

2.2.1 Privacy and Consumer’s perception

According to a Tellab’s survey which was conducted by The Nielsen Company that two-thirds of mobile users around the globe are interested in context related or personalized content (eMarketer 2010). Although the survey didn’t ask the users whether they want to be marketed based on their location, time and social settings. They got the result from users that the context information is welcome to be received. However, according to another empirical study, consumer held a negative attitude to mobile text advertising. But the attitude would be favorable when the messages were sent with permission (Tsang et al. 2004). If the advertisement is relevant, consumer would like to receive mobile advertisement and accept the value of mobile recommendation. (Barwise et al. 2002) According to the marketing program “ShopAlerts” which sends messages to consumers around a retail location, they claim that 79% of consumers using the program were more likely to visit the store, and 65% made a purchase. Also, 60% said the location-triggered messages were “cool” and “innovative” (Adena 2010).

Although, the mobile marketing is still on its early stage, the innovators first come to this field and provide consumer satisfaction to the services. According to the Classic Consumer Adoption Process, now the location based services and related marketing services are in the early adopters step and may cross the chasm to achieve the early majority consumer (Watters 2010). See Figure 7. The consumer’s attitude is optimism according to the previous study. (Moore 1991)

Figure 7. The consumer adoption process, crossing the Chasm. (Rogers 1962)
2.2.2 **Business models of the location based services**

In Table 2, the comparison before and after ubiquitous internet marketing shows that there is larger business potential recently. With the beginning of context related marketing, the web sites centered marketing strategy would change a lot. And it’s only one piece of consumers’ digital media environment.

<table>
<thead>
<tr>
<th></th>
<th>Today’s internet</th>
<th>Ubiquitous internet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intermediary</strong></td>
<td>-The destination website</td>
<td>-The mobile media</td>
</tr>
<tr>
<td><strong>Access points</strong></td>
<td>-Computer equipped with web browser</td>
<td>-Mobile phone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Other internet-enabled mobile devices, ipod touch, iPad, etc.</td>
</tr>
<tr>
<td><strong>Customers can be reached</strong></td>
<td>-When and only when they’re sitting in front of their computer and browsing the web.</td>
<td>-24 hours a day, seven days a week, anywhere, in the transportation, at the mall, at a sports arena, at work place, etc.</td>
</tr>
<tr>
<td><strong>Customer focus</strong></td>
<td>-Price-conscious comparison shoppers</td>
<td>- Anyone with an immediate need, who will spend money to save time</td>
</tr>
<tr>
<td><strong>Strategic mandate</strong></td>
<td>-Focus on content -Build destination website -Personalize web pages -Just wait for customers to show up</td>
<td>-Focus on context -Build ubiquitous agent alongside customer -Master technology that lets you know when you’re needed -Be there when and where your customer is ready to buy.</td>
</tr>
</tbody>
</table>

Table 2. Before and after ubiquitous Internet marketing. (Kenny & Marshall 2000)

Personalization and information are really important for users in location based mobile services (Kaasinen 2002). However the business model of location based services will not restrict to the content. The most mature business model within location based services is the navigation services. Most of the traditional business models are implemented in this field, for example, standalone subscription services, subscription
bundled service, pay-per-use and Ad-based model, etc. In the subscription services method, user pay by the services price and if update service information, additional fees need to pay. Pay-per-use can be purchased for one-day use at a higher price than subscription. But users don’t usually use these kinds of location information that frequently, such as traffic information or detail navigation in other countries. Finally, Ad-based model are not major business model for the navigation services. (Kim 2009)

But for other location based services, various advertisements are the present business model. Especially for location based social network services, attracting more users as bargain power to sell more web or mobile based advertisement is the business model. At the same time location tagged advertisement is already out there, the location services are the filters to refine the result in order to make it more relevant and personalized.

On the other hand, there are also new methods which create new business model for location based services. For example, a location based services company “Foursquare” tried some new ideas in promoting products and services. In New York and Los Angeles, Foursquare using the “mayorships”, which the user gets when checked a place the most times than others in the city, as a marketing program to give out special offers, such as free beer. Now this idea is expending. In San Francisco, not only the mayor of the venue could get free drinks, but also everyone who checks in the venue on Foursquare and shows to the bar will get discount. Foursquare co-founder Dennis Crowley said, “Ideally, when people check in into places that have some kind of special / offer / etc, we’ll show a banner at the bottom which you tap to slide over and see the promo info. If the promo requires some certain level of “local” (e.g. you’re currently the mayor / you’ve been here 10x / etc) then you’ll see a special screen that you can show to bartender / waitress etc that makes it easier to identify that you’re entitled to the freebee.” The real value of location based services such as Foursquare from a business perspective is that it was the service which knew that whether the user went to the place, such as a restaurant or a bar according to the check in system. These services are not only advertising a product or service on web, but also they know the effect of actually purchasing information. (MG Siegler 2010)
3. Methods

To better discover the relationship between users’ position information and the potential marketing values, we setup a set of exploratory experiments from April 2009 to April 2010. The study was mainly conducted in Stockholm, with two KTH master students and one KTH teacher. All of them have technology education background, and familiar with location based mobile applications. All of them use mobile phones with internet capability and with GPS embedded in their mobile phones.

The experiment methods include three parts, location tracking services analysis, data generation and analyze the location based mobile marketing environment.

3.1 Location tracking services analysis

In order to get the location tracking data, the study needs to find out a suitable service for location tracking with mobile devices. During the related services analyzing, there are two approaches to achieve the objective. The first one is to evaluate the applications with the purposes of record and tracking our locations for further analysis. The benchmark for the first approach needs to be simplified and could record the data easily. Second, analyze the existing services and use segment evaluation criteria to study the marketing value of location based services for the further discussion.

The first evaluation for the related geo-services would serve for the geographic tracking statistics. Each of the location based services has some unique features. But in this experiment, the following features are compulsory:

- The application must work on Nokia Symbian S60 and Google Android G1. These are the mobile platform of the experimenters.
- Cell identification location tracking methods.
- Export position data
- The application must work at background for the mobile phone.
- The battery consumption should be low enough to keep the tracking for more than one day.
- The changing of location should be updated automatically.
- The developing API is helpful for further study.
3.2 Data generation

3.2.1 High-level model

The solution model for the data gathering process was showed in Figure 8. This model consists of four parts, mobile end user, Location data, other context data and marketing information. The last two parts, other context data and marketing information are not completed in the thesis work, but related discussion is presented in the discussion, Chapter 5.

![Diagram of the solution model for data gathering process.](image)

The experimenters need to setup up the selected location tracking application on their mobile phones, and run it at the background. For each experimenter, there will be a unique user ID which could use for identify different location data. When the user turn on the application, the primary location positioning method will be cell identification positioning. Wi-Fi positioning will be used when the experimenters are available to
access, or they are using personal computer with web browser. GPS tracking is optional method in the location tracking process.

The JSON which stands for JavaScript Object Notation is a lightweight data-interchange format. The JSON feed which adheres to the GeoJSON 1.0 specification (a format for encoding a variety of geographic data structures) is used for fetching the location data. This feed provides user’s current location data, latitude, longitude, and timestamp, etc. The database stored the user name, latitude, longitude and timestamp as location history data. From 18 September 2009, the accuracy of the location was also stored in the database.

3.2.2 Data visualization

The raw location data is not ordered well or with regular pattern. It’s difficult to analysis the location data information without map. Especially for marketers, visualized data on the map is more convenient to communicate and manage marketing programs.

When implementing the data visualization, it involves four classes of analysis methods. They are clustering, classification, regression and association rule learning.

First, “clustering” - is the tasks to discover groups and structures in the data. These groups and structures are possible to gather together with some similar features. In this study, some location data around a specific location is a cluster which can be identified to a specific meaning to the users.

The second task is “classification”, which uses the known structure from above to apply to new data. For example, use the location information in the first month to find out the user’s most frequently visited places. And then attempt to classify this location to identify its further information for the user, such as home or school.

The third task is “Regression”. In this part, find out a regular pattern to improve the accuracy of location data information.

The last one is “association rule learning”, which searches for relationships between variables. In this case, use the association rule learning to determine potential marketing communication rules with the meaningful location data. Also learning user’s frequently visiting places habits and use this information for marketing purposes.
Methods

To implement the data visualization method, database system is used for building tables, analysis featured data and setup filter to explore the possible results. Then export the data to KML file, which is a file format used to display geographic data in Google Earth and Google Maps. It is based on the XML standard, uses a tag-based structure. Microsoft Excel is used for exporting the target data to KML files. The Google Maps API is used for mapping the KML files and make further analysis. The position marker in Google Maps is presented by gradient dots which are recognized as cluster. To better understand the location information and user’s everyday activities, the comparison between the location data and experimenter’s calendar was recorded. The date is random picked from 17 August, 2009 to 23 August, 2009.

3.3 Analyze the location based mobile marketing environment

3.3.1 Porter’s five forces model

Porter’s five forces model is a classic analysis model which can help us understand the structure of the industry or markets. Although location based mobile marketing is an emerging and high tech marketing environment, Porter said the industry structure drives competition and profitability, not whether an industry is emerging or mature, high tech or low tech. It is relevant to apply the model into this emerging field. (Porter 2008) The Figure 9 describes Porter’s five forces model. This is a simple but powerful tool for understanding where power lies in any business situation. (Goldfarb 2010) Previously some other researcher applied this model to analyzing similar area, such as mobile commerce. (Yeo & Huang 2003) So the Porter’s five forces model is suitable for analyzing location based mobile marketing.
Methods

Figure 9. Porter's five forces analysis framework. (Porter 1979)

- Rivalry among existing competitors. Study the industry growth, the competitors’ size and power. In Chapter 3.1, the related services are collected to analyze the features for the experiment. There will be further discussion in marketing research.

- Threat of new entrants. The new entrants always bring new capacity and a passion to gain market share. Especially when new entrants are diversifying from other markets, they can leverage existing capabilities and other resources to stimulate the competition. The threat depends on the height of entry barriers. Entry barriers are advantages which the incumbents have relative to new entrants. Entry barriers are the main factor I will focus on in this part.

- The power of suppliers. Powerful suppliers capture more of the value by charging higher prices, limiting quality, or shifting cost to industry participants. The suppliers of location based mobile marketing services are not easy to identify. Determine the most relevant suppliers can clarify the industry structure.

- The power of buyers. Powerful customers can capture more value by forcing down prices, demanding more service, etc. If the customers are price sensitive or have negotiating leverage, they are considered as powerful.

- The threat of substitute products or services. A substitute performs the similar function or service as an industry’s product by a different method. And sometimes a substitution is indirect when it replaces a buyer industry’s product.
3.3.2 Value creation model

The value chain of location based mobile marketing field could provide more concrete discussion about the value creation model. Sultan and Rohm (2005) developing the value chain in mobile marketing field and consider it is important and complex. In Figure 10 the value chain can consist of three steps to reach the consumer.

Figure 10. Value Chain for mobile marketing. (Sultan & Rohm 2005)

As in any business partnership, these relationships combine necessary skills and capabilities. In the mobile marketing arena, the value chain is an important and complex chain of suppliers and strategic partners. So the value-creating networks model (Kothandaraman & Wilson 2001) could analysis this field.

Figure 11. The value creating network model. (Kothandaraman & Wilson 2001)

In Figure 11 the model uses three core concepts of value creation, superior customer value, core capabilities and relationships, to capture the interrelationships between the core concepts. The objective for all the location based services is creating customer value. The networks are influenced by the services’ core capabilities together to create superior customer value. The quality of relationships facilitates the value creating.
4. Results

The results consist of four main parts: 1. the results of location tracking services, 2. identify the meaningful location, 3. location data with transportation, 3. location data in a different country, 4. relative factors between locations and personal calendar. The results of location tracking services provide comparisons of four selected location services and choose the most suitable one for implement the following experiment. The meaningful location indicates the specific location for different users with particular meaning. From the long term tracking location data, the user’s home place and working location can be identified. When experimenter travelled with vehicles, the approximate commuting information can be recognized as a series tracking data. The location data can identify the experimenter’s behavior was changed when he or she moved to a different country. In the final part, the future location data can be hardly predicted according to personal calendar.

4.1 Location tracking services analysis

There were five location based services were selected for the final decision. They are BrightKite, LociLoci, Buddycloud, Sports Tracker and Google Latitude. For example, BrightKite is a location based social network services (SNS). It could manually update current location by sending SMS or using website. It’s convenient to interactive with friends on the same services and easy for post pictures and blog. But BrightKite is lack of automatically update and export position capability. BuddyCloud is also a location based mobile community software. This service relies on “the place mark” system which is not given enough points to record the location in Stockholm. Another service is LociLoci, which can track the position but the cost and no API support make us abandon it. On the other hand, Sports Tracker is another kind of software which exclusively using GPS to track the users continued position. It provide more accuracy data when the user outside building. But the limitation is the locating tracking method can only use GPS, and the battery consume so high that couldn’t keep tracking for long term.

The following form in Table 3 shows the result according to some relevant benchmark.
After the location applications test and comparison, we consider Google Latitude is the most suitable application for gather data so far. The method is to fetch the real time longitude and latitude value from Google Latitude, and store in the database. The tester record everyday location statistic by using mobile phones (two Nokia Symbian S60 phones and one Google Android G1 mobile phone). Also we use web-based Google Latitude application with Google Gear to record location information using Wi-Fi positioning method.

### 4.2 Identify the meaningful location

From the flowing map data (Figure 12), it is possible to find out the user’s main activity locations. The density of the location points imply that the more frequent user is staying in the places the more location points will display in the area. Usually, users spend more time at home and work place than other locations. The circles in the following diagram show the location area of the user. This result give the meaning for
the location data, it’s not just latitude and longitude. Nurmi and Koolwaaij (2006) defined the meaningful location as a place that is meaningful to the user and to which the user can attached some meaningful semantics. From the long term location tracking, there are significant meaningful locations which can be recognized from the raw data. But still, more related information need to define the location. For example in Figure 12, these two circles could either be home or work place. The user visited the most area is in the circles. During the long term tracking data, it is possible to predict the locations.

Figure 12. Identify the meaningful location, home and working places of one experimenter.

When experimenter only using Wi-Fi positioning method, it is easier to identify some specific locations. In Figure 13, user connected to Wi-Fi points mostly at home and universities. In this case, some attribute such as time could provide further evidence. The spending time in each location can imply user’s time spending and time management. This information is also valuable for the consumer.
Result

Besides the density of positioning points, the oscillation of the positioning points is another clue to identify the location. When using cell identification method to send location data, the data usually floats to the place nearby even the user hasn't moved. This is because the nature accuracy imperfection of the cell phone tower positioning method. But it also tells us there will be more points when the user is staying in one place for a longer time. Wi-Fi positioning method has the same imperfection when there are more Wi-Fi connection points available. The following diagram (Figure 14) illustrates the position oscillation at KTH building E. Tester’s position should stay in KTH Building E, but the result shows the location data float within this area. The location data cannot be accurate when using GSM cell identification and Wi-Fi positioning method.

Figure 8. Experimenter using Wi-Fi positioning method, circles indicate home and universities.
4.3 Location data with transportation

During the data observation, the following dashed line (Figure 15) expresses the typical transportation between two areas. The larger circle area in Figure 15 is the Stockholm city central area. And the upper circle is the Arlanda airport. While the dark purple square dot line connect the center and the airport with the position point in between. In Figure 15, it is easier to recognize the airport shuttle bus than the public transportation within the city.
Figure 10. Public transportation from city center to the airport.

The previous example is typical, but compare with everyday public transportation. There are some other unique features. For example, during the subway transportation, the location tracking method will only be the cell identification positioning within subway stations. Mobile phone GPS is not functional when underground, due to the weak GPS signal. At the same time, there is no Wi-Fi coverage in the subway stations in the experiment city. The cell identification requires cell phone towers nearby. The following diagram (Figure 16) illustrates the specific cell phone towers position.

The position points within the circle are predicted as the mistake position during the subway transportation between the stations “Universitetet” and “Tekniska högskolan”. Every time one of the experimenters took subway from “Universitetet” to “Tekniska högskolan”, the location will show in those points within the circle in Figure 16. From that, it is predictable that the subway stations use the specific cell towers to provide cell
phone communication signal and the “location data”. In that case, it is possible to track the user’s modified position and recognize if the user is taking subway. Even more, the specific subway line is also available from the modified data.

![Cell tower for subway from Stockholm University to KTH.](image)

Figure 11. Cell tower for subway from Stockholm University to KTH.

In Figure 17, there was another location data finding when experimenter taking ferry travelling by water route. From this data, the cell identification system position the user along the coast. But the data cannot be fetched when travelling on an open seas.

![Location tracking data with boat.](image)

Figure 12. Location tracking data with boat.
4.4 Location data in a different country

There is a big difference between users’ behavior according to location based services when they are travelling compared with living in home city. Figure 18 is the data of one experimenter taking summer vacation in his home city Dalian, China. The circle at the bottom left area is the nearby area of the experimenter’s home place. And the other two circles are the two largest commercial centers in that city. Consumer spends more time at home and at the commercial centers, but there is no location point’s cluster in working area. There is no subway in the city, so the approximate transportation route by buses and trains could be estimate more accurately. See the dash lines in Figure 18. The purple dash line implies the city bus transportation from home to city center.

![Figure 13. Location data from Dalian, Liaoning Prov. China.](image)

Although user will spend more time in city center than when in Stockholm within certain duration, but generally it’s hardly to deliver further customized marketing information according to the location differentiation. Other marketing programs can be delivered with better efficiency. For example, the tourist information could be relevant in this case when customer travels to a different city or country.
4.5 Location and personal calendar

The location data and calendar was compared from 17th August, 2009 to 23rd August, 2009. In the personal calendar (Figure 19), the real location information was recorded where the experimenter have been. The data was predicted to provide detailed and more instructive information for with the weekly record. But the results show that only some frequently visit points have the directly connection between calendar and user’s real time location. It is hard to get sufficient information only from location data.

From the short term location tracking data, it is not predictable to the next location. The long term location tracking is necessary for collecting sufficient data. In this result, the user’s personal calendar is not patterned with restrict location information. This
phenomenon is common when people record personal calendar. To establish direct relationship between personal calendar and location data for marketing usage, long term tracking and restrict calendar pattern are necessary.
5. Discussion

The discussion chapter mainly focused on three parts, the marketing value of the location, marketing environment analysis results and media communication channel. The marketing value of the location data start discusses with the location data from Chapter 4. Marketing environment analysis brings out the further discussion using Porter’s five force model and the value creating network model. The final discussion of mobile media communication channel is based on the usage during location tracking experiment.

5.1 Marketing value of the location data

5.1.1 The marketing strategies for specific meaningful location

From the results in Chapter 4.1, see Figure 20, more accurate marketing segmentation and marketing reaching are advantages by the meaningful locations. For marketers, define the targeting group and reach them are two major tasks when design and implement marketing programs. Connecting with local business, it can provide suitable marketing activities with the filter of location. Proximity marketing (the localized wireless distribution of advertising content associated with a particular place) will extend the marketing range and make prediction in advance. For example, given the consumer’s home and working place, relevant marketing information can be delivered during working or relaxing at home. Local shopping center position can be given, when user approach to this specific place, customized marketing information with use’s permission is useful for the consumer.

![Figure 20. Identify the meaningful location, home and working places of one experimenter.](image-url)
Secondly, with the help of meaningful location, marketers can also lead the users to go to some specific location to reach some marketing promotion. This is not “waiting” for the consumer go to specific location. It’s more actively motive the user to explore more activities. By using promotion, it’s efficient to increase the business exposure. It will encourage the user’s visiting frequency, or promote to explore more places which users haven’t been to before. This can be efficient for new business starting up.

5.1.2 The potential marketing are with transportation

There are lots of marketing programs that could deliver within the transportation, using mobile phone as media. We can take subway as an example, marketers could provide the mobile transaction method for the subway tickets, when users using the specific cell towers, it will automatically charged from the mobile phone. In Figure 21, the specific cell tower is detected by the location data.

When user is taking the subway, the free subway newspaper is relevant to push to the mobile phones with permission. It not only saves the cost of printing publication but also target the audience in subway transportation. Even more, with the combination of the other context information, such as weather, gender, age, time and user’s calendar, personalized and informational mobile advertising could provide to the users with free mobile newspaper.

There are huge marketing potential and marketing value lie in the transportation and context information. From a student’s perspective, when taking subway to go to
university in early morning, if the information about today’s lecture topic, schedule and classroom location send from system, and along with a marketing promotion about discount coffee just outside subway station, it will be very helpful for both consumer and marketers. It’s not only providing relevant information to the user, but great marketing value to the customer.

5.1.3 Location data enhance the tourism marketing

Tourist industry is a location sensitive industry. When users moved to a new city, the practical information and local information is important for them. Marketers carefully tested in this field. One of the successful usages is from telecommunication carries. They usually send the “welcome” SMS with price plan to the user when mobile users go to other countries.

5.1.4 Marketing with various context information

In Chapter 4.4, the results didn’t show much clear relationship between location and personal calendar. But, if the context information could combine location data and calendar data together, the data could perform much better and convenient. Based on user’s calendar, it is possible to send notification when the user has not reach to the expected location. Or check the public transportation schedule automatically for the users. If customer planned an activity but has not decided which place they are going to, the potential marketing field comes out. For example, if the user put “go to supermarket” on the weekend, it is relevant to promote some advertising about supermarket information in advance.

5.2 Marketing environment analysis results

5.2.1 Five forces in mobile marketing

In Chapter 3.3.1, Porter's five forces model was mentioned to analyze the mobile marketing environment. The following parts are the five forces:

- Rivalry among existing competitors. From the results in Chapter 4.1, the related location based services are different in size and power. Also the
Discussion

marketing growth is fast. The actors in this field don’t necessarily fight for market share. The competition is on dimensions other than price. The competition on product features, support services, brand image are less likely to reduce profitability, because they improve customer value.

- Threat of new entrants. The barrier for the new entrants is still low. Google already acquired AdMob to come in to this industry. There are some other big players, such as Facebook and Twitter etc. who may plan to enter to the location based mobile marketing field. The giant web services regardless the capital requirement, economy of scale, limited distribution channel and switching cost barriers, could be the crucial threat for the location based mobile marketing environment. These new entrants are diversifying from other internet services. They can leverage existing capabilities, such as existed large amount of users. Although the barriers of entry to this field are low. But the highly product differentiation and strong customer’s loyalty are the most significant barriers.

- The power of suppliers. The advertisement or marketing campaign is one of the “supplier” for location based marketing. Although there are other suppliers for this area. The advertising agency can be recognized as raw material supplier for the location based services. The marketers are involved in the supplier’s role. According to a survey by Matthew Pugh (2010), 22% of the 157 surveyed marketers considered the mobile marketing as “very important” to the overall strategy. 26% said it’s “important” and with 28% response “somewhat important”. Location based mobile marketing activities are considered cost effective.

- The power of buyers. This paper focuses on the consumer market which indicates that the buyers for this field are mostly the consumers. The buyer’s “price” sensitive will reflect on the marketing strategy’s accuracy and the personalized information. The bargain power for the consumer is relatively strong. Users are comfortable with the location based service which haven’t developed marketing orientated business model. So the marketing strategy has to be based on the user’s attitude. On the other hand, users seem to understand the trade-off of advertisement for free content and free applications, 76% users prefer ad-based free apps than paid ones. (eMarketer 2010)

- The threat of substitute products or services. The threat of the substitutes is mainly from new technology. For example, Radio-frequency identification (RFID) could be one of the substitute services. It can provide location
information by contactless communication with RFID reader. But generally, location based mobile services are still innovative technology. It’s still on the early stage of development, so the substitutes are even immature.

### 5.2.2 Value Creation Model

As the results for location based mobile marketing services, they providing information and transaction to customers at any time and any places they are going to buy a product or a service. (Kenny & Marshall 2000) From the services analyzed in the experiment, some location based services such as Brightkite and Loopt, focus on creating social networks between customers. And all these services are free of charge. Even with their mobile applications, users already accept the paid apps in iPhone’s App store. They still provide high quality and free software to the customers. This is one way to improve the relationships between customers. In Figure 22, the selected location based services present different dimension with their core capabilities to deliver superior value to the users.

![Figure 15. Comparison with core capabilities.](image-url)
Foursquare and Gowalla also perform very high quality relationships with consumer by making the services more like an entertainment game. The promotion to the “mayor” definitely both a marketing activity and facilitate the customer value. On the other hand, Google Buzz inherited the customer relationship from Google’s other services and brand value. The services, such as Gmail, have already established high quality relationships with customer. Now the customer value reinforces the relationship with the new services Google Buzz. And the service is focus on more functional and integration product with social networks features.

5.3 Media channel

During the experiments, how to communicate from mobile devices with location information and other context information is one of the crucial discussions. There are several methods for location based service to communicate with customer, such as SMS, Multimedia Messaging Service (MMS), E-mail, Social network message and standalone application etc. For the first three media channels, they can be categorized with traditional mobile communication method. The marketing information could actively push to the users by these channels. But the E-mail marketing already exist for long time, in the mobile services it could not take advantage of the unique feature. Although MMS is not totally failure, it is not going to growth in the new mobile age. So the only applicable traditional communication channel for mobile marketing is SMS. SMS could used for inquire about the location’s marketing information. But in the push method, SMS may be not as good as we expect. Because people usually consider SMS is an important tool for communication. It is not designed for marketing program to disrupt the user. The users’ response for SMS marketing is low. Only telecommunication carrier perform marketing program well with SMS. To respect customer, SMS is not considered as a suitable media communication channel in the location based services marketing.

For the second category, social network message could be more suitable to implement marketing program. The usage of real time information network is quite often, such as Twitter and Google Buzz and Facebook. More and more mobile based users are browsing social network directly from mobile phones. For example, in January 2010, more than 25 million Facebook users access the service via a mobile browser (Bloch 2010). These trends set up the foundation for communicating by social network message via mobile phones. And users are already used to receive large quantity media
information from social networks, such as Twitter or Facebook. Marketing information in these media channel is acceptable for consumer. And if the customer satisfies with the promotion, word of mouth may be the most cost efficiency broadcasting method. Another advantage for social media is user generated content. Nowadays, location based services information is not enough to meet the potential needs. The advertisement with location tagged is growing, but it’s less efficient when generated by advertising agency. Using some stimulate reward to motivate customer contribute the location related marketing information is desirable.

The third media channel is standalone mobile application. One typical application is Yelp, which provide review information about local business. In this case, if customer uses the services, it will get more chance to convince customer. Users understand the service is for marketing use. It get more user acceptance and reliable by balance the trade off of the quality of marketing information. The threshold for these kinds of services is attracting more customers or discovery niche marketing field. Figure 23 shows a user generated location based marketing program example and word of mouth advertising in Stockholm.

Figure 16. User generated marketing program from Foursquare. (Provided by Fourwhere)
6. Limitation and future studies

6.1 Lack of consumer interview

“Consumers believe location based services offer them significant benefits in functionality and relevance,” said Peter A. Johnson, “Consumers’ significant adoption and appreciation of location based services opens up enormous new opportunities for brands and agencies to leverage this unique virtue of the mobile channel.” (eMarketer 2010)

When we started the thesis work in the spring 2009, the location based services were in the early stage of developing. After talking to a group of media management students, this field is lack of consumer awareness and people will over concern about the privacy issue. So we give up the quantity interview part. Instead we only have limited interview conversation with supervisor and some early adopter to this field. But with the location based services growing, especially in recent months, it’s mature to take quantity interview. Although, this paper regards the consumer behaviors, but if there are more interview results may provide more concrete results from consumers’ voice.

6.2 Limit with the experiment scale

The experiment scale is limited. All the experimenters are all in university environment. Also it’s not a quantity experiment. If there are more experimenters, it may be more findings about experimenters’ location and relationship. One suggestion is corporate the project with telecommunication companies and making the test group more demographic diversified.

6.3 Time spending on specific location area

It’s possible to calculate the time spending within specific location. GIS data analysis would involve in this part to traversal specific polygon area. If the user get time spent in some specific location, it is convenient for personal time management and planning.
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Figure 17. Internet evolution timeline as user traffic calculation per day, 1969-2007. (Todaro 2007)
Figure 18. Other transportation routes by boat.
Figure 19. Detailed personal calendar for chapter 4.4.
### Sample Location Data from the experiment

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