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MARKET SEGMENTATION APPROACHES IN THE MOBILE  
SERVICE BUSINESS

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As smartphones are becoming more common as end-user devices in mobile networks, new advanced mobile services are made accessible to a growing number of users. This broadening user base, however, exhibits a range of distinct needs, characteristics and behavior and therefore a single product or service cannot be expected to satisfy everybody equally. Market segmentation, one of the most fundamental concepts in modern marketing, means dividing heterogenous markets into smaller more homogenous segments that can be effectively served with products and services matching their unique needs.

This thesis studies the segmentation of Finnish smartphone users. As a part of academic research on mobile phone usage, annual panel studies have been arranged in Finland since 2005. These studies employ a special handset-based data collection method to measure the participants' smartphone usage. In this thesis, the focus is on exploring the potential of this data collection method for market segmentation purposes based on the data from the study of 2007.

After a thorough literature review, this study evaluated three exemplary market segmentation schemes. The heavy half segmentation showed potential as a simple way to identify the most valuable customers. Benefit segmentation proved to be challenging due to insufficient background data and low usage rates, but can be a useful tool for understanding user needs in the future. Person-situation segmentation expressed the effect of usage situation on mobile service consumption and is a promising topic for further research. The results of this thesis describe the strengths and weaknesses of handset-based data collection and indicate that the method has the potential to evolve into a working tool for market segmentation.

Keywords: market segmentation, mobile services, handset-based data collection



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Älypuhelinien yleistyessä matkapuhelinverkon päätelaitteina uudet, kehittyneemmät matkapuhelinpalvelut ovat tulleet yhä isomman käyttäjäjoukon ulottuville. Laajenevalla käyttäjäkunnalla on kuitenkin toisistaan poikkeavia tarpeita, ominaisuuksia ja käyttötapoja, ja siksi yhden tuotteen tai palvelun ei voi odottaa tyydyttävän yhtälailla kaikkia. Markkinasegmentointi on eräs modernin markkinoinnin olennaisimmista konsepteista, ja se tarkoittaa heterogeenisten markkinoiden jakamista pienempiin ja homogeenisempiin segmentteihin, joita on mahdollista palvella segmenttikohtaiset tarpeet tyydyttävillä tuotteilla ja palveluilla.

Tämä diplomityö tutkii suomalaisten älypuhelinikäyttäjien segmentointia. Osana matkapuhelinten käytön akateemista tutkimusta on Suomessa vuodesta 2005 lähtien järjestetty vuosittainen paneelitutkimus. Paneelitutkimuksessa käytetään erityistä päätelaitepohjaista tiedonkeruumenetelmää osallistujien älypuhelinikäytön mittaamiseen. Tämä työ keskittyy arvioimaan kyseisen tiedonkeruumenetelmän potentiaalia markkinasegmentaatiotarkoituksiin ja perustuu vuoden 2007 paneelitutkimuksessa kerättyyn aineistoon.

Perusteellisen kirjallisuuskatsauksen jälkeen tässä työssä arvioitiin kolmea esimerkkiskeemaa markkinasegmentoinnista. Käytön määrään perustuva segmentaatio osoitti potentiaalia yksinkertaisena tapana tunnistaa arvokkaimmat käyttäjät. Tavoiteltuihin hyötyihin perustuva segmentaatio osoittautui haasteelliseksi riittämättömien taustatietojen ja alhaisten käyttömäärien vuoksi, mutta voi tulevaisuudessa olla hyödyllinen työkalu käyttäjätarpeiden ymmärtämisessä. Henkilöön ja tilanteeseen perustuva segmentaatio osoitti käyttötilanteen merkityksen mobiilipalvelujen käytölle ja on lupaava aihe jatkotutkimukselle. Diplomityön tulokset kuvailevat päätelaitepohjaisen tiedonkeruun vahvuuksia ja heikkouksia sekä osoittavat että menetelmällä on potentiaalia kehittyä jatkossa varteenotettavaksi markkinasegmentoinnin apukeinoksi.

Avainsanat: markkinasegmentointi, mobiilipalvelut, päätelaitepohjainen tiedonkeruu



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# Abbreviations

<b>3G</b>	third generation of mobile phone standards and technology
<b>AIO</b>	activities, interests and opinions
<b>COSEG</b>	componential segmentation
<b>CRM</b>	customer relationship management
<b>EDGE</b>	enhanced data rates for GSM evolution
<b>GPRS</b>	general packet radio service
<b>GSM</b>	global system for mobile communications
<b>GPS</b>	global positioning system
<b>HSPA</b>	high speed packet access
<b>ICT</b>	information and communication technology
<b>LOV</b>	list of values
<b>LTV</b>	customer lifetime value
<b>MMORPG</b>	massively-multiplayer online role-playing game
<b>MMS</b>	multimedia messaging service
<b>MOMI</b>	modeling of mobile internet usage and business
<b>MVNO</b>	mobile virtual network operator
<b>PRIZM</b>	potential rating index for zip markets
<b>S60</b>	series 60 software platform
<b>SIM</b>	subscriber identity module
<b>SMS</b>	short message service
<b>VAS</b>	value added services
<b>WLAN</b>	wireless local area network



# Chapter 1

## Introduction

The ever-turbulent mobile business is at the very core of today's information and communication technology (ICT) industry. Mobile devices serve no more as simple end-user equipment for voice calls but have soaked up several capabilities traditionally associated with personal computers. The trend of service convergence is driving diverse media content – more and more often created by the users themselves – straight to the pocket. The convergence of Internet and voice call technologies in one portable gadget is bringing Internet companies to compete over the service business at the grounds traditionally monopolized by network operators. Mobile Internet is starting to gradually change the business environment. This thesis is written as a part of the MoMI (Modeling of Mobile Internet Usage and Business) research project that aims to measure and analyze emerging mobile Internet usage patterns and the new associated business models.

At the heart of every business are the customers. Knowing the buyers is every bit as important as knowing the functions and features present in the market deliverables. Very few companies can actually succeed by aiming a single offer to a very broad range of dissimilar customers, a marketing strategy known as mass marketing, but first divide the market into smaller subsets, market segments, and then choose to target the ones that appear most profitable to them with separate product and marketing variations. This segmented marketing approach has proven to be invaluable as it can increase sales and provide a stronger position within each of the chosen market segments compared to undifferentiated marketing across all segments. As customer needs are continuously diversifying, the requirement for knowing the buyers and thus being able to form an effective segmentation is gaining emphasis. There are several ways to segment a market, the most commonly used methods being demographic, geographic, psychographic and behavioral segmentations.

Usually, the input data for a market segmentation project is somewhat subjective by nature. Data can be collected by, for example, conducting interviews or performing focus group research with a sample population from a market. The data is then analyzed in detail to build customer profiles that represent the typical buyer within each of the market segments. The subjectivity of these methods emerges from their

limited ability to record a realistic and generalizable picture of the market. The respondents can intentionally or subconsciously provide erroneous information about, for example, their lifestyle or product usage habits. Advanced mobile technology can, however, provide a novel marketing research method for collecting accurate and objective information about the usage of mobile services.

This study uses a handset-based data collection method to research the usage of so-called smartphones, mobile devices that are packed with advanced capabilities beyond the voice calls and text messaging common to all mobile phones. Modern smartphones enable their users to, for example, shoot pictures with an integrated high-quality digital camera, browse the web using a high-speed Internet connection or enjoy music and video clips stored in the device memory or streamed straight from the network. Mobile service usage is monitored and logged with a software installed on a set of smartphone devices partaking in an academic smartphone panel study. Additionally, demographic data about the study panelists is collected with surveys to support the new measurement-centered method.

The conducted service usage measurements and panel survey results are utilized jointly to generate exemplary segmentations of the Finnish smartphone service market. The pros and cons of each segmentation scheme will be discussed to assess their suitability for segmenting mobile service users. The evaluation of various segmentation schemes is made to support the main goal of this thesis, that is to explore the utility of the handset-based data collection method for market segmentation purposes.

The aim of this thesis is not finding the best way to perform market segmentation in the mobile service business. The purpose of this study is to be an explorative research to discover what new aspects – if any – can the handset-based data collection method introduce to the field of market segmentation. The scope of this study is exclusively set on the Finnish consumer market, an environment with high handset penetration rates and a strong ecosystem of handset vendors and network operators. A Finnish smartphone panel study, conducted in the year end 2007, provides the measurement and survey data for the analysis part of this thesis.

The thesis begins with a general walk-through of the theoretical aspects related to market segmentation methodology and a short review of the mobile service business. Chapter 2 introduces different market segmentation variables and models, considering also their respective benefits and caveats. The recent developments in the marketing environment are then discussed shortly to speculate the future of market segmentation. The mobile service business is portrayed in Chapter 3 with a discussion of its three main components – devices, networks and services – to give a concise review of the elements that build up the mobile industry.

Chapter 4 introduces the marketing research methods used for data collection and analysis in this thesis. The principles of handset-based usage monitoring are first briefly outlined and the panel study setup is reviewed, to show the research design used for gathering usage data. The statistical methods applied in the analysis of the collected usage data are then discussed to the extent that they bear relevance



for market segmentation practises.

The data analysis results are presented in Chapter 5. Three exemplary segmentation schemes derived from the smartphone service usage data are presented together with discussion of their pros and cons and thoughts about their overall applicability to practical situations on the mobile service market.

This thesis is concluded in Chapter 6 beginning with a summary of the analysis results. Following is a short discussion about the different possibilities for exploiting this information from the viewpoints of business, technology and academic research. Finally, subjects for further research on the topic are suggested.



# Chapter 2

## Market segmentation

### 2.1 Basic concepts

Market segmentation is a popular subject for research and therefore the literature base is extensive. The following two subsections discuss the most essential topics related to consumer market characteristics and market segmentation concepts, to back up the examination of segmentation variables and segmentation models in the later sections. Business markets utilize similar methodology for segmentation but then differ from consumer markets in many other fundamental ways. The scope of this thesis is exclusively limited to consumer market segmentation.

#### 2.1.1 Consumer behavior

Customers choose between competing products and services based on their assessment of superior value. In other words, they choose the proposition that consists of the benefits they are looking for at a price they perceive as providing superior value for money. The challenge for companies is to understand from a customer's perspective what these propositions need to be. McDonald & Dunbar (2004) argue that, from this point of view, customers segment themselves and what the companies must do, is understand the motivations that drive the choices made by the customers. Many of the characteristics influencing a consumer's behavior toward the organization and its marketing offers cannot be affected, but they must certainly be taken into account when planning business strategies. Kotler & Armstrong (2003) divide the characteristics affecting consumer behavior into cultural, social, personal and psychological factors:

- *Cultural factors* include the basic values, perceptions, wants and behaviors learned by a member of society from family and other important institutions.
- *Social factors* include the influences from small groups, family, social roles and status.

- *Personal factors* include the personal characteristics affecting decision-making such as the buyer's life-cycle stage, occupation, economic situation, lifestyle and self-concept.
- *Psychological factors* include the influences of motivation, perception, learning plus beliefs and attitudes.

Cultural factors are further divided into influences from culture, subculture and social class. Growing up within a society, a child learns to respect the basic values of that society's culture. For example, in the Western Countries, values such as achievement, progress, youthfulness, individualism and freedom are cherished. Each culture also contains smaller subcultures, groups of people with shared value systems identified by e.g. nationality, religion, race or geography. Subcultures often make up important market segments, such as the growing Hispanic market in the United States. Social classes are defined as relatively permanent and ordered divisions whose members share similar values, interests and behavior. Buyers from different social classes have distinct preferences concerning products and brands, influenced by their class background.

Social groups influence consumer behavior in two main ways. Membership groups to which a person belongs have a direct effect on buying behavior. Reference groups, in turn, are used as points of comparison in forming attitudes. A person may, for example, aspire to belong to a group that has a certain lifestyle and thus will try to conform to the product and brand choices of the group members. Family members also influence consumer behavior, as the wife, the husband and their children have different roles in decision-making. Because a person usually belongs to various different groups, clubs and organizations, the status in each affects buying behavior. Brands and products that reflect the perceived status will often be favoured.

Consumer buying behavior is shaped by the personal life-cycle stage. Such stages might be, for example, young singles, married couples with children, same-sex couples or the recently divorced. A consumer's taste in products varies through the different stages in life, while the changes in occupation and income level also affect the choice-making. Lifestyle is an increasingly popular differentiation factor for people coming from the same subculture or social class. Lifestyle deals with a person's psychographics, measuring consumers' activities, interests and opinions thus aiming to profile the whole pattern of acting and interacting in the world. Psychographics are more extensively discussed in Section 2.2.3.

Psychological factors influence consumer behavior in four major ways. Firstly by motivation; the consumer's reasons for certain behavior such as seeking satisfaction of a sufficiently pressing need. Companies must have a clear profile of the needs they offer to fulfill. Secondly by perception; the selection, organization and interpretation of information to form a meaningful picture of the world. As people are exposed to a staggering amount of products in their daily life, companies need to understand how customers interpret the various offerings. Thirdly by learning; the changes of behavior caused by previous experiences. Practically, if the experiences of using

products from a certain brand are rewarding, the customer will more probably buy other products from them. Last by beliefs and attitudes acquired by doing and learning; the thoughts, feelings and tendencies towards an object or an idea. They influence buying behavior by having an effect on the perceived brand image and are usually difficult or costly to change.

One example of a company embracing the requirements set by the diversity of consumer behavior is Nokia Open Studio, a research project introduced in LIFT Conference in February 2008 (Jung, 2008). In this project, three selected communities from around the world were invited to participate in a mobile phone design competition. Nokia, the global mobile phone market leader, asked the local communities of Rio de Janeiro in Brazil, Accra in Ghana and Mumbai in India to design the handset of their dreams. The researchers quickly learned that influences from the local culture were becoming visible in the functions and features of the returned solutions. Challenges brought up by e.g. low income levels, criminality or the prevailing weather conditions had their reflections in the design choices. In Ghana, for example, the ability to use multiple subscriber identity modules, SIM cards, would enable a customer to switch to the cheapest mobile operator in the area, thus meeting the challenges set by the economical background. Research projects like this give valuable grassroots level insights into consumer behavior and allow designers to promote discussion about new technologies and their impact on the user community. As announced in the Nokia presentation, there are over 3 billion mobile users globally. Understanding what a mobile phone means to all the different users coming from a wide range of cultural and social backgrounds is necessary to successfully service their needs and thus the handset industry must appreciate the local forces that heavily affect consumers' choices.

### 2.1.2 Market segmentation and target marketing

An effective business strategy depends on a proper definition of a market. A market is the set of all actual and potential buyers of a product or service (Kotler & Armstrong, 2003), and as noted in the previous section, buyers differ from each other in many ways. Markets are by nature complex and under continuous change and thus require a diversified analysis to avoid short-sightedness. Day (1981) suggests an integrated analysis that utilizes two separate methods of defining a company's market: the top-down and bottom-up analyses. The top-down analysis specifies the market in terms of the company's capabilities and resources. The bottom-up approach installs customer requirements and usage patterns as the basis for a market. Both methods have their weaknesses. The top-down approach is apt to cause delayed responses to rapidly shifting customer requirements and usage patterns, whereas a dedicated bottom-up approach may hinder finding new opportunities to exploit a company's core competencies and experience. By accepting the need for multiple approaches, the competencies of both methods can be used to tackle different issues in assessing a market's potential and choosing the market to serve.

Modern companies seldom try to appeal to all buyers in their market in the same

way. The concept of market segmentation dates back to the mid-20th century when marketers began to accept divergent demand as a fundamental market characteristic and started to adjust product lines and marketing strategies accordingly. According to Smith (1956), the lack of homogeneity on the demand side can be based upon different customs, desire for variety, or desire for exclusiveness or may arise from basic differences in user needs. Through market segmentation, large heterogeneous markets are divided into smaller more homogeneous segments that can be more efficiently reached with the products and services the customers really want and will pay for. Specifically, market segmentation is the process of dividing a market into distinct groups with distinct needs, characteristics, or behavior who might require separate products or marketing mixes (Kotler & Armstrong, 2003). A segment is a group of customers with similar needs, sharing characteristics that are strategically relevant (Day, 1981).

Analytical market segmentation has two basic approaches (Green, 1977):

1. *A priori segmentation*, in which the researcher chooses some cluster-defining descriptor in advance. Customers are then classified into a predefinable number of segments and further examined in terms of other characteristics. For example, a segmentation might be formed on the basis of a favorite brand and then any differences between the segments in terms of e.g. demographics or lifestyle could be studied.
2. *Post hoc segmentation*, in which the customers are clustered into segments according to the similarity of their multivariate profiles. The segments can then be further examined for differences in other characteristics. The number or relative sizes of the segments is not known before the analysis is completed, only the set of variables on which customers are to be clustered is prespecified. For example, the initial clustering might be done based on customer profiles that describe benefits sought from a product and then any significant differences between the segments assessed utilizing other segmentation variables.

Alternatively, a hybrid scheme utilizing both of the aforementioned approaches can be employed. In Green's (1977) example, a hybrid scheme starts out with two data sets, (1) a clustering by favorite brand and (2) ratings on product needs statements. The customers are first grouped according to their favorite brand to produce an a priori segmentation. Next, a clustering algorithm is used to seek out any common benefit-seeking profiles within each of the brand-favorite groups, to develop a more elaborate clustering. This way, a hybrid approach also addresses the problem of intrasegment heterogeneity, the remaining variance of needs within a market segment. Green discusses yet another segmentation design, the componential segmentation (COSEG). The COSEG procedure aims to predict the consumers' evaluations of new stimuli, e.g. new products, rather than simply partition the existing market. The primary objective is to forecast how would a consumer choose among a set of alternative products.

In Section 2.2, several alternative variables used for segmentation are explored, but not all segmentation schemes are able to meet a particular market situation effectively. Kotler & Armstrong (2003) list fundamental characteristics that any useful segmentation scheme and its market segments must possess:

- *Measurability.* The size, purchasing power and profiles of the market segments can be measured.
- *Accessibility.* The market segments can be effectively reached and served with promotional and distributional efforts.
- *Substantiality.* The market segments are large or profitable enough to serve.
- *Differentiability.* The segments are conceptually distinguishable and respond differently to different marketing mix elements and programs.
- *Actionability.* Effective programs can be designed for attracting and serving the separate segments.

Cahill (2006) adds that market segmentation should not be performed concentrating exclusively on what makes one group different from another. Quite the contrary, the most important question in the segmentation design should be: what makes the members of one group more like each other than they are like the members of another group. The use of similarities allows for the use of statistical methods that cluster people into groups based on the correspondence of values of the chosen segmentation variables.

Developing products and services for specific market segments allows for a better focus on matching the customers' unique needs. Haley (1968) argues that new and old products alike should be designed to fit exactly the needs of some segment of the market. By targeting two or more segments simultaneously, their appeal is not maximized to anyone, and there is a risk of ending up with a dangerously fuzzy brand image. Target marketing is the company's process of evaluating each market segment's attractiveness and selecting one or more segments to enter (Kotler & Armstrong, 2003). Strategies for targeting often balance between cost efficiency achieved with using fewer manageable segments and ultimate customer satisfaction achieved with customizing the deliverables even for the tiniest of subgroups. Figure 2.1 illustrates a range of strategies based on different market segment sizes.

When a firm decides to target several market segments and design separate offers for each of them, it is utilizing a differentiated marketing (or segmented marketing) strategy (Kotler & Armstrong, 2003). This is in contrast to the undifferentiated marketing strategy, mass marketing, depicted in the far left end of Figure 2.1. By offering product and marketing variations to these subsets of a market, companies aim to strengthen their position within several segments, to attain a larger total market share than just by undifferentiated marketing across the whole market. Smith (1956) concludes that while a successful product-based strategy will result in giving

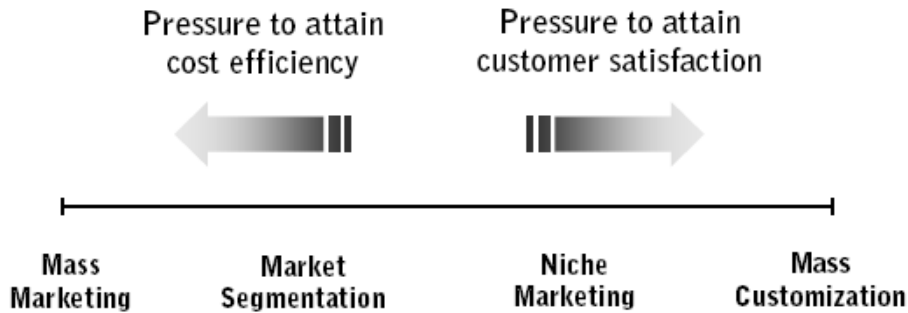


Figure 2.1: Strategies for target marketing (adapted from Mattsson, 2006)

the marketer a horizontal share of a broad and generalized market, equally successful application of segmented marketing tends to produce depth of market position in the penetrated segments. As an illustration, the product differentiator seeks to secure a layer of the "market cake", whereas one who employs market segmentation strives to secure one or more wedge-shaped pieces. The drawbacks from differentiated marketing are the increased costs of e.g. developing marketing plans, conducting marketing research and creating promotional campaigns to serve multiple customer bases. Anyhow, most modern companies employ segmented marketing instead of mass marketing as highly satisfying all consumers with a single product or brand is a difficult, if not an impossible task.

The next strategy on the way to narrower target markets is called niche marketing. Niche marketing is a market-coverage strategy in which a company decides to grab a large share of one or a few relatively small segments, or niches, instead of chasing a small share of a larger market (Kotler & Armstrong, 2003). Niching is often employed by relatively small companies that are able to compete by serving any niches that may be overlooked by larger competitors. This concentrated marketing strategy strives for a strong market position by fine-tuning the company's marketing programs, products and services toward the consumers it can serve most profitably. The risk in serving a very limited subset of a market is that if it turns out to be less profitable than expected, this will have a heavy impact on the business. However, McKenna (1988) notes that large markets often evolve from niche markets. Because niche marketing teaches many important lessons about customers – in particular, to think of them as individuals and to respond to their special needs – companies learn to respond faster to demand changes and thus become market driven. McKenna also emphasizes the importance of word of mouth references. Today, largely due to the global penetration of the Internet, references can travel around the connected world rather quick and hence word of mouth may effectively make or break a new product.

In the narrow end of the segment size scale is the strategy of customizing products and marketing programs to the needs and wants of specific individuals and locations. This practice is called micromarketing and it consists of local marketing and individual marketing (Kotler & Armstrong, 2003). Local marketing observes



the effect of local influences on customer needs and wants and takes tailoring of products to the dimension of cities, neighborhoods and stores. Thanks to flexible manufacturing technologies, mass production is no longer dominating niche production economically and therefore companies can confront fragmented markets with effective marketing strategies that address regional and local differences. The downside is that when products and marketing messages are made to vary substantially in different localities, communicating a clear and consistent overall image of the company brand can prove to be a challenge.

Individual marketing is the most extreme form of the micromarketing strategy, in which the preferences of individual customers are considered as the starting point for marketing operations. Following the developments in computing power and manufacturing technology, companies can employ a strategy of mass customization, the use of flexible processes and organizational structures to produce varied and often individually customized products and services at the price of standardized, mass-produced alternatives (Hart, 1996). Technology evolution has had a profound effect on manufacturing; already in 1988, 75% of all machined parts were produced in batches of 50 or fewer (McKenna, 1988). Moreover, consumers are now increasingly taking more responsibility for the choice of brands and products. The Internet, with a vast amount of communities and discussion forums, provides an easy way to search information relevant to a purchasing decision. The shift toward individual marketing and the challenges brought by the decreasing size of market segments are examined in more detail in Section 2.4.

## 2.2 Segmentation variables

Performing market segmentation requires the selection of a basis for segmentation (the dependent variable) as well as descriptors (the independent variables) of the various segments (Wind, 1978). These variables can be divided into (1) general customer characteristics, including demographic and socioeconomic characteristics, personality and lifestyle characteristics, and (2) situation-specific customer characteristics such as product usage and purchase patterns and benefits sought in a product category. Usually, multiple segmentation variables are used in combination to achieve smaller, better-defined target groups. The most useful techniques have often resulted from practical successes, not as much from theoretical studies. Marketers must identify which of them provide the best view of the market structure currently in question.

### 2.2.1 Geographic segmentation

Dividing a market into geographic segments is one of the oldest ways to perform market segmentation. The underlying assumption is that people have different needs and wants based on where they live. Commonly, a geographical segmentation scheme divides a market into units such as nations, states, regions, counties, cities or neighborhoods. A company can decide to operate in only a few of the segments, or in all of them but customize their offering according to the geographical differences in needs and wants (Kotler & Armstrong, 2003). Geographic segmentation is most commonly used by multi-national industrial and high-tech businesses, who alter their marketing mix based on the differing needs of consumers in each of the geographic segments they wish to serve. Simple geographic segmentation is usually an easy, manageable and comparatively inexpensive way to handle a market – especially an international one.

The downside of geographical segmentation schemes is the used hypothesis that the customers within an area have homogenous product preferences. Often this is not true even at the most local level. For example, people living on the same street do not generally choose similar groceries, furnishings or clothing. The practicality of geographical differentiation on a multi-national scale has also been criticized (Kotler & Armstrong, 2003; McDonald & Dunbar, 2004). Global markets are usually divided into regional segments like Western Europe, Eastern Europe, North America or Latin America. Inside such Western European segment, for example, exists enormous environmental (from sunny southern Spain to chilly northern Finland), economical (the gross domestic product of Switzerland is seven times that of Portugal), cultural (neighbors France and Germany) and linguistic (Romance and Germanic languages) variety. Equally, Canada and Mexico in North America are no more similar than are Brazil and the Dominican Republic in Latin America.

Regardless of these obvious pitfalls, geographical variables do have a role in consumer market segmentation. Although geographic areas are inadequate to define

the proposition required by a segment, background information about buyers helps in identifying where the customers from each market segment can likely be found and, consequently, how they can be effectively reached (McDonald & Dunbar, 2004).

### 2.2.2 Demographic segmentation

Another widely recognized consumer market segmentation scheme makes use of demographics. Demographic segmentation is defined as the division of a market into groups based on demographic variables such as age, gender, family size, family life cycle, income, occupation, education, religion, race, generation and nationality (Kotler & Armstrong, 2003). Demographics have gained much popularity because they are easily measured and often vary closely with consumer needs and usage rates. The complexity and costs of the scheme also stay relatively low.

Demographic variables must, however, be handled carefully. Critique from Cahill (2006) points out that although there generally are behavioral differences between e.g. men and women or teenagers and elders, they are at best displayed by only a large majority of the group. Consequently, the remaining subset whose behavior does not fit into the framework of the demographic group (e.g. youngsters acting like elders, or vice versa) might not enjoy being reminded that they do not fit in with their peers. The majorities may also resent being stereotyped, even more so in Western cultures where individualism is one of the most revered values. Reaching the desired segment without offending anyone belonging or not-belonging to the target group can thus prove to be a challenging task. Demographic segmentation has also been criticized, together with geographical segmentation, of the approach of predetermining how the market divides into segments (McDonald & Dunbar, 2004). In reality, customers do not slot themselves into any categories determined beforehand, and this is why companies should rather focus on getting a holistic understanding of their customers' needs than engaging the market with ready-made pigeonholes for groups of buyers.

When employed properly, demographic variables can provide a productive basis for consumer-centric market segmentation. Demographic and geographic variables have been combined to create geodemographic segmentation schemes based on the principle that people are more similar to those who live around them than they are dissimilar. The Potential Rating Index for Zip Markets (PRIZM) system regards each U.S. Zip Code area as a cluster that has a marketing and attitudinal personality of its own. With geodemographics, PRIZM aims to capture the lifestyle of a neighborhood and classify it into one of 62 segments that cover every one of the 260,000 U.S. neighborhoods (Cahill, 2006; Kotler & Armstrong, 2003). Englis & Solomon (1995) empirically examined how consumers' cognitive representations of meaningful social types relate to lifestyle data generated by PRIZM. They discovered that consumers may stay clear of purchase, ownership, and use of such products and activities that might identify them as members of a negative reference group, an avoidance group. The principle of geodemographic segmentation schemes could therefore be alternatively phrased "if people are where they live, they certainly are

not where they do not live” (Cahill, 2006), thus emphasizing the role of avoidance on product choice and use.

Anyhow, regardless of the used segmentation basis, the information provided by demographic characteristics is often used after performing a market segmentation to profile the customers in the different market segments. This helps assessing the target market’s size and determining how to reach the customers efficiently.

### 2.2.3 Psychographic segmentation

Using a psychographic segmentation scheme means dividing the market into different groups based on various psychological characteristics of the buyers, such as social class, lifestyle or personality (Kotler & Armstrong, 2003). Marketers have understood that to attract or motivate a particular group of consumers, it is necessary to know how they think and what their values and attitudes are, as well as who they are in terms of the traditional demographic variables (Ziff, 1971). The power of psychographics is that it identifies basic beliefs and attitudes that influence consumer behavior in various situations. Ziff’s study suggests that by finding a core of attitudes and values that affects the buying behavior for a class of products, one can gain general understanding that can be applied to other related products or even completely different classes of products. Because the changes in person, family and occupation throughout life affect buying behavior, psychographic and demographic segmentation bases are often used in combination to better identify market segments. Behavioral variables, e.g. usage rates, can also be used to complement a psychographic segmentation scheme.

The utilization of lifestyle variables has particularly gained popularity among psychographic segmentation bases. Lifestyle focuses on the questions “What we do”, “What we want” and “What we think”. Variables mapping activities (work, hobbies, social events attended), interests (family, fashion, choice of medias) and opinions (of themselves, of social issues, of products) – the so-called consumer’s AIO dimensions – are used in building a lifestyle profile to predict the customer’s buying behavior (Cahill, 2006). Relationships between products and AIO statements have been studied by Wells & Tigert (1971), who noticed that some products are “richer” than others in terms of correlation with activity, interest and opinion items. Thus, AIO variables are not guaranteed to work in every market situation. A widely-used tool for lifestyle segmentation is the proprietary VALS scheme that blends research of values, hierarchy of needs and sociology in its operation. The original VALS combines demographics and psychographics to describe the nine types of customers it recognizes. Later, the typology was developed further to put more emphasis on psychology and downplay demographics (Cahill, 2006). The second edition of VALS classifies people according to how they spend their time and money, dividing the customers into eight segments based on two major dimensions: self-orientation and resources (Kotler & Armstrong, 2003; Winters, 1989). An alternative psychographic segmentation scheme, the List of Values (LOV), has been developed to further improve the predictive utility of lifestyle segmentations and to provide a tool that is in

the public domain and thus accessible to all researchers (Kahle *et al.* , 1986).

Critique concerning psychographics is most often related to issues in reliability and validity of the measures used. Wells (1975) concludes that psychographic measurements and procedures can have satisfactory reliability, but generally satisfactory reliability does not imply adequate reliability. He also points out that while the validity of psychographic measurements does vary greatly, psychographic variables are capable of producing substantial differences between groups of consumers, and these differences are often larger than the differences produced by standard demographics. Cahill (2006) notes that if the goal of market segmentation is no deeper than to directly increase profits, then on surface validity, doing it just because it works, is fine. Fennell & et al. (2003) examined the relationship of psychographic and demographic variables with product use, brand use and relative brand preference across 52 product categories. The study provided evidence that these variables could predict product use and unconditional brand use, but could not predict brand choice conditional on product category use. Variables that can be expected to explain brand preference must reflect the substantive conditions that lead people to action – and potential brand use – and thus they reflect a more granular explanation of behavior than demographic and psychographic variables are able to provide.

Wells (1975) summarizes that, to marketing practitioners, psychographic methods offer a new way of describing consumers that has many advantages over alternative methods, even though much work on reliability and validity remains to be done. Psychographics is one technique among many, and with a qualitative motivation research approach, it can provide information about customers unavailable with quantitative methods. Plummer (1974) concludes that by beginning with the people – their life styles and motivations – and then determining how various marketing factors fit into their lives, fresh insights are often acquired into the market. Psychographic segmentation techniques should therefore be used to enrich the understanding of target markets and augment the total package of market segmentation tools.

#### 2.2.4 Behavioral segmentation

Behavioral segmentation divides buyers into groups based on their knowledge, attitudes, uses or responses to a product. Common approaches are, for example, usage rate and occasion segmentations (Kotler & Armstrong, 2003). A behavioral segmentation scheme has the advantage that it is rather closely tied to the product or service that the company is offering.

Usage rate segmentation divides the market into light and heavy users, according to the product or service consumption volumes. Twedt (1964) developed the so-called "heavy half" theory by studying the annual purchase concentration of 700 U.S. households in 18 product categories. He divided the studied households into non-users, the light half and the heavy half by purchasing rate. If a household's purchasing rate was greater than zero but less than the median for the category, the household was classified into the light half. If the rate was greater than the

category median, the household was placed in the heavy half. Twedt found out that the heavy half is generally responsible for over 80% of the overall consumption. The study emphasizes the importance of a heavy half household to the marketer, as the purchase volume can be nine times that of a light half household. Haley (1968), however, notes that not all heavy consumers are seeking the same kinds of benefits from a product, and therefore cannot be effectively reached with the same brand or marketing messages. Wansink & Park (2000) studied the characteristics that differentiate heavy users from light users. They found out that the differentiating characteristics are related to five basic lifestyle factors and six personality factors. Cook & Mindak (1984) replicated Twedt's original study twenty years later and found out that the two decades' changes in product penetration and lifestyle had not altered the relative strengths of the usage categories.

Occasion segmentation groups consumers according to the occasion of getting the idea to buy, actually buying or effectively using the purchased product. Dickson (1982) claims that because demand results from the interaction of a person with his or her environment, a segmentation perspective that includes both the person and the situation is needed to explain demand and target marketing strategy. Customer segmentation should therefore not be equated with market segmentation; markets can also be subdivided by usage situation. Sandell (1968) discovered that situational factors are responsible for variation in choice behavior; an alternative with a high choice probability for a person in one situation does not necessarily have a high choice probability for the same person in another situation. Sandell's experimental scenario studied the beverage preference for satisfying the need of quenching thirst in various situations. However, Dickson (1982) points out that there are also other possible goals that people seek by consuming beverages. The alternative drives can be, for example, relaxing and reducing shyness, sedating, cooling down, warming up, stimulating taste buds, relieving throat irritation or celebrating. Thus, the observed situation-specific preferences can be caused by very different needs. Belk (1975) reviewed the influence of usage situation for various other products and also considers the dimensions characterizing a consumer situation. The COSEG model discussed in Section 2.1.2 can be expanded with situational variables that may influence consumers' choices among multiattribute options as suggested by Green & DeSarbo (1975).

### 2.2.5 Benefit segmentation

Benefit segmentation divides buyers into groups according to the benefits they seek from a given product. Haley (1968) describes benefit segmentation as an approach whereby it is possible to identify market segments by causal factors rather than descriptive factors. Therefore, the benefits which people are seeking from a given product are the basic reasons for the existence of true market segments. Benefit segmentation is reviewed here as an independent segmentation scheme, but it has also been categorized as an instance of psychographic (Haley, 1984) and behavioral (Kotler & Armstrong, 2003) segmentation schemes.

According to Kotler & Armstrong (2003), benefit segmentation requires finding the major benefits people look for in the product class, the kinds of people who look for each benefit and the major brands that deliver each benefit. Haley (1968) notes that it is the total configuration of the benefits sought which differentiates one segment from another, rather than one segment seeking one particular benefit and another a quite different benefit. Individual benefits are likely to have appeal for several segments because most people would like to have as many benefits as possible and thus they choose products with benefits that add up to the most value and satisfaction. Yee (2005) researched the motives for playing massively-multiplayer online role-playing games (MMORPGs). By asking 3,000 MMORPG players 40 questions about their reasons for playing through online surveys, a wide variety of alternatives emerged. Yee performed a factor analysis on the survey data and as a result obtained 10 motivational components that could be factored into three main component categories:

- *Achievement* (advancement, mechanics, competition)
- *Social* (socializing, relationship, teamwork)
- *Immersion* (discovery, role-playing, customization, escapism)

For example, the players that seek satisfaction from reaching goals, gaining status, understanding the game mechanics and challenging other players have achievement as their main motivational component. A MMORPG player is not exclusively tied to any one of the categories, but can have connections of different strengths to several motivational components, thus building up the total value. Nardi et al. (2004) studied the benefits sought from another popular form of online user interaction, blogging, by conducting interviews with bloggers and following the interviewees' blogs at their web sites. As a result, they identified five major motivations for maintaining web logs:

- *Document of life*, using a blog as a record to inform and update others of personal activities and events.
- *Commentary*, using a blog to express opinions on the topics that are important to the writer.
- *Catharsis*, using a blog to let out thoughts and feelings concerning personal issues.
- *Muse*, using a blog to get an audience for writings and archive thoughtpieces for future use.
- *Community forum*, using a blog to express views and exchange information within a community.

As a summary, identifying the variety of motives behind the usage of any product or service is essential to be able to analyze the customers' buying behavior correctly. Haley (1968) notes that after segmenting a market based on sought benefits, the segments should be compared in terms of e.g. demographics, usage rates and lifestyles to deepen the understanding of the persons who make up a segment, to allow for reaching the market effectively.



## 2.3 Segmentation models

Various segmentation models have been developed to assess the exploitability of market segments. The models usually complement segmentation variables with more or less extensive use of data mining methods to evaluate a concrete market situation. The Technographics Segmentation model (Forrester Research, 1999) categorizes consumers based on their attitudes, motivations, and abilities to use or acquire technology. The holistic segmentation model (Björkstén *et al.*, 2007) uses three dimensions of a techno-economic framework to estimate the profitability of different psychographic segments. The customer value model (Hwang *et al.*, 2004) confronts the segmentation problem of dynamic markets by modeling customer value in three dimensions. The reviewed models serve as good examples of the various applications of market segmentation.

### 2.3.1 The Technographics Segmentation model

As technology products are getting more versatile and the variety of services is expanding, market researchers strive to understand the motivators behind technology purchases. The customer base of ICT businesses displays a diversity of attitudes towards technology. To understand the buyers' level of openness to technology, research must go beyond demographics and buying patterns – it must capture how people use technology day to day, and how they feel about it. Forrester Research Inc. (1999) developed the Technographics scheme to analyze consumers' motivation, desire and ability to invest in technology.

In Technographics, data collected with a study of 100,000 North American households is analyzed with multivariate statistical methods to split consumers into 10 different segments. The multivariate model classifies customers in three dimensions:

- *Attitude toward technology* divides consumers into technology optimists and pessimists. Optimists are willing to change their behavior to acquire or use a new technology for need satisfaction. Pessimists are not interested in using technology to fulfill needs that can be satisfied with traditional methods.
- *Income* further divides technology optimists and pessimists into high-income and low-income consumers.
- *Primary motivation* divides the motivations for the use of technology into career, family and entertainment categories. Career motivations relate to the need to have a status at work, family motivations correspond to the need to provide care and entertainment motivations are associated with the need to have fun.

Additionally, the model utilizes demographics to describe the customers within each of the classes. For example, technology optimists tend to be younger and better

educated than technology pessimists. Entertainment-motivated customers are least likely to be married and own homes, whereas family-motivated customers are likely to be married and have grown children. The classes also exhibit differences in technology usage habits. While the high-income optimists regularly use on-line services themselves, the high-income pessimists do own computers but their main users are the household's children. Thus, after the framework has identified the receptive customer segments, the potential buyers should be further profiled for employing targeted marketing.

The Technographics study suggests that the level of technology optimism has a considerable influence on the acceptance of a technology-based offer. Naturally, technology optimists are the most likely prospects for technology products and services as they are early adopters of technology for home, office and personal use. The Technographic Segmentation model can be used as a tool for determining market potential and profiling the potential buyers to find a suitable marketing communications mix for reaching them efficiently. Recently, Forrester has introduced the Social Technographics scheme that classifies people according to how they use social technologies e.g. publish self-generated content or visit social networking web sites (Forrester Research, 2008).

### 2.3.2 The holistic segmentation model

A techno-economic model is a representation of a certain business ecosystem created with the combined use of (1) data describing technologies and (2) data describing the economic environment. Techno-economic models aim to provide a holistic understanding of the interaction between these two factors in a system. Björkstén et al. (2007) present a holistic techno-economic framework developed to serve as a concrete basis for revenue stream analysis of service delivery ecosystems. The holistic techno-economic modeling framework consists of nine modules, describing the economics related to different parts of the service delivery value chain. Specifically, the "User" module models the user behavior in different segments when various changes are introduced to the system.

The segmentation scheme used in this framework is based on psychographic segmentation variables that divide the users into four segments.

- *Achievers* are pragmatic and business-oriented. They want to make life more efficient and have an ambition to succeed.
- *Explorers* accept challenges, are intrigued by new things and get involved with many communities.
- *Connected* users value stability, family connections and responsibility.
- *Seekers* follow role models, seek acceptance and want to show status through appearance.

The perceived value – the price ceiling of a product – and the profitability of different market segments is assessed in three dimensions; based on the needs, value of time and user experience of each segment.

The needs of a user segment define the use of services and applications. The techno-economic model splits user needs into four main categories: social, usefulness, entertainment and esteem. The prospective importance of a service to the customer can be analyzed by studying the dominant needs of the user’s segment. Applications that foster the most intensive needs of the segment will be used by its members. For example, connected users have highly intensive social needs, and thus they are likely to use applications that enable social communications. The mapping of needs for all four psychographic segments is depicted in Table 2.1. Additionally, a mapping between the user needs and applications is needed to estimate how well can an application satisfy the needs from a certain category.

Table 2.1: User segments, the related needs and the need weights.

	<b>Social</b>	<b>Usefulness</b>	<b>Entertainment</b>	<b>Esteem</b>
<b>Connected</b>	X (high)		X (low)	
<b>Achievers</b>		X (med/high)	X (low)	
<b>Explorers</b>	X (med)		X (medium)	
<b>Seekers</b>		X (med)	X (high)	X (high)

The second dimension in the techno-economic framework is called value of time. This concept depicts the user’s opportunity cost of time. Opportunity cost is the cost that incurs when a person chooses one option over another, and thereby loses the opportunity to experience the other, next best alternative. The cost is not necessarily financial by nature, but as in the case of lost time something that is of value to the person assessing the situation and making the choice. Here, the use of a service is mutually-exclusive to performing some other – often equally desirable – activities with the same time span instead.

The user segment’s technical capabilities form the third dimension in the holistic user segmentation model. Technical capabilities influence the user’s choice of applications, and further the number of successful usage sessions. Services that require advanced technical capabilities force the technically illiterate segments to invest more time in getting their needs fulfilled by applications. This decreases the perceived value from the service. Moreover, as discussed in Section 2.3.1, the attitudes towards technology affect the buying behavior for sophisticated technological offerings.

The study of Björkstén et al. illustrates various points of view into customer market segmentation. Building holistic understanding of the service market requires taking multiple approaches by, for example, psychographics, technographics, cost analysis and assessing the perceived customer value. Each of these provides their own insight and contributes to the overall success of the segmentation scheme. The model also highlights the role of customer segmentation in building techno-economic frameworks

for assessing the profitability of markets. A useful segmentation scheme centered on users' needs and values makes it possible to predict customer behavior in case of a changing service environment.

### 2.3.3 Segmentation model based on customer value

Customer lifetime value (LTV) is an important part of the customer relationship management (CRM) business strategy. Customer relationship management is defined as the overall process of building and maintaining profitable customer relationships by delivering superior customer value and satisfaction (Kotler & Armstrong, 2003). Practically, this means that companies retain and grow their existing profitable customers, going beyond the view of just constantly attracting new potential buyers. In fact, because of the competition and overcapacity common to modern industries, the costs of searching, studying and assessing new target customers often prove to be substantially higher than those of keeping the current customers satisfied. CRM is closely bound to customer segmentation, since careful market segmentation allows a company to focus its relationship building to the segments that exhibit the greatest business potential.

The concept of customer lifetime value relates to assessing the value of revenues that a customer brings in for the company. That is, the value of the entire stream of purchases that the customer would make over a lifetime of patronage (Kotler & Armstrong, 2003). This complements the CRM principle of building long-term relationships, as the worth of a customer is understood to be more than simply the worth of a single sale. Various LTV models have been developed to assess the value of a customer in the period that they stay as customers to the company. However, because of the stiff competition in dynamic business environments, such as the mobile service business, customer defections are common and therefore the attempts to model the long-term value of a customer often prove to be fruitless. Hwang et al. (2004) have approached this problem by suggesting a new, more elaborate LTV model that is based on regularly and continuously renewed short-term customer value. They also derived a way of performing customer segmentation with the customer value results from this model.

The key idea behind the research is that customer defection probability should be taken into consideration when calculating customer lifetime value. The so-called customer churn of users switching their service providers is a serious issue in turbulent environments, such as in the case of the wireless telecommunications industry. Mobile user switching behavior as a phenomenon has been studied by e.g. Ranganathan et al. (2006), who found evidence that relational investments made in the user-provider relationship decrease user migration – the users with higher levels of usage and multiple services bundled into their service plan were less likely to defect. The study also indicates that demographics and usage patterns have an effect on customer churn. Male users are relatively more prone to switching mobile service providers and the customers who use a mobile phone for functional and work-related needs differ from those who use it more for social and lifestyle purposes. Hwang et

al. (2004) classify customer value into three categories:

- *Current value*, the profit contributed by a customer during a certain period
- *Potential value*, the expected profits obtained if a customer used additional services of the company
- *Customer loyalty*, an index of a customer's probability to remain as a customer to the company

Each category was set up as an axis in three-dimensional space and cut in half by a plane to produce a visualization of a customer segmentation scheme with eight compartments, as shown in Figure 2.2.

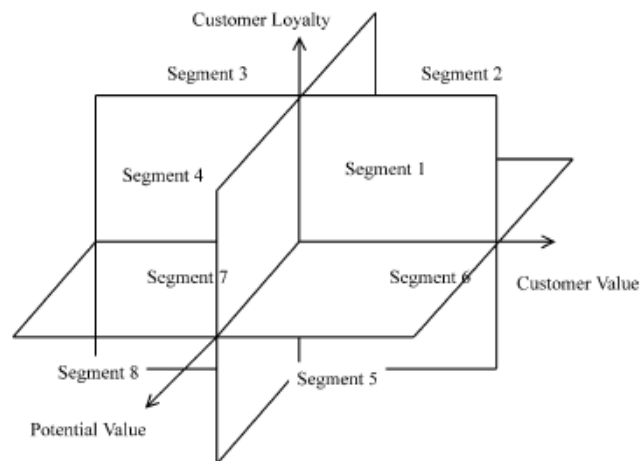


Figure 2.2: Segmentation based on customer value in three dimensions (adapted from Hwang *et al.* , 2004)

The segmentation figure clearly shows that the most valuable customers – with high current value, high potential value and high customer loyalty – are found in Segment 1. Naturally, this is where all customers should be pushed to maximize the profits. As the research paper suggests, different marketing strategies can be applied on the basis of the segmentation results to move the users into more profitable compartments. For example, the customers with high current value can be presented with volume discounts, while the users with high potential value could be approached with free trial periods for new services. The segmentation model thus provides a viewpoint for identifying financial potential, cross-selling opportunities and the durability of the two aforementioned values.

## 2.4 Developments in market segmentation

”There are no longer markets for products that everyone likes a little, there are only markets for products that somebody likes a lot.”

This motivation for concentrating a company’s resources portrays the realized long-time evolution of consumer market demand rather well. Today’s buyer-centric companies must treat customers as individuals, and personalize products and services to meet individual wants and needs. The following two subsections concisely introduce the development in consumer market demand and its effects on market segmentation by reviewing two essential concepts known as mass customization and the long-tail phenomenon.

### 2.4.1 Mass customization and customerization

Before the discovery of interchangeable parts in the end of the 18th century, the supply of products was generally very limited. In this age, unique products had to be put together one by one by skilled craftsmen and this made availability a key factor in making buying decisions. Later, the principle of interchangeability made standardizing the assembly of products possible, and together with the expansion of production capacity enabled by the Industrial Revolution, led to mass production in many industries. Volume was no longer an issue. While assembly lines and process management theories drove the growth of productivity in the 20th century, customers were enticed to buying by promising low prices achievable with economies of scale. Next, the emphasis shifted on quality. Production processes were carefully scrutinized to eliminate any quality defects, as poor perceived quality could give the company name a permanent stain. When production quality issues were generally under control and the buyers had learned to expect good quality as default, the wave of customization hit the markets. In the 1990’s, the production of technically flawless inexpensive products became insufficient to guarantee success in modern industries. The companies now had to customize their products to satisfy the needs of ever smaller – even of size one – subsets of the market. In the course of time, mass production has transformed into mass customization, and now the customers are once again served as individuals and offered very much tailor-made products.

As the market environment has become more complex, so has also the process of market segmentation. Target marketing strategies have been shifting towards very narrow segments, the right end in Figure 2.1, going as far as targeting individual buyers. Pine (1993) writes that mass customization is no longer an option but an imperative in an increasing number of industries, and describes five approaches for implementing a mass customization strategy. He also notes that creating customized products or services requires finding the characteristics that are most personal and the most individual about the product or service, and then embedding those aspects within the offering. Here, the role of segmentation schemes based on e.g. psychographics or benefits sought is clear, as the fundamental purpose of market

segmentation is to profile customers to identify and group their needs. The high level of market fragmentation, however, sets a challenge for market segmentation schemes. In particular, marketers must find a way of capturing such information about the customers that allows accurate enough profiling of their individual needs.

One approach to tackle this problem has been developed by Blyk, a UK-based mobile virtual network operator (MVNO). MVNOs do not own the physical network they operate their services on but must rent transport capacity from network core operators. Consequently, they often opt to draw revenue from value added services (VAS), as price competition is not financially sustainable. Blyk offers exclusive invitation-only mobile operator services strictly targeted at 16-24 year olds. The monthly offer to the selected customers is 217 text messages and 43 minutes of voice calling free of charge. As a substitute, the users of their service must accept the delivery of up to 6 brand messages per day to their handset. In addition, before an invitee can be registered as a Blyk user, he or she must fill out a user profile by answering questions about personal interests. By collecting such personality data, Blyk aims to prepare the way for marketing communications designed to match the interests of its individual members. The user data collection process starts at the creation of a profile at registration, and continues whenever a user interacts with Blyk. The more a user communicates, the more the system can learn about his or her interests and, consequently, the more potential the advertisements have to be relevant. A research by E-consultancy displays an average response rate of 29% across 50 advertisement campaigns delivered over Blyk within the first six months of operations (Blyk, 2008b). The same research shows that non-customized campaigns over e.g. direct mail or the Internet achieve far inferior response rates of less than 5% (Table 2.2).

Table 2.2: Average response rates for advertisements in various media.

Medium	Average Response Rate (%)
Online advertising	0.5
E-mail	2.5
Direct mail	2.0
Mobile (unprofiled)	4.5
Mobile (profiled)	29.0

In April 2008, six months after its launch in the UK, Blyk reported breaking the limit of 100,000 subscribers, half a year ahead of a planned schedule (Blyk, 2008a). If the subscriber base keeps growing and the response rates of Blyk campaigns prove to be sustainable, it would imply that companies can collect highly accurate profiling information about their customers to meet the challenges of mass customization.

The redesign of marketing strategies from using seller-centric practices to using buyer-centric practices has been named customerization, which effectively means combining mass customization with customized marketing (Wind & Rangaswamy,

2001). Wind & Rangaswamy note that both mass customization and customerization are attempts to provide products and services that better match the needs of customers. However, Huffman & Kahn (1998) suggest that an overwhelming number of options can sometimes be confusing rather than beneficial, and thus product retailers must strive to reduce the complexity of the sales interaction. The potential benefits of mass customization for the company are, for example, substantial reductions in inventory, more accurate market information and forecasting on customer tastes and achieving higher customer satisfaction, and consequently customer loyalty (Wind & Rangaswamy, 2001).

### 2.4.2 One-to-one marketing and the long tail

Advanced customization increases the costs of designing different strategies for the numerous market segments and therefore puts pressure on its positive effects on profitability. Before the evolution of manufacturing technologies, there was a clear limit to which diversity in market offerings could be carried without driving production costs beyond practical limits (Smith, 1956). Now that flexible manufacturing has obsoleted the classic tradeoff between tailoring products to the needs of individuals and the costs associated with delivering the desired product, Wind & Rangaswamy (2001) suggest that the customizability of marketing is proving to be a limiting factor in implementing mass customization at a full scale. Consequently, millions of manufacturing options are left unused and the customers are still stuck with mass-produced products. All the while, the variety of available products has undoubtedly been on the increase: the number of different products in supermarkets grew from 13,000 in 1981 to 21,000 in 1988 (McKenna, 1988). Dell Computer Corporation employs customerization with a build-to-order system and in 1999 satisfied the needs of its customers with 25,000 different computer configurations (Wind & Rangaswamy, 2001).

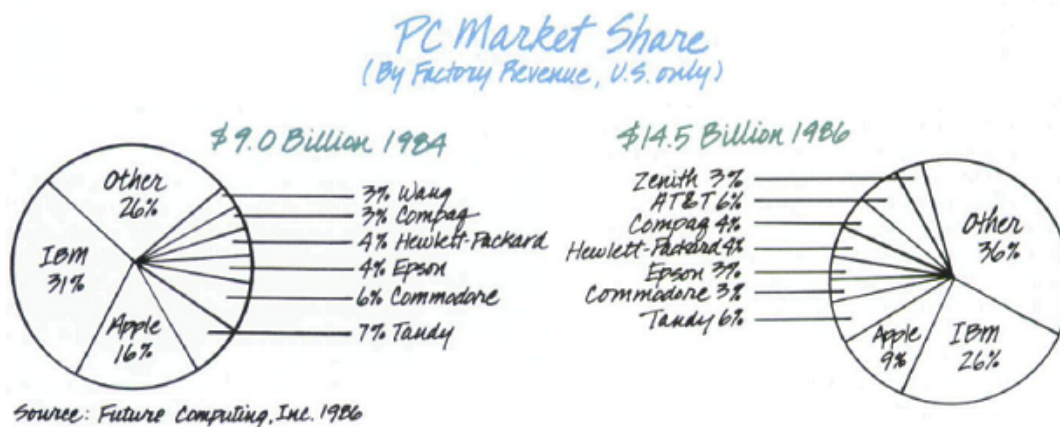


Figure 2.3: Evolution of personal computer market shares in the 1980's (adapted from McKenna, 1988)

McKenna (1988) discusses the effects that such expanding diversity has on compe-



tition with an illustrative example depicted in Figure 2.3. A large market share achieved with a single brand of a large corporation is no longer unchallenged and secure, but the proliferation of successful small companies has in fact lead to the situation where the "Other" category dominates the market. McKenna noticed that as diversity increases, the relative importance of serving niche markets grows. The few big players in a market are not so big after all as the majority of buyers is split between their alternatives. This suggests a need for the companies to perform more granular market segmentation.

In the 21st century, the growing digital economy pushed the same phenomenon to the surface. The Internet now provided a virtual world, where the cost of showcasing a large variety of products was no more explicitly linked to physical space. The traditional hit-driven economy has often been characterized with the so-called 80-20 rule, where the most wanted 20% of products bring in 80% of the revenues. The customer base has been segmented accordingly, with no particular interest in marketing the subcommercial 80% of titles that the buyers, in the light of sales volumes, had little or no demand for. After all, there were only limited resources available for e.g. displaying a selection of books and DVD's in store shelves or screening films in movie theaters. But when a practically unlimited selection of books, music or movies can be made available to fulfill the needs of even the smallest market segment, an individual user, the economy is changing. Now, instead of counting the sales of a handful of bestsellers, it is more relevant to ask: "What percentage of the top 10,000 titles in any online media store rents or sells at least once a month?". According to Anderson (2004), the correct answer is 99%, a far larger proportion than just the 20% that are traditionally considered as hits. The thinning but lengthy end of the demand curve, coined "the long tail" (Anderson, 2004), consists of the vast amount of niche markets left outside the hit market.

To power of the long tail is in its cumulative size. Before, if something wasn't a hit, it couldn't make enough money to return the cost of its production. In other words, only hits deserved to exist economically and thus marketing operations were designed to maximize their profitability. Anderson (2004), however, emphasizes that the "misses" usually make some money too, and because there are so much of them that money can add up quickly to a huge new market. Kilkki (2007) has built a mathematical model for applying the long tail framework in various real-life situations. Figure 2.4 depicts the book sales in the U.S. using Kilkki's model on logarithmic scale.

The shape of the curve clearly shows that an 80% share of the revenues is brought in by books that fall outside the top 1,000 titles. The collected statistics show that in total more than 1,2 million different titles were sold at least once. Anderson (2004) also illustrates the cumulative power of the long tail with books: the average Barnes & Noble retail bookstore carries 130,000 titles but more than half of the Internet bookstore Amazon's book sales come from outside its top 130,000 titles. This suggests the market for books that are not sold in an average bookstore can be even larger than the market for those that are. According to Kilkki (2007), there exists a latent demand for objects with very low popularity that cannot be

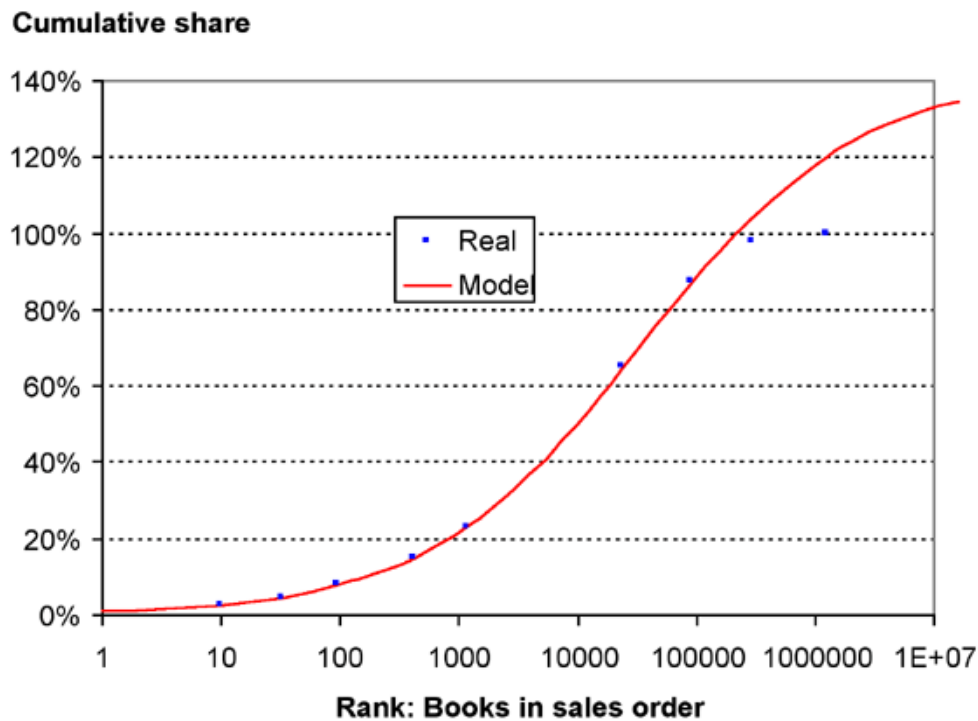


Figure 2.4: The cumulative U.S. book sales in 2004 (adapted from Kilkki, 2007)

satisfied because of the cost structure of the current business model, and therefore the demand is "artificially" suppressed.

The developments in the marketing environment and their subsequent impact upon consumer behavior are changing the way in which market segments are determined and managed. The growing diversity increases the market heterogeneity that market segmentation was designed to handle. At the same time, individual consumers are increasingly performing self-marketing; taking more responsibility for determining the best choice from a variety of alternatives by using the Internet as a tool for searching information about the available products (Kotler & Armstrong, 2003). Fortunately, while the developing information technology is enabling an increasing product variety and the ease of browsing it for the consumers, it also brings great opportunities for the companies. Today, businesses can create detailed records of customer preferences and behavior which can be updated and manipulated with ease (Dibb, 2001). Dibb suggests that the improvements in data management technology are increasing the opportunities for segmenting the market with product-related factors e.g. benefits sought or product usage patterns, and the advances in data capture allow marketers to record and respond to the needs and wants of individual customers. Marketers now have the potential to target the individual needs of customers in markets where previously it was only possible to satisfy the requirements of a larger segment or group. Such targeting strategy is often described with the term one-to-one marketing – being willing and able to change your behavior toward an individual

customer based on what the customer tells you and what else you know about that customer (Peppers *et al.* , 1999). One-to-one marketing is grounded in the idea of establishing a learning relationship with each customer: the customer tells of some need, and the company customizes the product or service to meet it. With every interaction and modification the ability to fit the product to this particular customer improves.

While the one-to-one marketing approach evidently enhances the company's understanding of its customers, there are also drawbacks. Dibb (2001) lists resources, company characteristics and customer cooperation as the main three barriers. The resource problem is mainly linked to the fact that not all companies have the technology or expertise required for capturing and manipulating data to produce such a complex segmentation scheme. Organizational structures that guide company operations according to product groups or a leadership culture reluctant towards changes can in turn prove to be company characteristics that conflict with one-to-one marketing. Finally, the one-to-one approach assumes that the customers are prepared to engage in some kind of interaction with suppliers. In order to achieve and maintain this interaction, the suppliers must offer customers tangible benefits or they will not let themselves to be managed.

Thus, despite the benefits acquired with one-to-one marketing approach, there are clearly limits to its application and therefore not all companies can or should employ it. Dibb's study concludes that while one-to-one marketing will play an important role in future marketing strategies, it will continue to co-exist with traditional segmentation.



# Chapter 3

## Mobile service business

### 3.1 The mobile ecosystem

Mobile phones have been used for voice calling and text messages for over a decade already, but the penetration of more advanced services varies greatly across different markets. In Japan, for example, people have been using mobile Internet services since 1999, while in Finland and in other parts of Europe, as well as in the United States, different players in the industry are still seeking their roles in the competition (Soininen, 2005). While voice calls and the short message service (SMS) still bring in most of the telecom operators' revenues, the greatest potential for growing the business is usually thought to lie with more advanced mobile services.

Expectations for the profitability of new mobile services are well reflected in the Finnish mobile ecosystem, where telecommunications companies are widening their range of offerings. During the year 2007, all three mobile network operators invested in constructing and updating their networks, especially enhancing the third generation (3G) network supporting the High Speed Packet Access (HSPA) technology, which enables faster data transfer rates. In 2007, data traffic over mobile networks increased fivefold on the previous year, giving an indication that new data-based services are starting to pick up on the Finnish market. At the same time, mobile voice calls and SMS messaging also continued to gain popularity with the respective growth rates of eight and six percent on the previous year (FICORA, 2008).

Mobile industry's role in the development of Internet business is currently a hot topic. Leading ICT companies, such as Apple and Google, have already signaled that mobiles are an essential part of their business strategy – Apple by launching the iPhone smartphone (Apple, 2007) and Google by founding a consortium to develop an open mobile platform (Open Handset Alliance, 2007). In the introductions of both of these products, the importance of rich Internet applications in the future of mobile service business was clearly communicated. In May 2008, Olli-Pekka Kallasvuo, the CEO of Nokia, announced that the company's future goal is "to act less like a traditional manufacturer, and more like an Internet company" (Nokia, 2008a).

Soininen (2005) has argued that the definition of the mobile Internet industry can get somewhat vague, when companies formerly active in separate mobile and Internet markets are entering the same arena. To clarify the competitive field and describe the relationships between different players, he has built a model of the elements of the mobile Internet industry. The business ecosystem, depicted in Figure 3.1, consists of five main elements: 1) networks, 2) devices, 3) operating systems, 4) content, services and applications and 5) support services and regulation. Competition occurs not only inside each circle, but because of the convergence of the industries, between them as well. The industry's value networks are complex, and therefore it is not easy to foresee who will reach the dominant position.

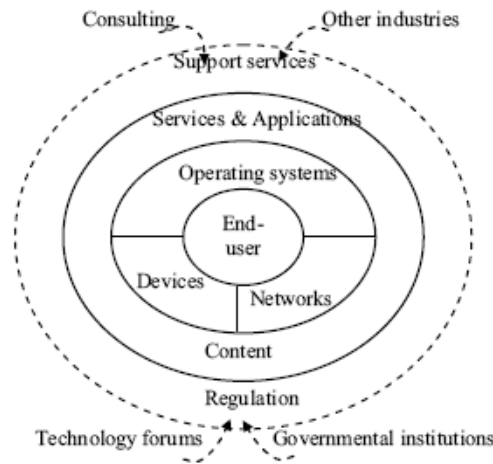


Figure 3.1: Elements of the mobile Internet industry (adapted from Soininen, 2005)

The following three sections review devices, networks and services as the most relevant elements for the purposes of this study. While Soininen notes that by only including these three main areas a much generalized view with only a basic categorization is acquired, the chosen elements are used here only to provide a short review of the market under study.

## 3.2 Devices

The mobile devices studied in this thesis are defined as smartphones. Iftode et al. (2004) describe smartphones as combining significant computing power with memory, short-range wireless interfaces (e.g. Bluetooth), Internet connectivity and various input-output components (e.g. high-resolution color touch screens, digital cameras, and MP3 players). While touch screens are only beginning to reach the mass market, Internet connectivity and a music player can be found in all of the handsets that took part in the smartphone panel study analyzed in this thesis. A digital camera is integrated in 94% of these devices. The conceptual difference between a smartphone and a traditional mobile phone is that the device has not been designed to be a "dumb" terminal for passing voice and data between end-users, but can by itself run more advanced applications such as games, multimedia players or office applications. The mindset of the ICT industry has lately been evolving towards dumb networks and intelligent terminals, partly because the greatest business opportunity lies at the consumer interface, partly because of the fit to the current Internet model. For a few years already, Nokia has been calling its high-end devices "multimedia computers" instead of mobile phones. Figure 3.2 is an illustration of the various technological features integrated within a modern smartphone and the range of content that is commonly available for mobile consumption.



Figure 3.2: The wide range of features and functions on a Nokia N95 smartphone (adapted from Vanjoki, 2007)

Vaughan-Nichols (2003) notes that because today cellular phones are used for much more than just making voice calls, their operating systems have had to improve. Smartphones work with an operating system designed particularly with the challenges of handheld devices, e.g. screen size and battery life, in mind. The current market leader in mobile operating systems is the Symbian OS which supports the Se-

ries 60 (S60) software platform. All the handsets that took part in the smartphone panel study were running Symbian and the S60 platform. Other notable mobile operating systems on the market are Windows Mobile from Microsoft, BlackBerry developed by RIM and iPhone OS from Apple. Figure 3.3 illustrates the current state of the global smart mobile device market with some relevant key figures. In operating systems, the global market share of Symbian is 67%, followed by Microsoft (13%) and RIM (10%) (Canalys, 2008). The Canalys report also shows that the converged device market (consisting of all smartphones and wireless handhelds, e.g. PDAs) exhibits an annual growth of 60% making it one of the fastest growing segments of the technology industry.

**Worldwide converged smart mobile device market  
Market shares Q4 2007, Q4 2006**

Vendor	Q4 2007 shipments	% share	Q4 2006 shipments	% share	Growth Q4'07/Q4'06
<b>Total</b>	<b>35,522,360</b>	<b>100.0%</b>	<b>20,667,200</b>	<b>100.0%</b>	<b>71.9%</b>
<b>Nokia</b>	18,802,480	52.9%	11,114,630	53.8%	69.2%
<b>RIM</b>	4,046,860	11.4%	1,829,260	8.9%	121.2%
<b>Apple</b>	2,320,840	6.5%	-	0.0%	NA
<b>Motorola</b>	2,301,260	6.5%	1,463,090	7.1%	57.3%
<b>Others</b>	8,050,920	22.7%	6,260,220	30.3%	28.6%

Source: Canalys estimates, © canalys.com ltd. 2008

Converged smart mobile device market: smart phones and wireless handhelds

Figure 3.3: The global smart mobile device market in numbers (adapted from Canalys, 2008)

In November 2007, an alliance of leading technology and wireless companies led by Google joined forces to develop Android, an open operating system and software platform designed for mobile devices. By openness, the formed Open Handset Alliance aims to enable developers to work more collaboratively thus accelerating the pace at which new and compelling mobile services are made available to consumers (Open Handset Alliance, 2007). In June 2008, Nokia announced plans to acquire Symbian Limited, the company responsible for the development and licensing of Symbian OS, and then contribute Symbian and the S60 platform to a foundation, to provide a royalty-free open platform for developing new smartphone applications (Nokia, 2008b). Other major contributors to the foundation will be Motorola, Sony Ericsson and NTT DoCoMo, all bringing in their own Symbian-based systems. The main goal of the foundation is to simplify the ecosystem for handset manufacturers, operators and developers by unifying the software platform that has been already shipped on over 200 million devices.

All the aforementioned developments clearly show that there currently is an enormous interest surrounding the smartphone business. The converged smart mobile devices represented 10% of the global mobile phone market by units in 2007 (Canalys,



2008), but the further development of mobile Internet applications is expected to drive the sales even further. Yet, it is still not clear where the true killer application for smartphones can be found. Vaughan-Nichols (2003) speculates that the most important driver in the corporate smartphone market will be the increasing demand for mobile applications as powerful as their laptop-counterparts, while demand in the consumer market will be driven by rich multimedia and games. In any case, faster processors and more memory on the devices, as well as the new generation of wireless networks offering greater bandwidth, are the enablers for developing more powerful mobile applications.

### 3.3 Networks

Mobile communication networks have currently evolved into their third generation. The first generation of mobile networks, laid out in mid-1980s, used analog radio signals to convey voice calls and support speech-related services. The second generation mobile communication system was designed with emphasis on compatibility and international transparency. This digital system exceeded all commercial and technical expectations, introducing additional capabilities such as sending text messages via the short message service, SMS, and general packet-switched data transfers using the general packet radio service (GPRS) (Kaarainen *et al.*, 2005). The first 2nd generation network using the GSM (Global System for Mobile communications) standard was launched in Finland in 1991. The data transmission rates in the GSM network were later improved with the introduction of Enhanced Data rates for GSM Evolution (EDGE) technology (also known as "2.5G"). The third generation of mobile phone standards and technology, 3G, was developed to provide for high-speed Internet access and data transmission required to support new data-intensive mobile services. The first commercial 3G networks were launched in 2001 in Japan and South Korea. In Finland, a 3G network was first launched by TeliaSonera Finland on 12th of October 2004, followed by launches from Elisa (23.11.2004) and DNA (19.12.2005) (FiCom, 2008). While any exact figures illustrating the current 3G network coverage in Finland are hard to find, a report by the Finnish Ministry of Transport and Communications counts that about three fourths of the Finnish population were living in an area covered by a 3G network at year-end 2007. It is expected that 95% of the population are covered by 3G in three years time (MINTC, 2008). In the fall of 2007, the share of 3G phones out of all mobile devices connected to the Finnish mobile network was 17% (Kivi, 2008). Of the smartphones that took part in the panel study analyzed in this thesis, 96% were capable of utilizing 3G networks.

While operators still make investments to improve their 3G network coverage towards nationwide accessibility, alternative access technologies for smartphone devices have also begun to emerge. Wireless Local Area Network (WLAN) technology is getting more common in handsets: in the smartphone population studied in this thesis, already a 43% share had the capability to connect to a WLAN. While the coverage of WLAN's is usually limited to a very local level, e.g. within buildings or rooms, they can offer bandwidth capacity unmatched by 3G and are often free of charge due to certain subsidies and the low cost of equipment required for setting up access points. Common providers of free wireless network access in Finland are, for example, universities, libraries or municipalities. Free WLAN connectivity is also offered by commercial players such as hotels, cafes, bars and restaurants. These so-called WLAN "hot spots" are either open for all or require some sort of authentication, and possibly also customership. Korhonen (2003) argues that while users readily consume very high data-rate services, they tend to do so in relatively constrained spaces. Such services may require focusing of attention or constant eye contact from the user and therefore the higher the application data rate is, the lower

the consumer mobility tends to be. Thus, WLAN and 3G are not exclusionary options for smartphone network access, but rather complement each other in different contexts. While cellular networks provide for ubiquitous access, WLANs offer static and localized bandwidth capacity.

The most important role of mobile networks is to function as an enabler for services and new innovations. In Finland, for example, SMS messaging capability has been the driver for utilizing mobile phones in payment services that include, for example, purchasing tickets for the public transportation, paying for parking fees and buying soft drinks from vending machines. The 3G network technology has been designed to be the enabler of new data-intensive services such as multimedia communication, enhancing person-to-person communication with high-quality images and video, and accessing information on public and private networks with higher data rates (Holma & Toskala, 2000). While the services promoted with the launch of this new generation of network technology have not yet caught on in the same way as text messaging services once did, the transition to a new core technology has been justified with its flexibility to handle connections (Korhonen, 2003). In practice this means that while the current GSM technology is able to support many of the same services as the newer 3G technology, a network utilizing 3G can provide them more efficiently and economically.

## 3.4 Services

The meaning of service can vary greatly in different contexts. According to Kotler & Armstrong (2003), a service is any activity or benefit that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Kaaranen et al. (2005) note that the word "service" suffers from inflation in the telecommunications business area as it is used in almost any context. Because discussing the nature or content of services is not in the scope of this thesis, a mobile service is here defined as the service mobile network operators, handset manufacturers or separate mobile service providers offer to their consumer customers. Thus, the mobile service business is defined by its company actors - network operators, equipment manufacturers and service providers - and the transactions taking place with the end-users of mobile phones.

While the focus of the MoMI research project is on studying the use of new mobile services enabled by the emergence of mobile Internet, the well-established voice and SMS services cannot be ignored because of their importance to the mobile operator business. In April 2006, the regulatory authorities in Finland wanted to boost the diffusion of new technology by allowing the sale of a 3G mobile phone and a subscription as a package, a procedure known as handset bundling. With bundling legalized for 3G handsets, the usage of advanced mobile services was expected to grow alongside the smartphone population vitalizing the mobile service business. However, according to a consumer survey conducted by FICORA (2008), only one tenth of the people who bought their smartphone as a part of a bundling deal made the purchase because it enabled them to use new mobile services, such as the Internet and e-mail. About 60 percent of the survey respondents claimed that the purchase of a new 3G handset had not effected their mobile phone using habits at all. On the other hand, the share of respondents claiming to use Internet and e-mail services more than before almost doubled from the previous year, now measuring 30%. An academic study based on mobile network traffic measurements indicates that handset-generated data traffic grew 160% between 2006 and 2007, with web browsing and e-mail currently the driving services for data usage (Kivi, 2008).

All in all, the FICORA survey shows that SMS messaging was the most popular mobile service after voice calls in 2007 with a 90% penetration rate. About one third of the survey respondents used multimedia messages, while other mobile services enjoy significantly inferior success when measured with penetration rates. The situation is similar among the smartphone study population. A summary of the perceived and expected usage of various mobile services based on the study data is graphed in Figure 3.4. On the horizontal axis is the share of panelists who stated in the pre-panel survey that they intend to use a certain service on their smartphone. On the vertical axis, in turn, is the share of panelists that both intended to use a service before the study and then actually used it during the study, as recorded by the handset usage monitoring application. The services that raised pre-panel interest but for some reason never sparked actual usage are positioned below the dashed diagonal line, the distance from the line illustrates the difference between intended

and realized usages.

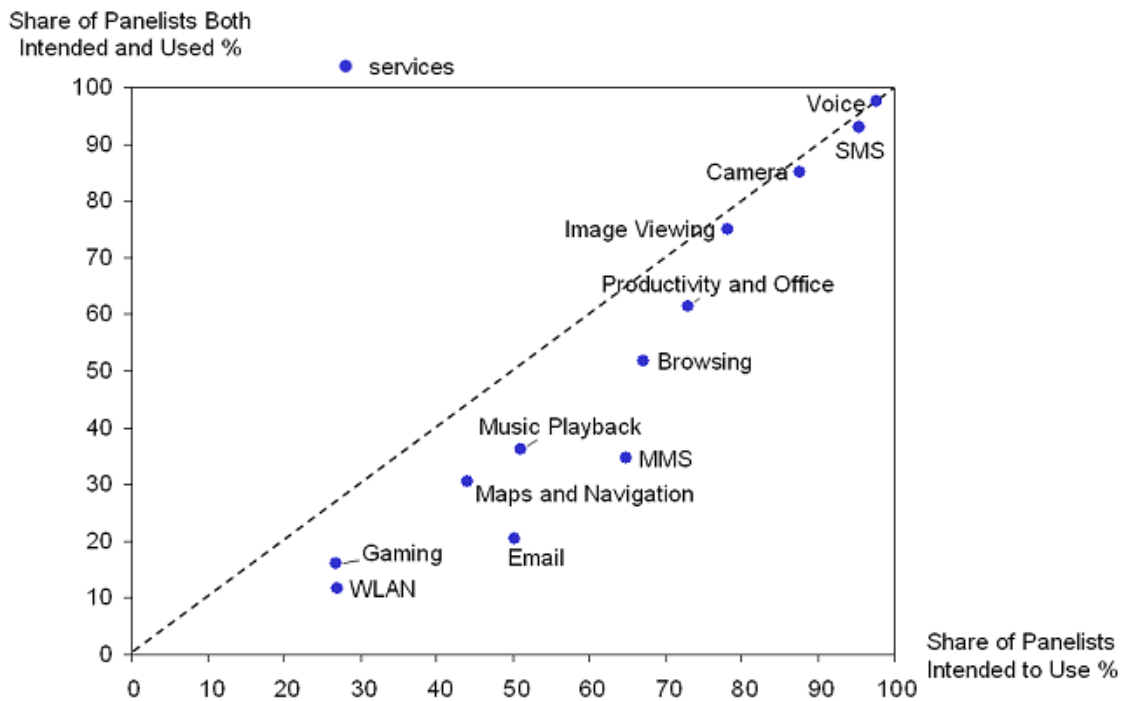


Figure 3.4: Panelists' intentions for using and the measured actual usage of smartphone services (adapted from Verkasalo, 2008c)

Photography-related services, along with voice calling and text messaging, display little variation from their expected usage, but several new mobile services show relatively little actualized usage. Why? According to the FICORA survey, new mobile services are not used mostly because they are not considered necessary. Lack of skills and the price level are other commonly stated reasons for low interest (FICORA, 2008). Mobile Internet services have often immigrated from the world of personal computers, where the Internet has been in widespread use for almost a decade. Consequently, the services that are newcomers on mobile phones are compared to their equivalents on other service delivery platforms. Blechar et al. (2006) discovered that because users perceive advanced mobile services as being similar to Internet services, they are used as a benchmark for their mobile counterparts. The utility in using a new mobile service is not necessarily clear, if it is not able to deliver the same quality experience as the users have learned to expect. What's more, the reference price of an Internet service accessed on e.g. a flat-rate broadband connection can currently be close to zero thus delivering a cost/value relationship that can be hard to equal with a mobile data subscription. The study of Blechar et al. suggests that service differentiation can therefore be an extremely important factor in creating value for new mobile services.



# Chapter 4

## The marketing research process

### 4.1 Data collection methods

Marketing research is formally defined as the function that links an organization to its market through the gathering of information (Hair *et al.* , 2006). Alternatively, marketing research has been defined as the systematic design, collection, analysis, and reporting of data relevant to a specific marketing situation facing an organization (Kotler & Armstrong, 2003). Marketing research mechanisms aim to reduce the unpredictability of consumer behavior by generating accurate, relevant and timely information describing the market opportunities and problems. In this thesis, the role of marketing research is in performing a situational analysis of the mobile service market, to identify groups of customers who possess similar needs, characteristics or preferences.

#### 4.1.1 Handset-based monitoring of smartphone usage

Chapter 3 gave a short review of the increasing buzz that smart mobile devices are currently generating within the ICT industry. As in any business, a company competing in the mobile service business must know who are the customers and how do they prefer to use mobile services, to be able to successfully fulfill the customer needs. Obtaining knowledge on the usage of smartphones and mobile services, however, is not necessarily a simple task. Verkasalo & Hämmäinen (2007) reviewed the research on mobile subscriber behavior and argue that while interviews, laboratory tests and surveys provide inaccurate or subjective data, network-based monitoring, on the other hand, can only produce aggregate measures such as the amount of total packet data transmitted, without actually revealing the application that has generated the traffic. Also, with a network-based monitoring solution it is impossible to obtain any data of the usage of such handset functions that do not utilize the network (e.g. cameras or music players).

Kivi (2007) made a comparison of the various data collection methods used in study-

ing mobile user behavior and service usage, to clarify their fundamental differences. The different measurement points that can be used to provide source data for analysis-making are illustrated in Figure 4.1. Kivi notes that all studied methods have their advantages and disadvantages, and therefore the applicability of a particular method depends on the research objectives as no method is suitable for all purposes. Different methods entail a tradeoff between sample size and data granularity: surveys and handset monitoring provide very detailed but sample-based data, while wireless access network data is less granular but can be based on the entire subscriber base of an operator. While producing somewhat subjective data, surveys are able to provide knowledge about issues that are not directly measurable, and therefore automated data collection and surveys are likely to complement each other in the future. The study of Kivi also suggests that the mobile device is the most potential data collection point for the purposes of measuring mobile user behavior and service usage.

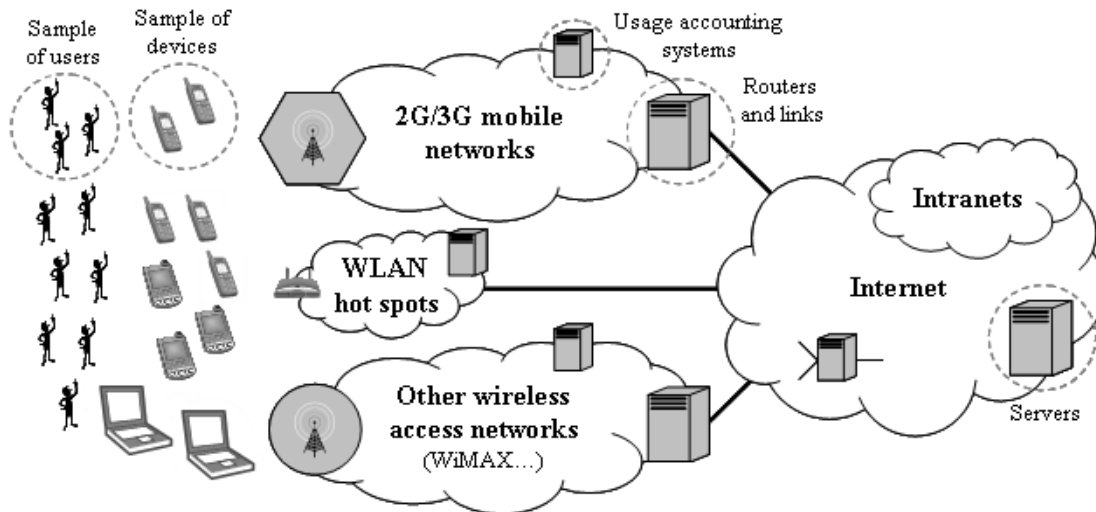


Figure 4.1: Various data collection points in the mobile ecosystem (adapted from Kivi, 2007)

The market segmentation study in this thesis explores the potential of data collected with a handset-based usage monitoring software introduced by Verkasalo & Hämmäinen (2007). They discuss its possible uses for various study topics while concluding that as a whole it is a highly objective and accurate way to measure actions and events taking place in the smartphone. The development of the monitoring software and the pilot panel studies took place in 2003. Earlier studies of the method's utility are therefore available on the topics of, for example, using statistical tools in modeling mobile customer behavior (Verkasalo, 2005) and making a cross-country comparison of handset and mobile service usage (Verkasalo, 2006). Both of these studies give a review on the implementation of the data acquisition and retrieval process of the software client. An outline of the whole research process is depicted in Figure 4.2.



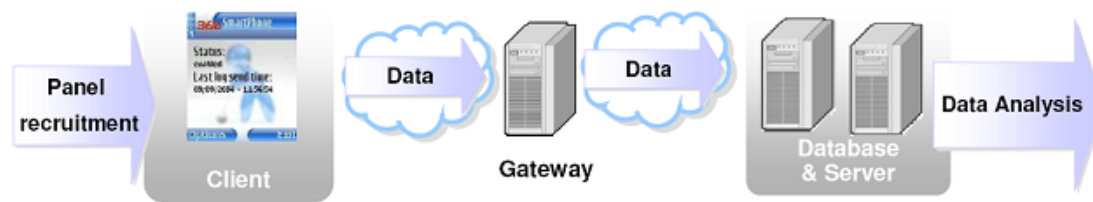


Figure 4.2: The data collection process in the smartphone panel study (adapted from Verkasalo, 2008c)

Annual smartphone panel studies have been executed in Finland since 2005. In 2007, the panel recruitment was performed by the collaborating telecom operators who used SMS messages to contact a random selection of their customers. After being recruited, the panelists had to approve contracts concerning the utilization of the collected data, to assure that the study is executed according to the legislation. The panelists then installed the monitoring software on their S60 smartphones and their mobile service usage could thereafter be continuously observed. On a daily basis, the compressed and encrypted data logs were uploaded over a packet data link to servers, where they were aggregated and made ready for data analysis.

Verkasalo (2006) argues that the monitoring software can overcome many existing problems in studying usage-level factors. Most importantly it is objective, since sometimes mobile subscribers' own perceptions of their usage are not in line with actual usage. By acquiring data straight from the handset, the subscriber cannot directly affect the results through her own interpretations. Secondly, the monitoring software is able to collect data on a wide range of relevant smartphone functions with high accuracy.

The weaknesses of the data collection method are related to the sample population. All of the panel participants are required to be 18 years old due to legal restrictions, they must own a Nokia smartphone that runs the S60 software platform and be capable of installing the usage monitoring software into their phones. This effectively limits the degree in which the analysis results can be generalized. Although 3G phone bundling deals are starting to make smartphones more common – 17% of the devices in the Finnish mobile network were smartphones in 2007 (Kivi, 2008) – it can still be assumed that the owners of S60 devices that are willing to participate in a study researching smartphone usage are more technologically advanced than regular mobile subscribers. The requirement of installing the monitoring software on one's own also calls for some degree of orientation towards more advanced uses of mobile technology and familiarity with using mobile devices.

In summary, even with limits on the generalization of results from the smartphone panel study to the mass market, handset-based usage monitoring is a method that is able to provide accurate and objective usage data about an extensive range of mobile services. It is then left to the marketing researcher to decide what conclusions can

be drawn out of such information and if any other measurement methods should be used to gain complementary information about mobile service usage.

### 4.1.2 Surveys

Surveys were used in the smartphone panel study to acquire background information about the participants. The panel surveys were self-administered, the panelists filled a prepared questionnaire that was made available through the Internet. Because the questions were quite general and unambiguous, there is no reason to expect that the respondents would give false information on purpose. Survey data was collected mainly with an initial panel survey that was executed prior to the start of the usage monitoring study. The collected data was by nature demographic concerning e.g. the age, gender and occupation of the panel participants. Other types of pre-panel questions were used to query the participants' mobile subscription type (e.g. if it is pre-paid or bundled), the charging plans of voice, message and data subscriptions (usage-based, packaged or flat-rate) and the intentions of using various mobile services in the present time and in the future. The questions whose data was utilized in the market segmentation study can be found in their original form in Appendix A.

Some of the original questions had response categories too granular to provide a basis for statistical analysis and therefore some of the response values were merged to produce aggregate values with greater response frequencies. Particularly, this was necessary with the age and occupation variables, because most of the panel participants were young students or employed people.

## 4.2 Data analysis methods

With the introduction of new ubiquitous data collection methods, such as the handset-based usage monitoring client described in the previous section, more accurate and timely information is becoming available for business decision makers. To make use of this data that is often warehoused in extensive amounts, various data mining techniques are employed. Because the questions of interest to marketing researchers are usually rather complex and involve multiple dimensions, multivariate analysis is required to model the simultaneous relationships among the phenomena. Multivariate analysis is a group of statistical techniques used when there are two or more measurements on each element and the variables are analyzed simultaneously (Hair *et al.* , 2006). Under review in the following subsections are two multivariate techniques: cluster analysis and factor analysis.

### 4.2.1 Cluster analysis

Cluster analysis has become a common technique for developing empirical groupings of persons, products, or occasions which may serve as the basis for further analysis. Unlike other statistical methods for classification, such as discriminant analysis, it makes no prior assumptions about important differences within a population (Punj & Stewart, 1983). Cluster analysis is an interdependence multivariate method, that strives to identify natural groupings or segments among many variables without designating any of them as a dependent variable (Hair *et al.* , 2006).

Punj & Stewart (1983) discuss various clustering methods used for marketing practises, and summarize from a review of numerous empirical studies that iterative partitioning methods are preferable to hierarchical methods. Iterative clustering methods, however, require a non-random starting point and a prior specification of the number of clusters the marketer wishes to produce. Among hierarchical clustering methods, Ward's minimum variance method stands out as the most reliable choice for most cases, when there are no outliers present in the data. Whenever the initial starting points for iteration and the desired number of clusters can be specified the iterative K-means procedure outperforms other algorithms.

To cope with the absence of preliminary information, a hierarchical method can first be utilized to produce a preliminary clustering solution, to suggest a candidate number of clusters and the cluster centroids to be used as the starting points for iterative clustering. Kuo *et. al* (2002) studied such two-stage approaches to clustering for market segmentation purposes and conclude that the integration of a hierarchical and a non-hierarchical method offers better performance compared to using either kind of clustering method alone. Wansink & Park (2000) also suggest that a hybrid two-stage clustering analysis is the superior diagnostic method for the purposes of profiling heavy users in a usage rate segmentation scheme.

### 4.2.2 Factor analysis

Factor analysis is a multivariate statistical technique that is used to summarize the information contained in a large number of variables into a small number of subsets called factors (Hair *et al.* , 2006). Factor analysis is an interdependence technique used in simplifying data. Stewart (1981) describes factor analysis as a multivariate statistical technique that is concerned with the identification of structure within a set of observed variables and whose appropriate use involves the study of interrelationships among variables in an effort to find a new set of variables. Factor analysis indicates the important qualities present in the data, a factor is thus a qualitative dimension.

### 4.2.3 Chi-square analysis

Marketing research often calls for analyzing data by means of cross tabulations, to study relationships among variables. For market segmentation purposes, the effect of descriptive variables on a segment membership variable is often of interest to the marketer. The question might, for example, be "Is the frequency of young people in a certain segment larger than is to be expected by the age distribution of the total population?" Chi-square ( $\chi^2$ ) analysis assesses how closely the observed frequencies fit the pattern of the expected frequencies, often referred to as a "goodness-of-fit" test (Hair *et al.* , 2006). A chi-square analysis tests the null hypothesis that the frequency distribution of a variable observed in a sample is consistent with the theoretical distribution assumed from the population. The test proceeds by first calculating the  $\chi^2$  statistic with the formula:

$$\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i}$$

The chi-square statistic is then used to calculate a p-value by comparing the value to the chi-square distribution, with the proper degrees of freedom. A p-value of 0.05 or smaller – at least 95% probability that the null hypothesis is invalid – is here interpreted as a justification for rejecting the null hypothesis that a variable is unrelated to another variable. The chi-square results will be distorted if more than 20% of the cells in the cross tabulation matrix have an expected frequency of less than 5, or if any cell has an expected frequency of less than 1. Practically, this is relevant in the situations where the segment membership variable and the descriptive variable are divided into several categories, thus decreasing the frequencies within individual cells in the cross tabulation matrix. In such cases, it might be necessary to collapse some of the original descriptive categories into fewer combined categories to get fewer cells and larger frequency counts.

# Chapter 5

## Segmentation of smartphone users

### 5.1 Data set

Chapter 5 concentrates on building exemplary segmentation schemes to illustrate the challenges and opportunities associated with researching mobile service markets with the handset-based data collection method. The three analyzed market segmentation schemes are based on a usage data set that was collected in the 2007 Finnish smartphone panel study. This annual study took place between October 2007 and January 2008. In total 644 panelists, who were required to be at least 18 years old, were recruited with a text message campaign carried out by the collaborating Finnish telecom operators. Out of this base population, the panelists that recorded usage data for over three weeks during the panel study period were chosen as the targets of data analysis. From this set of 578 active users, only a subset of 257 panelists could in the end be used due to serious reliability issues detected in the data set. Information about the general – e.g. demographic – characteristics of the analyzed panel population can be found in Appendix B.

The first two of the following segmentation schemes are based on the aforementioned sample of 257 Finnish smartphone users. The last scheme uses a considerably smaller target population, because of the limitations posed by location context detection. The identification of three contexts was successful for a subset of 98 panelists, of which 83 had provided demographic background information and were thus chosen to form the population of the person-situation segmentation scheme.

## 5.2 Scheme 1: Heavy half segmentation

Because the handset-based monitoring software is able to accurately log all relevant usage events taking place in the smartphone device, it seems self-evident that a segmentation scheme based on usage rates should be constructed and evaluated. The situation was approached by testing the applicability of Twedt's heavy half theory (Twedt, 1964) developed in the sixties and revisited in the eighties (Cook & Mindak, 1984). Heavy half segmentation divides the users of a service into non-users, light users and heavy users according to their volume of usage. A heavy user's usage volume is higher than the population median, a light user's is less than the median while the non-users, self-evidently, do not use the service at all.

### 5.2.1 Scheme analysis

Twedt (1964) originally studied heavy users with everyday consumer products having varying penetration rates among the studied American households: from 98% for toilet tissue to 33% for canned hash. In this study, the penetration rates of the studied mobile services range from 100% (voice calling) to 42% (MMS messaging). The bar charts in Figure 5.1 show usage rate concentrations for seven analyzed mobile services. The widths of the colored bars describe the sizes of the usage rate segments for a service. The segment size is also indicated by the number above each colored bar telling the segment's share of the total population. The large number inside each colored bar in turn reports the segment's share of the total service usage volume. For example, camera usage divides the studied population into 9% of non-users, 46% of light users and 45% of heavy users. The heavy users can then be read to be responsible for 75% of the total camera usage during the panel study.

Usage volumes for the seven studied mobile services were measured in different ways. The browsing usage metric is a composite measure of the inbound and outbound data traffic created by mobile web browser applications. SMS and MMS messaging volumes were measured by counting the messages sent by the panelist. Voice calling activity is measured by counting outbound calls. Usage volumes for the music & radio, calendar and camera services were measured by counting the application launches for each of the services.

The services of Figure 5.1 exhibit variety in the concentration of usage, yet they bear substantial resemblance to the figures of the original heavy half scheme. Verkasalo (2008b) studied the influence of user heterogeneity, service maturity and network effects on usage volume distribution in the Finnish mobile service business. The so-called heterogeneity effect implies that at the early stages of a mobile service's life-cycle, the thin audience consists of technologically enthusiastic users and therefore the average usage intensities tend to be very high. As the service matures and its user base widens, the amount of marginal users grows causing the user population to become less technologically advanced. Consequently, the average usage rate decreases transforming the usage volume distribution. All in all, the users of a

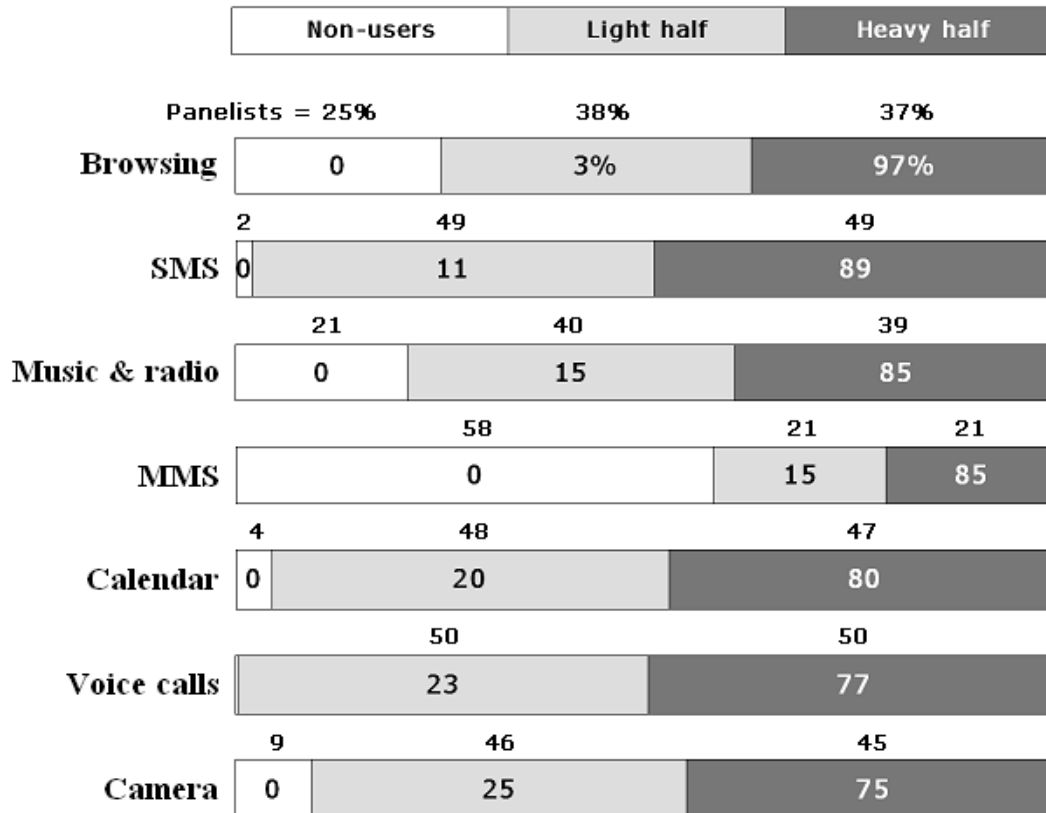


Figure 5.1: Usage volume concentration for seven smartphone services

mobile service have widely diverging needs and preferences – marginal users differ from the enthusiastic – and therefore usage distributions are expected to be rather skewed by default.

Profiling the users in each segment was done with cross tabulations, to find out if correlations exist between segment membership and the chosen five descriptive variables. Three of the variables were by nature demographic – gender, age and occupation – while the two other descriptives indicated if the panel handset was part of a bundling scheme and what kind of charging plans were used in the mobile subscription. With the used cross tabulation method, chi-square values ( $\chi^2$ ) were acquired to signify if the descriptive variables had statistically significant effects on segment membership. Because the amount of panelists in the non-user segment was very small for some services, only light and heavy users were studied with descriptive statistics.

The degree of web browsing shows no statistically significant correlation with either age or occupation. Gender, however, clearly affects ( $\chi^2 = 10.35, p = 0.006$ ) browser usage as the heavy half segment includes a high number of male users and the female users are more concentrated in the non-user segment. The bundling of handsets has no effect on browser usage, but data package and flat rate types of charging plans

correlate strongly with increased browser usage rates ( $\chi^2 = 42.13, p = 0.000$ ).

The heavy usage of SMS messaging correlates with all three demographic variables. Age group stands up as the statistically most significant factor ( $\chi^2 = 22.79, p = 0.000$ ), with the youngest "18-29 year old" group populating the heavy half and older users, especially from the "over 49 years" group, occupying the light half. Female users are also more likely to be SMS heavy than the males ( $\chi^2 = 6.96, p = 0.008$ ). Occupation influences SMS activity ( $\chi^2 = 13.63, p = 0.001$ ), as there is a clear positive difference between the observed and expected amount of students in the heavy half segment. The subscription's SMS charging plan has somewhat naturally a strong effect on usage volume. Text message packages and flat-rate charging correlate strongly with heavy usage ( $\chi^2 = 34.19, p = 0.000$ ).

Music & radio usage rates do not seem to correlate with most of the descriptive variables at a significant level. Age can, however, be regarded as a significant affecting factor ( $\chi^2 = 18.11, p = 0.006$ ) for music player and radio usage. The two oldest age groups, "40-49 years" and "over 49 years", are rare in the heavy half segment, and the panelists in the "over 49 years" group are mainly situated in the non-user segment.

MMS messaging has the largest non-user group (58% of panelists) among the studied applications. The rate of sending multimedia messages, however, does not seem to depend on any of the tested demographic variables, bundling of the handset or MMS charging plan of the subscription. The same result holds for the calendar application that, on the other hand, displays an opposite kind of penetration rate with only 4% of non-users.

Heavy voice calling correlates positively with young age ( $\chi^2 = 10.44, p = 0.015$ ). The "above 49 years" age group shows distinct passiveness and the group members are often located in the light half segment. Additionally, the voice call charging plan of the panelists' mobile subscriptions has an effect on usage rates: voice call packages and flat rate subscriptions clearly drive heavy usage ( $\chi^2 = 15.07, p = 0.000$ ).

Heavy camera usage correlates positively with handset bundling as there is an increased density of bundled handsets present in the heavy user segment ( $\chi^2 = 9.67, p = 0.008$ ). It should be noted that camera is the only studied service whose usage is influenced by the bundling of 3G handsets. On the other hand, demographics and charging plans do not have any statistically significant effects on camera usage rates.

## 5.2.2 Scheme discussion

After examining these results, the marketing researcher is left with the question posed in the topic of Twedt's original study: How important is the heavy user? To assess the feasibility of heavy half segmentation, the requirements for an effective segmentation scheme by Kotler & Armstrong (2003) are applied: measurability, accessibility, substantiality, differentiability and actionability.



- *Measurability.* The heavy half segmentation divides customers into two user halves and the non-users, thus segment sizes can be easily measured from the usage data set. The purchasing power of a user is only somewhat implied by the heavy use of chargeable services. The demographic information acquired from surveys should be used to complement the aspects that concern measuring the segment members.
- *Accessibility.* The frequent usage of a certain mobile service creates opportunities to utilize the service itself, or some parts of it, for marketing efforts. For example, the heavy user segment of browser and music player applications could be accessed via web music stores, popular web pages or Internet community services.
- *Substantiality.* The scheme divides the service user population into two halves, and therefore the substantiality of the different segments largely depends on the service's penetration rate. For low-penetration services like for example MMS messaging, the active user part is rather small. In such cases, the marketer might need to consider if the heavy half scheme fits the current market situation.
- *Differentiability.* Separate marketing mixes appealing to heavy and light users can be designed by emphasizing different aspects of the offering. For example, the marketing for heavy users could promote the competitiveness of the product features – e.g. connection speeds, package pricing or customization – while non-users and light users would be approached with informational messages emphasizing the benefits from using the service and, for example, its ease of use, to lower the threshold for increasing usage.
- *Actionability.* Due to the simplicity of the scheme and the low number of segments, the efforts required for developing separate and customized marketing mixes are relatively low. If there is sufficient data available for profiling the segment members, acting on the usage rate segments is easier.

The heavy half scheme has some potential pitfalls, for example its a priori approach. Dividing a market into three segments does not generate deep understanding of the end-user requirements, but rather confronts the market with an overgeneralizing structure that locates the users with a method predefined by the marketer. Wansink & Park (2000) segmented the heavy users of soup products and found out that the segments within the heavy half were dramatically different in terms of personality, and consequently eat soup for different reasons. Therefore, all heavy users may not be uniformly considered the same customer segment, and the clusters found inside heavy user, light user, and non-user segments may overlap. The study also indicates that personality, lifestyle and demographic variables can all be used for building profiles of heavy users, with different degrees of success.

Beane & Ennis (1987) in turn point out that it is not always necessary to achieve total segmentation, to try segmenting the entire market according to the variables

being considered. A marketer with a product to sell and faced with an unknown market does not need to identify all of the segments who will not buy his product, only the one group that appears to need it. Thus, a heavy half segmentation scheme could be used for revealing the group that, in the light of previous behavior, has the potential for using mobile services in increased amounts.

In summary, usage rate segmentation combined with demographic, lifestyle and personality variables can identify and profile the group of smartphone users that is most valuable to the company. The heavy half theory offers a relatively simple and efficient way of segmenting users of a mobile service, especially when high usage volume is a key factor in the creation of revenue flows. The marketer must, however, be aware of the fact that increased usage rates by themselves do not imply that the heavy half would be homogenous in terms of personality or lifestyle. To compensate this, adequate background information about the customers is required to ensure that the segment members are correctly profiled, and consequently can be reached and served effectively.

## 5.3 Scheme 2: Benefit segmentation

To further analyze the usage rate data, correlations between the usage patterns of different mobile services were sought. The underlying idea was that if two or more services would be heavily used by the same panelists, it would imply the existence of a common benefit sought from this type of mobile services. This way, various types of motivations for mobile service usage could perhaps be identified and used in segmenting the user population. The idea of benefit segmentation has been introduced and discussed by Haley (1968; 1984). He proposes that while it is the total configuration of benefits sought which differentiates one segment from another, the relative importance users attach to individual benefits can differ importantly and be used as an effective lever in segmenting markets. Thus, while users generally seek multiple benefits from their smartphones, the differences in their relative importance can be used to perform segmentation. After trying out several explorative approaches with factor analysis, the studied services were classified into communication-related and entertainment-related service categories.

### 5.3.1 Scheme analysis

The communication category in Scheme 2 is composed of voice calling and SMS messaging services. Browsing, music & radio and camera in turn build up the category of entertainment services. Factor analysis was repeatedly executed on a set of mobile services to see whether any common underlying factors influencing their usage frequency were present and if these factors were capable of describing the variances in usage rates. The best result was achieved with the aforementioned two factors that were able to explain 57.3% of the total variance, which was deemed as sufficient enough for testing the benefit segmentation theory.

A panelist's usage of communication and entertainment services was computed by summing up the respective application launch frequencies and dividing the category sum by an index of the panelist's total smartphone activity. This way, the resulting variables effectively measure communication and entertainment services' share of a person's total smartphone usage. Prior to performing the cluster analysis that produced the actual segmentation, Z-scores were computed for both service category variables to suppress the effect of unequal variable ranges on counting distances within the clustering algorithm.

The segmentation procedure consisted of first executing a hierarchical clustering algorithm using Ward's minimum variance method, to generate an agglomeration schedule statistic that suggested the optimal number of segments and provided cluster mean values. After these preliminary pieces of information for iterative clustering had been acquired, the panelists were then clustered using the K-means procedure with the cluster mean values from hierarchical clustering as the initial cluster centers. This further refined the segmentation by increasing between-group heterogeneity and within-group homogeneity. The resulting user groupings are visualized in Figure 5.2.

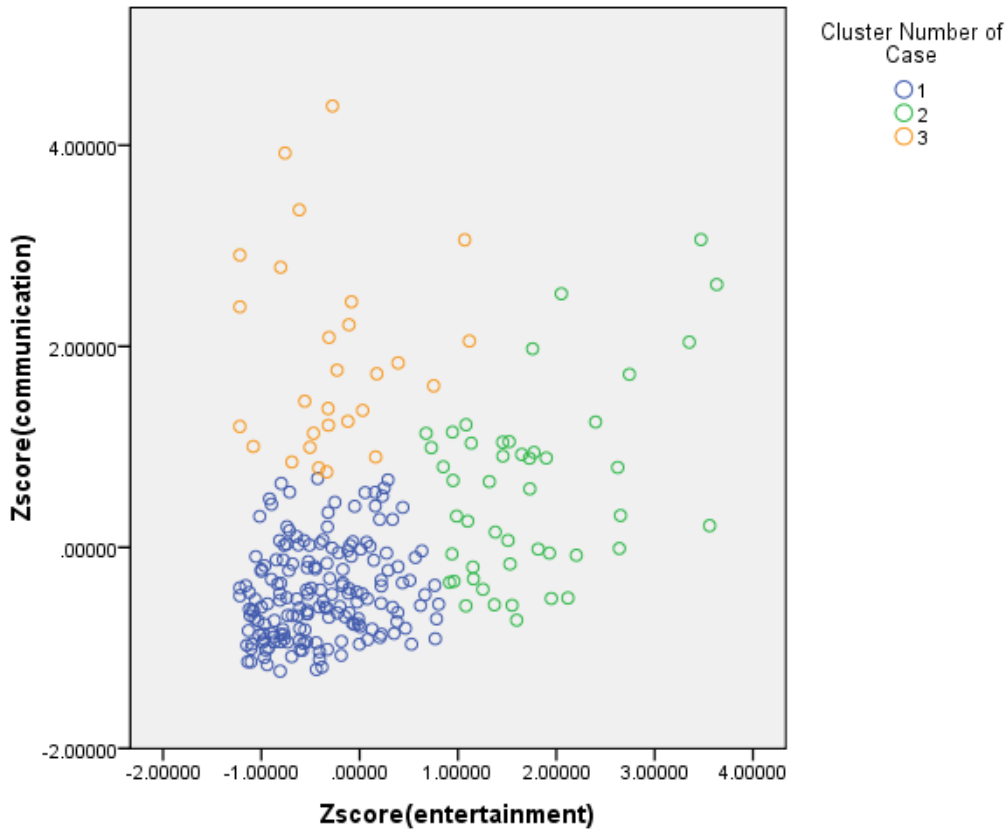


Figure 5.2: Benefit segmentation of smartphone users

The clustering algorithm was set to split the panelists into three segments as suggested by the agglomeration schedule statistic. Segment one (blue) is characterized by average usage of both communication and entertainment type of services. Segment two (green) members use relatively more entertainment-related services, while segment three (orange) uses more often communication-related services. Segment one is from now on called "Average Users", segment two "Entertainment Users" and segment three "Communication Users". The next step is to identify the kinds of people present in each segment. For this purpose, cross tabulations were executed with variables describing the segment members' demographic characteristics and subscription attributes. Chi-square values were used to show if the descriptive variables had any statistically significant effects on a user's segment membership.

Gender has an effect ( $\chi^2 = 11.51, p = 0.003$ ) on the relative importance of different service categories. The Entertainment Users segment is prominently male-heavy, but the Communication Users segment also includes more male users than expected by the gender distribution in the population. Consequently, the Average Users segment includes an increased number of female panelists who seem to use communication and entertainment services in more equal amounts.

The choice of data charging plan correlates with benefit segment membership ( $\chi^2 =$

14.99,  $p = 0.005$ ). The most distinctive difference between observed and expected frequencies is in the Entertainment Users segment, where data packages are highly popular and usage-based charging is missing to an equal degree. Curiously, flat rate charging plans are quite evenly distributed across the benefit segments.

The used SMS charging plan also affects segment membership ( $\chi^2 = 8.05, p = 0.018$ ). Package and flat rate charging plans are more common in the Average Users segment. The Entertainment Users segment has an increased frequency of usage-based charging plans, and the Communication Users segment also lacks package and flat rate SMS subscriptions.

The other tested descriptive variables failed to show any statistically significant correlations. This is not, however, necessarily very surprising. The available descriptives are mostly demographic and perhaps cannot even be expected to have a strong effect on the types of services favored by a smartphone user.

### 5.3.2 Scheme discussion

To assess the overall feasibility of the benefit segmentation scheme, its conformity to the five fundamental characteristics for an effective segmentation scheme is examined:

- *Measurability.* The size of the segments can be measured from the usage data, but it is not unambiguous how the preferred type of services correlates with e.g. a person's purchasing power. With the current descriptive variables, the segment members could not be profiled very comprehensively. This might, however, also suggest the need for more in-depth profiling questions.
- *Accessibility.* Entertainment Users could be reached via the supplementary services related to entertainment applications. For example, handset camera users often share their pictures online and thus an image sharing web site would be a place they likely visit, possibly even with their mobile web browser. Communication Users can be reached by the operator offering their communication services by means of e.g. direct marketing.
- *Substantiality.* To ensure the substantiality of the segments, the marketer using benefit segmentation must focus on a set of high level benefits to avoid splintering the market into groups that are too limited in size. The determination of such key benefits, however, is not necessarily an easy task.
- *Differentiability.* Because Entertainment Users are expected to seek different benefits from their smartphones than Communication Users, it is consequently possible to emphasize these offered benefits in marketing communications. For example, a device marketed with the newest imaging, networking and music technology would probably generate different responses from different benefit segments.

- *Actionability.* Benefit segmentation must be done at a correct level of abstraction, to avoid creating a scheme, where the needs of all segments cannot be satisfied with a reasonable number of product variations. Thus, marketing research data must provide the key sought benefits reliably.

A benefit segmentation scheme does not currently seem to be the most lucrative option for segmenting smartphone users. Most of the panelists are situated in the Average Users segment as the segregating power of the chosen benefit categories appears to be low. This is partly due to the fact that usage rates are very low or non-existent for many new mobile services. Besides having a very limited penetration, advanced mobile services are consumed only on random occasions among the smartphone panel population. Naturally, when there seems to be no need for using the services regularly, it is fruitless – and can potentially be misleading – to study the benefits sought from the usage.

Another factor that currently cripples the possibilities for benefit segmentation is the background information available for profiling the users. At the moment, the pre-panel surveys do not include proper questions for mapping the personality, attitudes or interests of the panelists. This effectively limits how well the end-user motives can be understood. The employed factor analysis approach can be used to test for correlations between various applications' launch rates, but it does not help in understanding the real needs of the users. The study of service categories only gives a glimpse of the current possible types of smartphone usage. Surveying the users' personality and lifestyle would provide understanding of the reasons behind the usage activity. Psychographic variables would also be useful as descriptives for profiling the benefit segments, because such commonly sought benefits as communication or entertainment do not by nature depend on demographic characteristics like age, gender and occupation.

Benefit segmentation can, however, prove to be useful in future market segmentation studies with the handset-based data collection method. The method seems to be very potent in measuring the realized usage of mobile services objectively and accurately, but lacks the possibility to understand the user motives. To fix this, a separate survey study of the benefits sought from smartphone usage should be conducted, and handset-based data collection could then be used as a tool of evaluation with the main contribution of describing how seeking different benefits actualizes as usage patterns of specific mobile applications.

Haley (1984) writes that because there exists only a very limited set of basic needs that can be fulfilled and because there are several brands attempting to tie into them, it can be difficult to differentiate a brand in terms of its superior ability to fulfill basic needs. By moving to more superficial levels, such as benefits, the chances for differentiating a product is greatly improved. In Finland, the technical quality of the core telecom operator services has for long been on such a high level that competing with technical properties, e.g. network reliability and coverage, has been rendered irrelevant. Any operator has been capable of fulfilling the basic needs for communication in an equal way. As a consequence, fierce service pricing

competition has taken place, which in turn has caused some serious profitability issues for the partaking companies. By identifying the fundamental benefits sought from smartphone usage, the use of pricing as the main factor for differentiation could be avoided in the future. What's more, understanding what people use smartphones for increases the potential for any elements of marketing advanced mobile services to be more relevant. The marketer can move from pushing technological or monetary figures, like connection speeds or prices per megabyte, to the prospective users into promoting the benefits that the target customers are really known to seek from their handsets.

As a conclusion, benefit segmentation of smartphone users may prove to be a good tool for marketers in the future. Because most new mobile services are yet used to a lesser degree and on random occasions, it is hard to determine the sought benefits from application usage rates. To better understand the motivations behind the different uses of a smartphone, one needs to collect extensive background information about the users to complement the handset-based data collection method. The combined use of survey and usage monitoring data would allow for a better understanding of the motives behind mobile service usage and how do they realize as patterns of smartphone application launches. The results from a benefit segmentation scheme can be used to develop new ways for differentiating mobile service offerings and creating more relevant marketing communication mixes.

## 5.4 Scheme 3: Person-situation segmentation

True mobility of the end-user device is a unique feature of mobile phones. The mobile phone has quickly conquered a place among the wallet and home keys as an object that is carried around all the time and everywhere. Consequently, the situations where mobile services can be used are extremely versatile. The significance of the context where products are purchased or consumed has also been noted in market segmentation studies. Dickson (1982) reviews the made research and discusses a person-situation segmentation that explicitly segments the market by groups of consumers within usage situations. Scheme 3 experiments with the possibility of utilizing information about a smartphone's location at the point of service usage for market segmentation purposes.

### 5.4.1 Scheme analysis

Defining a "situation" is a controversial subject. Dickson (1982) notes that for the purposes of market segmentation the most practical approach may be to describe the usage situation in terms of objective characteristics such as temperature or the presence of particular people. A situation in Scheme 3 is defined as the smartphone user's location context at the time of mobile service consumption. To identify location contexts, the handset-based usage monitoring software was first used to record handovers between the mobile network's base station cells. This timestamped data was then input to a context detection algorithm that clusters the base station cells together to form location contexts. The classification of base station cells as belonging to a certain location context is based on the total time the mobile device has been active within the cell and the time of day of the monitored presence. The algorithm can currently identify three location contexts for smartphone users: Home, Office and On The Move. For a more detailed description of the algorithm functionality, the reader is referred to its introduction by Verkasalo (2008a) and improvement by Jiménez (2008).

After mapping the users' panel presence time into location contexts, the consumption of mobile services could be specified as taking place in a certain situation. Service usage was measured with the amount of application launches divided by the time spent in the location context for all but voice and SMS, for which outbound calls and sent messages were used instead. The basic idea behind a person-situation segmentation scheme is that the usage situation has an influence on a person's utility structures. If the utility of a smartphone service varies across different location contexts, it should then be mirrored in the monitored usage rates. The general context-dependency of mobile service usage was first studied and is illustrated in Figure 5.3. The bar chart shows the shares of panelists that used different services on their smartphone within each location context during the panel study.

The decision to use a service is clearly affected by the user's location context. Although the voice and SMS legacy services are used more independent of the situation,



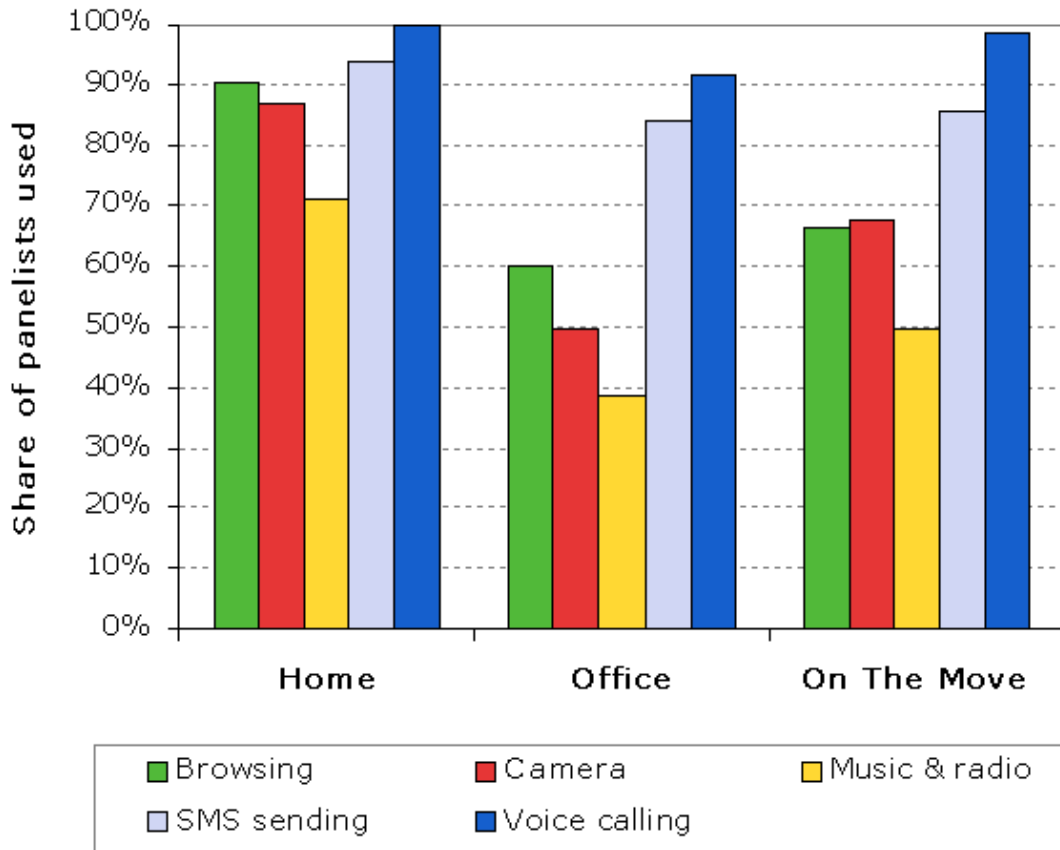


Figure 5.3: The share of panelists that used a smartphone service in various location contexts

dedicated smartphone services are favored in some situations and avoided in others. To see if mobile services have different utility for different user groups within the same location context, smartphone service usage was studied for four different age groups in all three location contexts. Person-situation segmentation matrices for camera (Table 5.1) and browser (Table 5.2) visualize the distribution of application launches and sum up some features describing the usage situations and the studied user groups.

”On The Move” is the most popular location context of smartphone camera usage for all but the oldest of the age groups. This can be expected because there are most likely more interesting targets to shoot outside the rather static home and work environments. What’s more, a key benefit of handset cameras is that because the device is carried along around the clock, the in-built camera is available at any point of creative inspiration, while a stand-alone camera would be available only if the owner has planned shooting photos beforehand.

The effect of ”Home” and ”Office” location contexts on camera usage is not unambiguous. For the youngest age group, photography at home is clearly less important

Table 5.1: Person-situation matrix 1: The share of camera launch rates in different situations by different user groups.

	Age group				situation features
	18-29 years	30-39 years	40-49 years	49+ years	
<b>Home</b>	26%	27%	20%	39%	<i>free time, substitutes</i>
<b>Office</b>	34%	23%	21%	32%	<i>busy, no privacy</i>
<b>On The Move</b>	40%	51%	59%	29%	<i>targets to shoot, no substitutes</i>
<b>person features</b>	<i>Generation Y</i>	<i>Generation X</i>		<i>Baby Boomers</i>	

than for the older users, of which the "Over 49 years" group use their handset camera mostly at home. Home and office environments also have features that restrict or devalue smartphone camera usage. It could be, for example, that it is not suitable to take pictures during work time or within a company confidential environment. While at home, with free time to spend in a private environment, digital cameras might be available as substitute devices that can offer, for example, superior features and picture quality.

Table 5.2: Person-situation matrix 2: The share of web browser launch rates in different situations by different user groups.

	Age group				situation features
	18-29 years	30-39 years	40-49 years	49+ years	
<b>Home</b>	27%	25%	29%	34%	<i>free time, substitutes</i>
<b>Office</b>	33%	28%	11%	22%	<i>busy, no privacy, substitutes</i>
<b>On The Move</b>	40%	47%	60%	44%	<i>no substitutes</i>
<b>person features</b>	<i>Generation Y</i>	<i>Generation X</i>		<i>Baby Boomers</i>	

The launch distribution for web browsing looks rather similar. "On The Move" is the most popular context of usage for every age group. The concentration of usage varies across age groups, with the "40-49 years" group being the most active "On the Move" users. Smartphones are most likely used for web browsing outside home and office, because the availability of substitute devices and access networks is limited. The ubiquitous web access offered by 3G mobile networks and mobile browsers is therefore the easiest choice for web service usage.

There are again notable differences between the application launch rates within "Home" and "Office" location contexts. Younger people seem to favor workplace over home for mobile browsing, while the older age groups clearly avoid smartphone browsing at work. Features that can have a reductive impact on smartphone browsing within home and work environments are, for example, the suitability of using a personal mobile phone during work time and even more the commonly available substitute devices – personal computers – that perhaps can offer a more satisfactory browsing experience.

### 5.4.2 Scheme discussion

The feasibility of the person-situation segmentation scheme is assessed with the five criteria for an effective segmentation scheme:

- *Measurability.* The frequency of occurrence of different usage situations can be measured from the usage-monitoring logs. Because it is situations not persons that need to be measured, it is also possible to complement handset-based monitoring with e.g. unobtrusive observation to better identify the types of situations where mobile services are used.
- *Accessibility.* Smartphone users within the situation segments can be approached directly at the situation of usage, e.g. with radio and outdoor advertisements while they commute in and out of office in the mornings or early evenings. Promotion can also be targeted by identifying the people who are likely to be in the chosen usage situations and then selecting the channels that can effectively reach these people.
- *Substantiality.* The substantiality of the situation segments depends on the granularity of the scheme design. The proposed three location contexts are very general and thus substantial enough for separate marketing mixes. The importance of successfully detecting the key contexts is, however, crucial.
- *Differentiability.* It is yet hard to say whether the context of use proves to be a useful tool for differentiation of mobile services. While situation seems to have some effect on the usage rates of advanced mobile services, it might be that a popular new smartphone service must first be identified to understand the importance of usage situations.

- *Actionability.* The degree to which situation segments are actionable largely depends on how well are the relevant features of each situation understood. A mobile service has numerous different usage situations and their unique features must be well understood to determine which of them have an effect on service usage rates.

The person-situation segmentation scheme combines data from multiple sources to create a holistic view of the interaction of a person (user) with an object (smartphone) in a certain situation (location context). An understanding of what the different situation segments should be is fundamental to the success of a person-situation segmentation scheme. Here "Home", "Office" and "On The Move" were used due to prior research on a context identification algorithm (Verkasalo, 2008a; Jiménez, 2008) that exploits data collected from handsets. It is, however, possible to determine other location contexts that may prove to be more useful than the proposed three. A good approach would perhaps be to utilize surveys and observation studies to gather evidence of the existence of separate location contexts and then see if they can be identified by monitoring the movements of the handset. Further development of the context detection algorithm could produce refinements to the context identification.

With the handset-based usage monitoring software, it is possible to keep track of the users' movement within the mobile network and consequently identify the locations where they spend time and use mobile services. Handset-based data collection, however, is not alone adequate for building a person-situation segmentation scheme. Demographic and psychographic data about smartphone users is essential for building person-situation matrices and determining what kind of people can most often be found in the studied location contexts. For the purposes of this study, only very basic demographic variables were available and therefore any differences in, for example, the users' personality or behavior could not be used for differentiation. To reach the customers with relevant marketing communications efficiently, handset-based usage monitoring and location tracking data should be complemented with survey-based background data that allows proper profiling the segment members.

In summary, person-situation segmentation is a way to make use of the mobility of end-user devices in segmentation practises. Mobile service usage situations can be identified by, for example, tracking handset movement within the mobile network. Situation segmentation provides a way for reaching the selected target segments, as the situation itself can be used to deliver relevant marketing messages right in the context of service consumption. While a smartphone killer application that utilizes the device's advanced capabilities has not yet emerged, identifying usage situations can be a way for better understanding the related opportunities and restrictions. The handset-based data collection method can be used to provide time and location stamped data about mobile service usage, but a complete person-situation segmentation scheme should combine that with rich demographic and psychographic data describing the end-users.

# Chapter 6

## Conclusions

### 6.1 Findings

This thesis has made an explorative study of applying various methods of market segmentation to a sample of Finnish smartphone users. The emphasis has been on analyzing the suitability of a handset-based data collection method for market segmentation purposes. The use of this novel method gives researchers a complete view of the actions taking place in a smartphone device. As a tool of marketing research, handset-based data collection can offer objective information about the realized usage of mobile services. The collected data can be used to model consumer behavior by studying, for example, the time of day when the services are consumed or the location context where the service consumption takes place. Three exemplary segmentation schemes were reviewed and discussed in Chapter 5.

The heavy half segmentation scheme reviewed in Section 5.2 was able to identify the users that have the most potential for increased usage of mobile services in light of their previous behavior. The usage data provided by the monitoring software gives an objective view of the current service penetration rates and usage volume distributions. With a usage rate segmentation method it is not, however, possible to develop a deep understanding of the reasons behind the end-user behavior. Rather, usage rate segmentation is a reactive way of researching the current market situation.

Section 5.3 discussed the feasibility of using sought benefits for segmenting smartphone users. While benefit segmentation appears to be a good choice due to its customer-centric approach, many advanced mobile services yet raise very limited interest among smartphone owners and thus it is not fruitful to study the sought benefits by analyzing usage data records. Besides, to better understand the end-user motives, traditional marketing research methods like surveys and focus groups should be used before starting handset-based data collection projects to identify the real benefits sought from mobile services. It is then possible to utilize the objective usage data to see how seeking these benefits realizes as the usage of specific applications on the smartphone.

The third exemplary segmentation scheme explored the potential of using information about the handset user's location at the time of service consumption for segmenting usage situations. The person-situation segmentation scheme reviewed in Section 5.4 investigated whether being at home, in the office or on the move had any effect on the perceived utility of a mobile service. Demographic division was used to test if the utility of a service varied within the same location context for persons of different age. It was discovered that the launch intensities for advanced mobile services vary across different location contexts. The smartphone user's age had an effect on the preferred usage context of mobile web browsers and handset cameras.

The discussions on different market segmentation methods provide an outlook of the capabilities of handset-based data collection for marketing research purposes. It seems that the method has potential to evolve into a useful tool in the total package of marketing research methods in the mobile service business. The most promising features are the capability to collect accurate data about practically every action taking place on the smartphone device and the ability to track the user's movement patterns to support context identification. Handset-based data collection should not, however, be used as a complete marketing research solution, because it is not able to understand the device end-user's personality and therefore reveal the consumer needs that drive mobile service usage. Rich psychographic and demographic background information is required for profiling the members of a segment, to allow reaching and serving them effectively. Accordingly, surveys and focus groups should be used together with handset-based data collection, to acquire a holistic view of smartphone users and their interaction with mobile services in various contexts.

## 6.2 Exploitation of the results

This thesis has also given a segmentation-orientated review of the challenges associated with researching emerging businesses. The mobile service business is currently a melting pot of companies from the Internet and telecommunication industries, a ground where delivering superior customer experiences matters the most. Exploring new ways to measure customer behavior effectively and accurately is therefore very topical and the results of this study pave the way for developing more applications for usage data collected from handsets.

From a technological perspective, smartphone user segmentation can be helpful in finding the user group most receptive to new handset features and mobile services. Heavy half segmentation, for example, is a way to identify the current most active users of a mobile service. By profiling heavy users, it is possible to discover the people that are already using a service most frequently. This information can then be used to support the design of new related technologies and applications. Person-situation segmentation can be used to map the different contexts of mobile service consumption, which is useful for understanding the limitations and possibilities that the wide variety of usage situations poses for mobile device and service design.

For business purposes, the findings of this thesis serve as a review of the strengths and weaknesses of the handset-based marketing research method. The analysis of three exemplary segmentation schemes shows that even if the market for new mobile services is yet maturing, different segmentation approaches can provide various kinds of information. Heavy half segmentation produces factual information about service penetration rates and, with descriptive variables, can be used to identify and profile the current most valuable customers for a company. Benefit segmentation is applicable when the focus of marketing research is on identifying the motivations behind mobile service usage and understanding what services can best deliver the sought benefits to the users. Person-situation segmentation can be used to segment service usage situations, to better understand where and how mobile services are consumed, and what kind of people can most likely be found using the service in these situations.

From an academic viewpoint, this thesis provides a brief summary of the done research on the area of market segmentation and applies some established theories to the mobile service business. Although market segmentation is a very hands-on practise, as it should be performed with a specific target in mind and when faced with a concrete market situation, segmentation methods have been under continuous study within the academic community. The three presented segmentation schemes are based on studies that originally used traditional data collection methods to segment markets of consumer goods, e.g. groceries and toothpaste. In this thesis, a new method for collecting data about consumer behavior has been tested in an emerging service business environment. The done analysis offers insights of the method's marketing research potential and raises questions for further research on the topic of device-based usage monitoring.

### 6.3 Further research

There are two main limitations affecting the general applicability of the thesis results. First, it only focuses on the Finnish mobile service market and studies a panel study population of limited size and strongly biased towards young, technologically literate males. For further information on the demographic distributions of the panel participants, see Appendix B. Future research on the potential of handset-based usage monitoring for marketing research purposes could be made, for example, in the Japanese or South Korean markets, where 3G networks and advanced mobile services have already penetrated to the mass market. This way, a larger and demographically more diverse user population could be captured and the analysis of end-user behavior would produce more generalizable results. A cross-county comparison on different segmentation methods based on smartphone usage data could be another interesting topic for future research.

The second limitation concerns the quality of data and the setup of the used marketing research process. To ensure the validity of the data analysis, some strict limitations had to be imposed on the data collected in the newest smartphone panel study which, for example, cut down the size of the target population considerably and eliminated the possibility for employing application activity times as the measure of service usage. Future research will hopefully have larger samples and more descriptive data sets available. The process of collecting background data about smartphone users should in turn be improved so that the questionnaires also include topics concerning the respondents' lifestyle and personality. The current demographic questions (see Appendix A) should be refined to have more power of expression by e.g. querying the participants' birth year instead of an age group, to give data analysts the freedom of building the age groups appropriate for the research at hand. Rich psychographic and demographic data is needed in segmentation practises to ensure that the segment members are properly profiled and can be reached effectively with relevant marketing communications. Future research on market segmentation with the handset-based data collection method should ensure having an access to comprehensive background information about the users.

Researching the possibilities of person-situation segmentation of mobile service users is a promising topic for further studies by itself. The handset monitoring software's ability to record application launches and track changes in the device's location can help identify the most frequent usage situations for different mobile services. This can prove to be useful in the search of smartphone killer applications – perhaps it is the killer situation that needs to be found first? The determination of the unique features of each usage situation should be done with care and survey data on sought benefits should be used to complement the understanding of situation-specific user needs. The scheme analysis performed in this thesis serves as just one example of how the persons and situations for a person-situation segmentation scheme can be identified.



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# Appendix A

## Smartphone panel study initial survey questions

*Question 1. Choose your gender:*

1. Male
2. Female

*Question 2. Choose your age:*

1. < 20 years
2. 20-29 years
3. 30-39 years
4. 40-49 years
5. 50-59 years
6. 60-69 years
7. 70-79 years
8. > 80 years

*Question 3. Choose your work situation:*

1. Not working (retired)
2. Not working (housewife / house husband)
3. Not working (unable to work / disabled)
4. Not working (unemployed)
5. Other
6. Student
7. Working

*Question 7. What kind of subscription do you have?*

1. I don't know
2. Post-paid without a handset (the operator charges you for usage subsequently in certain intervals), the handset is not part of the subscription (non-bundled)
3. Post-paid with a handset (the operator charges you for usage subsequently in certain intervals), the handset is part of the subscription (bundled)
4. Pre-paid (you pay for the services beforehand by, for example, buying a prepaid card with certain credit)

*Question 8. How are your mobile data transfers (GPRS, 3G) priced?*

1. I don't know
2. The charging is directly based on usage volume (fixed price / megabyte or minute)
3. I have a data package in use that includes a fixed amount of traffic per month. How many MB:s?
4. I have a data package in use that can be used for unlimited data transfers (flat rate)



*Question 9. How are your mobile voice calls priced?*

1. I don't know
2. The charging is directly based on usage volume (fixed price / minute, the default model for operators)
3. I have a voice package in use that includes a limited amount of voice minutes per month. How many minutes?
4. I have a voice package in use that can be used for unlimited voice calls (flat rate)

*Question 10. How are the SMS messages sent from your mobile priced?*

1. I don't know
2. The charging is directly based on usage volume (fixed price / SMS message, the default model for operators)
3. I have a messaging package that includes a fixed amount of SMS messages per month. How many messages?
4. I have a messaging package that can be used for unlimited SMS sending (flat rate)

*Question 11. How are the MMS messages sent from your mobile priced?*

1. I don't know
2. The charging is directly based on usage volume (fixed price / MMS message, the default model for operators)
3. I have a messaging package that includes a fixed amount of MMS messages per month. How many messages?
4. I have a messaging package that can be used for unlimited MMS sending (flat rate)



# Appendix B

## Smartphone panel study descriptives

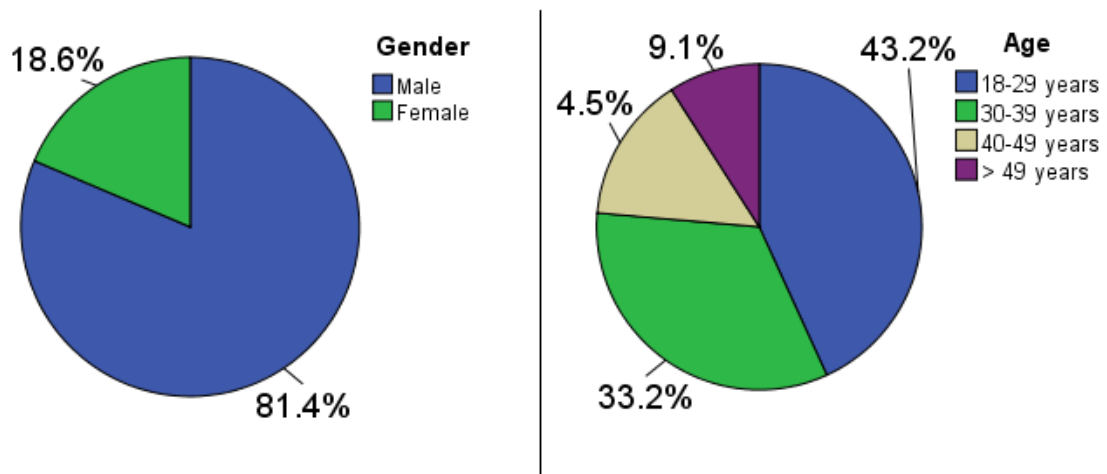


Figure B1: Age and gender distributions of the smartphone panel study participants.

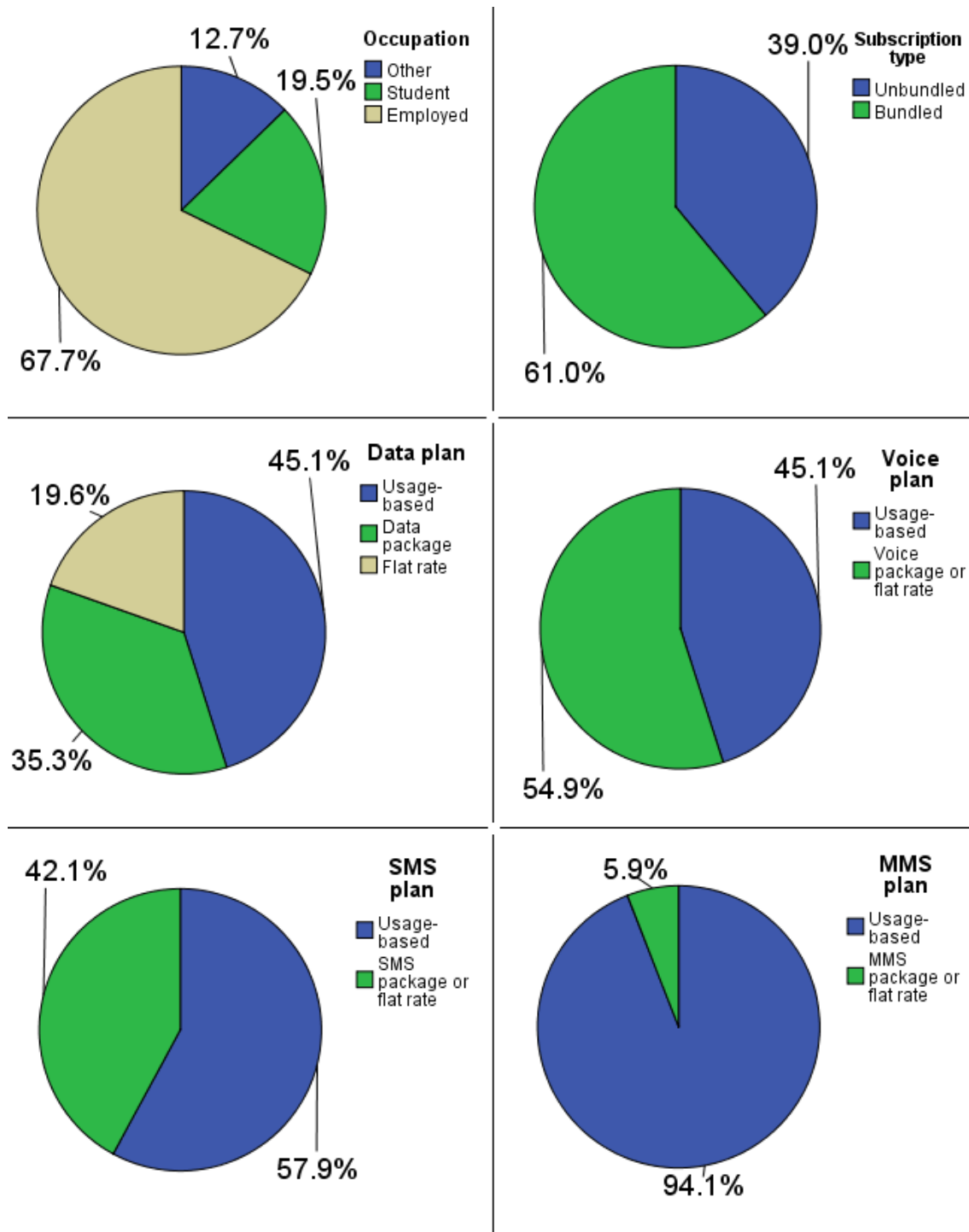


Figure B2: Occupation and subscription distributions of the smartphone panel study participants.