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Mobile clinics in public health care: Integrated service offerings for rural elderly

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PREFACE

This report presents the results from the research project named HEA (acronym of Finnish name Hyvinvointia ja Energia tehokkuutta Asumiseen) which was accomplished at Lappeenranta University of Technology. The full English name of the project was "Wellbeing and Energy Efficiency in Living - Applying the demand and user-driven open innovation methodology for creating wellbeing and energy savings".

The sub-projects of TBRC direct to analyze and develop mobile services regarding their offerings and platforms. The particular aim is to provide new insights into mobile clinic pilot of South Karelia Social and Health Care District, named Mallu. The development work was accomplished in collaboration with The Saimaa University of Applied Sciences. The main objective was to develop user-driven services in order to promote elderly people's wellbeing. Particularly, we aim to tap into the understanding of customer needs in this report.

The project was funded by the European Regional Development Fund (ERDF) programme for Southern Finland in coordination of Regional Council of Päijät-Häme. The South Karelia Social and Health Care District provide also funding for regional pilots at the South Carelia. The research was carried out in collaboration with Lappeenranta University of Technology (TBRC), Saimaa University of Applied Sciences, Aalto University (CKIR), Helsinki Metropolia University of Applied Sciences (coordinator), Kymenlaakso University of Applied Sciences, Arcada University of Applied Sciences, Laurea University of Applied Sciences, Turku University of Applied Sciences and Greennet Finland Ry.
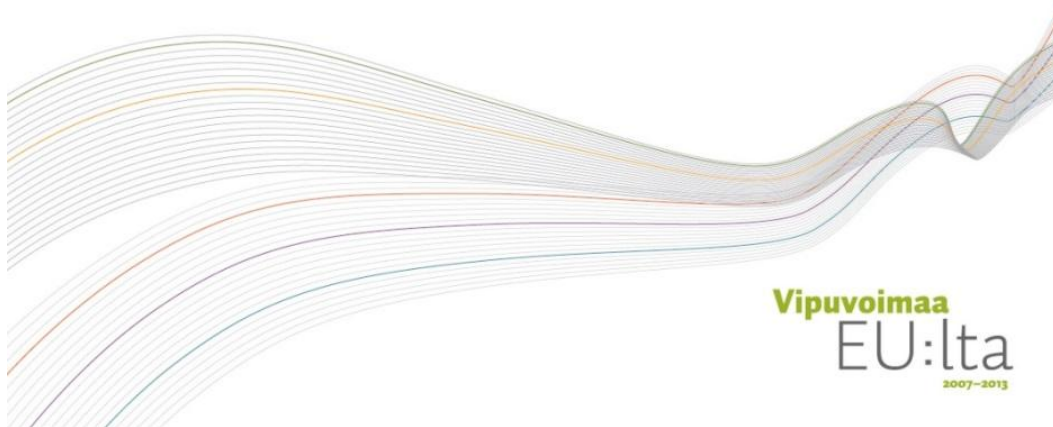
More information about the project finds at http://hea.metropolia.fi.

On 30th October at Lappeenranta,

Authors.

TIIVISTELMÄ

Väestön ikääntyminen pakottaa yhteiskunnan ja julkisen terveydenhuollon muutoksiin. Jotta ikääntyvien ihmisten kotona asuminen voidaan mahdollistaa, palvelujärjestelmän pitää mukautua muuttuvaan tilanteeseen. Raportin tarkoituksena on kuvata asiakaslähtöisiä palvelukokonaisuuksia, joita tarvitaan asiakkaan kodin läheisyydessä.

Tutkimuksen teoreettinen viitekehys muodostuu asiakasarvon luomisesta ja palvelutarjoamista. Tarkasteluryhmänä on Etelä-Karjalan alueen 60–90-vuotiaat ja käytetty aineisto on kerätty vastaajilta postitse lähetetyllä kyselyllä. Tutkimus on eksploratiivinen ja tulosten tulkinnassa on hyödynnetty määrällisen tutkimuksen ja verkostoanalyysin menetelmiä. Raportin keskeisimpiä tuloksia ovat asiakassegmentit ja segmenttien tarpeiden pohjalta muodostetut palvelupaketit. Tulokset kuvaavat asiakkaiden tarpeita tarjooman suhteen ja toteutuksen vaatimuksia tuottajan näkökulmasta. Empiiristen tulosten lisäksi teoriaviitekehystä on kehitetty eteenpäin, jotta palvelukeskeiset teoriat voidaan ymmärtää yritysten näkökulman lisäksi asiakkaan näkökulmasta.

ABSTRACT

This research is an analysis of the value and content of local service offerings that enable longer periods of living at home for elderly people. Mobile health care and new distribution services have provided an interesting solution in this context. The research aim to shed light on the research question, 'How do we bundle services based on different customer needs?' A research process consisting of three main phases was applied for this purpose. During this process, elderly customers were segmented, the importance of services was rated and service offerings were defined.

Value creation and service offering provides theoretical framework for the research. The target group is South Karelia's 60 to 90-year old individuals and the data has been acquired via a postal questionnaire. Research has been conducted as exploratory research utilizing the methods of quantitative and social network analysis. The main results of the report are identified customer segments and service packages that fits to the segments' needs. The results indicate the needs of customers and the results are additionally analysed from the producer's point of view. In addition to the empirical results, the used theory framework has been developed further in order for the service-related theories to be seen from the customer's point of view and not just from the producer's point of view.

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LIST OF ABBREVIATIONS

EKSOTE   Etelä-Karjalan sosiaali- ja terveyspiiri -

                The Social and Health District of South Karelia

G-D Logic   Goods-Dominant Logic

IADL   The Lawton Instrumental Activities of Daily Living

KELA   Kansaneläkelaitos - Finnish Social Insurance Institution

NSD   New Service Development

S-D Logic   Service-Dominant Logic

SNA   Social Network Analysis

1 EXECUTIVE SUMMARY

The research is an analysis of value and content of local service offerings that enable longer periods of living at home for elderly people. A research process consisting of three main phases was applied for this purpose. During the process, elderly customers were segmented, the importance of services was rated and service offerings were defined. The analysis is based on survey research conducted for those 60–90 years in age living in South-Eastern Finland. The service analysis was accomplished using a social network analysis (SNA) method, which focuses on relationships between network entities—service items in this case. Finally, customer-oriented local service offerings were described regarding core, supporting and facilitating services needed.

Segmentation was based on respondents' self-rated health, self-rated quality of life and self-rated functional ability. Self-rated health and quality of life scales are based on Zung's self-rated depression scale from which eight items were selected for this research. The biggest customer segment is **independent** (48.7% of respondents) in which health, quality of life and ability to function is perceived as good. The second customer segment is **activity deficit** (41.5% of respondents) in which individuals perceive slightly decreased health status, yet they are able to manage everyday tasks, and they are enjoying life. The smallest segment is **frail** (9.8% of respondents) in which there is a clear decline in perceived health, quality of life and ability to function.

The service grouping was conducted with UCINET 6, using the optimization clustering algorithm. The iterations for clustering analysis were repeated with an increasing count of clusters until the explanatory power for the cluster model reached its limiting value. The conducted clustering analysis resulted in the following service segments: independent 5, activity deficit 4, frail 5 and entire target group 4. Primary and secondary needs of the segments with related the service content is presented in Table 1.

Table 1. Summary of needs and service content for elderly segments

	Segment		
	Well-coping	*Activity deficit*	*Frail*
Primary needs	• Maintaining current health, spirit and functional ability	• Maintain current health • Prevent or alleviate future diseases	• Managing diseases • Preventing hospitalization
Secondary needs	• Live independently at home	• Having substance to life • Ease in everyday lives	• Creating substance to life
Core services	• Guidance and information • Errands • Health care /telehealth	• Supporting disease management • Alleviating functional decline	• All the health care services • Service supporting daily errands
Supporting services	• Easing daily errands • Increasing substance of life	• Time passing • Health care • Errands	• Time passing
Facilitating services	• Guidance of local service • Guidance on e-services • Support for administrative errands	• Guidance of local service • Guidance on e-services • Support for administrative errands	• Service guidance

Service packages should always be provided for customers if core services are included in the package. In addition, the facilitating services are needed in offerings if the customer gains benefits from the core services or if they meet customer expectations better. The supporting services can be included in an offering as a complement to core and facilitating services if an increased service level provides additional benefits to the customer without notable expenses to the provider.

The analysis shows that elderly people are not a homogeneous group to which similar service bundles can be offered. The health status of the customer influences both the service coverage of the offering and the perceived benefits of customization. Therefore, customer segmentation is critical prior to service design. The well-coping elderly need more alternatives, whereas the frail elderly benefit most from services focused on particular problems. The profiling of customers to whom agile approaches are applied helps, for example, to develop more acceptable service models for mobile healthcare units. The profiles can be created using measured segment characteristics (generic services) or assessing service usage in the long term (focused offerings).

2 INTRODUCTION

2.1 Aim and structure of the report

This research is an analysis of the value and content of local service offerings that enable longer periods of living at home for elderly people. Mobile health care and new distribution services have provided an interesting solution in this context. However, these are no longer new phenomena. We aim to shed light on the research question, 'How do we bundle services based on different customer needs?' A research process consisting of three main phases was applied for this purpose. During this process, elderly customers were segmented, the importance of services was rated and service offerings were defined.

The report consists of two parts. The first part provides a literature review on general trends, service value creation and a discussion of mobile health care units. The review on mobile health care includes a summary of actual trials in the field. The second part presents results of the empirical research in which service offerings for different customer segments were assessed. In the empirical research, the offerings were analysed by the importance, connectedness and role of service for customer. The research findings are summarized at the end of this research and recommendations for future service design are made.

2.2 Health care in Finland

Finland has one of the most ageing populations in Europe; thus, it is essential to develop social and health care practices that help elderly people to live at home as long as possible (European Commission 2013; European Commission 2012). When the population is ageing, society needs to adapt to the observed change and modify service offerings to suit the needs of this ageing population (STM 2008). The focus needs to change from around the clock care to anticipatory actions. New service concepts address the fact that the elderly should not be forced to switch from one service model to another when their ability to function changes. Instead, services

should be produced in the places where the elderly are living. The objective of new service concepts is to enable the elderly live independently in their own homes for as long as possible. This means developing integrated local service entities that help develop communal behaviour between ageing individuals. An additional target is to change the content of services to suit individual needs better (Muurinen et al. 2009). As a local service entity, mobile services should be considered.

2.3   Changes in rural regions

The description of the settlement and population structure is based on reports originally published by the Ministry of Environment, Ministry of Agriculture and Forestry and the Finnish Environment Institute (Helminen and Ristimäki 2007; Helminen et al. 2013; Helminen and Ristimäki 2008). The settlement areas are categorized by their distance from city centres and population density as (i) urban regions, (ii) areas surrounding urban regions and (iii) sparsely populated areas (Helminen and Ristimäki 2008). Urban regions are densely populated functional areas that cover city centres and surrounding suburban areas, creating a consistent functional settlement. Areas surrounding urban regions are distance sections located less than five kilometres from the outer borders of urban areas. Sparsely populated areas cover all areas other than urban or surrounding areas. This study concerns the last two settlement areas surrounding urban regions and sparsely populates areas.

Statistics show that population changes occur in Finland in both total population and in settlement areas. The overall population of Finland was 5,426,674 in the end of 2012, indicating a slight growth from preceding decades (Statistics Finland, 2013). Settlement emphasizes strongly urban or near urban regions in which 80% of the population lives. The other 20% of the population settle in rural areas that cover most of the area of Finland. A long term trend in Finland has been the centralization of settlements near urban regions, and this has led different regions along distinctive development paths that depend on distance to the city centres (Helminen et al. 2013). Overall, the growth of the population occurs particularly in areas surrounding the

urban regions of major cities, and that leads to more dispersed social settlement and the growth of sparsely populated areas. Such changes tend to make public service provision challenging because distances to available service sites increase, which influences the accessibility and efficiency of the public sector. The study area is a typical example of regions that are far from major cities and are facing population change. The average population (130,000 citizens) has been stable since 2000, but depopulation has been strong in remote, sparsely populated areas (Helminen and Ristimäki 2008). The depopulation particularly influences areas located more than 10 kilometres from the city centre. Along with ageing trends, this has caused a situation where a large number of aging people are living in sparsely populated areas.

3 SERVICES AS VALUE CREATION METHOD

3.1 The concept of service

The concept of *services* is worth to be clarified at first. According to De Jong and Vermeulen (2003), services can be distinguished from physical products by four factors: they are intangible, heterogeneous, simultaneously produced and consumed and perishable. From a more practical point of view, a service can be defined as a process that entails a set of activities that involve interactions between a customer and a service provider or physical resources and goods. It can also be defined as a system and infrastructure that represents the service provider (and possibly involves other customers) and aims at assisting the customer's everyday practices (Grönroos 2008). The main difference to traditional product manufacturing is that service is a process of doing something for the benefit of another instead of focusing on product quantities. Indeed, services are a reciprocal process, which is the essence of economic exchange (Vargo and Lusch 2008).

3.2 Value creation

When considering how value is created for the customer, there are two general views: *value-in-exchange* and *value-in-use*. The traditional seller-purchaser relationship is

called *goods-dominant* (G-D) logic, which is based on the value-in-exchange of a good's meaning of value. An alternative view to G-D logic is *service-dominant* (S-D) logic, the domain of which is the value-in-use meaning of value. In G-D logic, value is created by the firm and distributed in the market through the exchange of products and money (Vargo and Lusch 2008). S-D logic emphasizes the co-creation of value and profound interactions between providers and beneficiaries through the integration of resources and the application of competences (Vargo 2007; Vargo and Lusch 2008; Vargo, Maglio and Akaka 2008) . The roles of manufacturer and customers are distinct in the G-D view in which value is created in a process performed by the firm; however, S-D sees a customer as a co-producer participating in value creation (Edvardsson and Olsson 1996; Matthing et al. 2004; Vargo et al. 2008) In brief, value from the perspective of service provision is defined, co-created and determined by the customer during using usage process and experiences related to outcomes (Matthing et al. 2004).

3.3   Customer value

Customer value as a concept originates from assumed rational economic behaviour, which is related to perceived costs and sacrifices by the customer (McDougall and Levesque 2000). The customer perceived value relies on three assumptions: rationality of decisions, subjectivity of value assessment and dynamics between attributes during the evaluation-use-repurchase process (Eggert and Ulaga 2002). Customer perceived value is the trade-off between benefits and required efforts of the customer. Thus, at its simplest, customer value is benefits minus sacrifices (Eggert and Ulaga 2002).

Customer value address the definition of net benefits, which are related to the needs and wishes a customer wants to satisfy (Eggert and Ulaga 2002). The needs and wishes refer to expected outcomes of using the service, and this depends on perceived features and prior experiences of use (Edvardsson and Olsson 1996). Value in the customer's eyes means that the provider attaches value to a product or service in

proportion to its perceived ability to help solve their problems or meet their needs (Levitt 1980). The needs can also be latent, for example, when the customer cannot explicitly determine desires or request value creating services due to lack of prior experiences (Matthing et al. 2004).

Customer value can be altered, for example, by decreasing the perceived sacrifices, by providing value adds services, and by communicating benefits more efficiently to the customer. Perceived sacrifices can be seen as monetary costs (McDougall and Levesque 2000) or as non-monetary costs, such as effort, time and energy (Lapierre 2000; Grönroos 2000) Hence, perceived value is also influenced by inconvenience caused by waiting and the effort required to access to the service (King 2007). **Error! Reference source not found.**Woodal (2003) illustrates five components that affect customer perceived value: *net value for customer (VC), derived VC, sale VC, rational VC* and *marketing VC*. These components and their benefits and sacrifices are discussed below. Figure 1 shows how customer perceived value can be raised to a higher level.
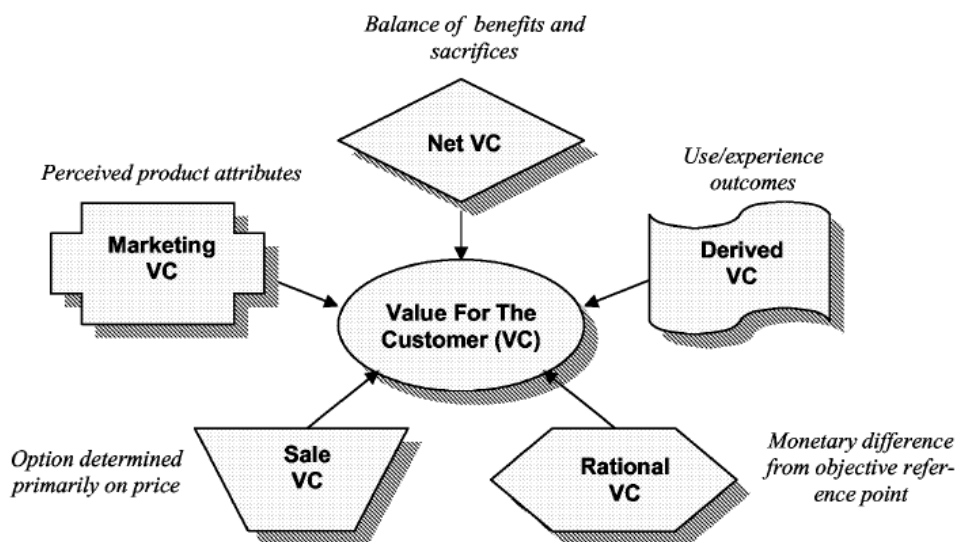
Figure 1. Five primary values for customer forms (Woodall 2003)

Net VC has been discussed previously and indicates the balance between benefits and sacrifices. **Derived VC** indicates use or experience outcomes; perceived benefits are derived from customer experiences using a product or service (Woodall 2003). Benefits can be divided into three categories: personal, social and practical (Ancarani 2009).

Marketing VC explains perceived product attributes. This indicates how a customer experiences what the company is offering before using the offered product or service (Woodall 2003). Four different benefits can be identified: (i) technical quality; (ii) organizational, rational and economical quality; (iii) core features and (iv) customization (Ancarani 2009). Marketing VC can also be referred to as attribute-based value, since the customer desires a product's or service's attributes or performance (Woodruff 1997).

Sale VC includes the price of the product or service in value creation. Sale VC only considers the price in terms of reduction in sacrifice without taking the product's or service's attributes into consideration, i.e. the lower the cost, the lower the sacrifice (Woodall 2003). The customer usually does not have only one price they are willing to pay for all of the items available in the market; they might have a set of prices they feel comfortable paying when moving from one product or service to another (Dodds et al. 1991). For sale VC, six sacrifices are identified and divided into four monetary and two non-monetary categories. Price, opportunity costs, acquisition costs and maintenance costs are the monetary-related sacrifices; psychological costs and time are non-monetary-related costs (Ancarani 2009).

Rational VC takes the product's or service's price premium into the equation but more profoundly than in sale VC (Woodall 2003). For instance, the customer might have a benchmark price or functionalities based on previous experiences during the purchasing of a product or a service. Customers are not just looking for the best product or the lowest price. Instead, they are focusing on the careful assessment of what benefits they obtain in exchange for the costs they perceive (Lapierre 2000). As

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mentioned earlier, sale VC only takes into account the price of the product or service; the lowest price brings more value because the sacrifices are lower. In rational VC, the price, attributes and possible previous experiences affect the outcome (Woodall 2003). For rational VC, there is one monetary-related sacrifice: opportunity costs (Ancarani 2009).

3.4 Service types

Services are built on five main elements, *self-service, direct service, pre-service, bundled service* and *physical service,* which are directly provided to a customer (Berry and Lampo 2000). After integrating previous service components into production and consumption, the result is transformed into a service offering (Grönroos 2000). An offering contains services and products that are designed and developed based on the best possible knowledge. An offering should be constructed in interaction with customers in order to satisfy customer needs (Fließ and Kleinaltenkamp 2004). Thus, the service offering is a more comprehensive answer to customer needs than a singular product or service. The service activities are distinct by virtue of the occurrence of direct customer-service provider contact. They include (i) service produced in isolation by the provider, (ii) service produced in interaction and (iii) service produced in isolation by the customer (Grönroos and Ojala 2004) (Grönroos 2011). Here, customer participation means that a customer has an impact on the perceived service.

3.4.1 Self-service

The traditional view of the customer role in a service encounter is that of the receiver. The nature of self-service is, however, to enable the customer to be both the service receiver and the service provider (Berry and Lampo 2000). During self-service process, the customer may use the customer interface provided by the service provider and thus play an important role with regard to outcomes (Berry and Lampo 2000; Grönroos and Voima 2013; Grönroos and Ojala 2004). The aim of self-service

is to increase the proactivity of the service provision, to improve access to services and to decrease direct costs of using service (Grönroos 2008).

3.4.2   Direct service

Direct service involves bringing the service to the customer instead of bringing the customer to the service. The service can be given at a customer's location, for example, at home or at a town centre (Berry and Lampo 2000). Unlike self-service, direct service is jointly produced by the provider and customer. The processes of service production that are visible to the customer depend on whether all the required processes are produced at the service encounter site or whether some were produced before the service encounter began (Grönroos and Ojala 2004).

Direct service increases customer value by decreasing the burdens of time, energy and hassle. It enhances access to services, since customers do not have to worry about, for instance, making the appointment early. Direct service also assumes some tasks that were formerly customer tasks. Whereas self-service asks the customer to do more, direct service asks the customer to do less. Direct services also require trust building and resources from providers, since a customer feels comfortable using the service (Berry and Lampo 2000).

3.4.3   Pre-service

Pre-service involves streamlining the front-end of a service process, which enables a quick and smooth transition into the benefit-producing part of the service. The front-end processes that require the customer's participation before they receive the core service are unwanted chores the customer must endure. Hence, the service provider acquires some tasks that were formerly customer tasks (Berry and Lampo 2000). From the viewpoint of the line of visibility, the service's front-end processes are produced by the company and the rest are interactions (Grönroos and Ojala 2004). The front-end processes produced by the company might be handled in isolation or with the presence of the customer. Issues, such as the nature of the service and the

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required front-end process, influence what parts of the production the customer will see. Pre-service increases customer value by (i) increasing speed of service, (ii) improving efficiency, (iii) shifting tasks from customer to service provider, (iv) separating service activation from service delivery and (v) customizing the received service. To successfully utilize pre-service, extra customer education and employee training is required (Berry and Lampo 2000).

3.4.4 Bundled service

The bundled service concept involves grouping or bundling multiple services into one offering (Berry and Lampo 2000). In service bundling, multiple services jointly contribute to fulfilling the customer's needs, and the nature of the services influences the provision (Grönroos and Ojala 2004; Shocker et al. 2004). Bundling is usually implemented in a fixed format in which customers cannot add or delete services (Berry and Lampo 2000). However, adequate bundling of services adds value for customers by increasing convenience of use and enabling mass customization. Offering bundled service requires an extensive knowledge of the targeted customers.

Combining core and complimentary services in a service bundle and offering it to a well-defined customer group can improve customer perceived value of the total service offering. It is difficult to develop a service bundle that will actually enhance the perceived value of an offer without the knowledge of the target customers (Berry and Lampo 2000).

4 MOBILE SERVICES IN HEALTH CARE

4.1 Definitions and existing concepts

A review of research on mobile health care reveals a constant increase in the number of publications from the early 1980s until today (Scopus: 2,524 publications in 1963–2012; search term mobile health care service unit) and shows a remarkably sharp increase since the early 2000s. However, nearly 80% of these publications are on

subjects related to medicine and nursing. A great part of this research focuses on advances in medicine and health technology and puts aside a broader strategic and business perspective. From a practical perspective, mobile services are considered to be services that are offered to customers from a vehicle. In the past, different players offered mobile services, such as grocery, library, bank and post office services. Mobile services can be roughly divided to three categories (Yhteispalvelun laajentamishanke 2009): (i) transportation and errands, (ii) one service unity and (iii) multiple services at one.

The basic idea behind transportation and errands services is the carrying of the service to the customer. In many cities, an example of this is a bus line for elderly people. This bus line picks up elderly people from specific bus stops and transports them to the city centre in order to run errands. One service unity offers the whole service package from a specific service field, for example, mobile libraries, from which a customer can borrow books and return them. Finally, multiple services at one offer many different services at one stop from the same car. The service offering can consist of health care, information distribution and legal services (Yhteispalvelun laajentamishanke 2009).

Mobile health care services are provided in developed and developing countries, such as the USA, Canada, Finland, India and many African countries. For instance, in India, these services are mainly offered to people living in rural areas where the offering of health care services would otherwise be very limited. On the other hand, in the USA, a major part of mobile health care services are offered to people who do not have health insurance. The health care industry in the USA is particularly tricky because it is based on health insurance. If a citizen does not have health insurance, they have little to no chance of accessing public or private health care because costs related to the doctor visit and subsequent treatments would be charged to the citizen and not to the insurance company. The existing concepts found in the literature and on web-sites are presented in the following pages.

Project	Country	Coordinator	The target Customers	Funding	Public / Private	Offering[a] [services] Tests and Other info	Other information
Project mobile clinic Africa	Africa		All citizens		Non-commercial	[PC]	Treatment and prevention of common diseases of Africa. US Doctors for Africa.
CPHC	Canada		Residents of Ontario	The Ministry of Health, city governments, companies and private donors	-	[PC, HCOUN, CDM] Tests: Blood tests, X-ray, mammography, ultrasound scan	Booking appointments and calendar. For youth lifestyle counseling.
Mobile Access Project	Canada		Prostitutes at Vancouver		-	[PC] Other: Condoms, clean needles, safety and support	Support with side effects of prostitution.
Saskatchewan Cancer Agency's mobile mammography bus	Canada		Aboriginal women	Health Canada	-	[HCOUN]	Mammography
Regional initiative for the Caribbean Area	Central America	SAVE (Save the children of El Salvador)	Children of Central America	SAVE	Non-commercial	[DH, HCOUN]	Temporal
Suupirssi	Finland	Savonia University of Applied Sciences	Health and social care companies	European Regional Development Fund, the European Social Fund, Savonia University of Applied Sciences	-	[DH, HCOUN]	
Liisu	Finland	The City of Helsinki	Adults and childs of Helsinki with acute dental problems	The City of Helsinki	-	[DH, HCOUN]	Free of charge
Liikkuva liinikka	Finland		Residents of North Karelia, Finland	Donation to North Karelia Centre for Public Health	Non-commercial	[PC, HCOUN, CDM] Tests: Self-measured cholesterol, blood sugar and blood pressure	Selfcare center
Moving health counseling	Finland	Helsinki Deaconess Institute	Drug addicts at Helsinki	Helsinki Deaconess Institute	-	[PC, HCOUN] Tests: Inflammation values	Operates in the evenings.
Silmo	Finland		Glaucoma patients of Oulu University Hospital		Commercial	Tests: Vision and eye pressure	

ª) Abbreviations for Services in the table: Primary health care = *PC*, Dental care = *DC*, Health counselling = *HCOUN*, Vaccinations = *VAC*, Chronic disease monitoring = *CDM*, Mental Health Services = *MH*, Health inspections of enterprises = *OC*, Telemedicine = *TM*

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Project	Country	Coordinator	The target Customers	Funding	Public / Private	Offerign [services] Tests and Other info	Other information
Finnish red cross moving blood service	Finland	SPR	Blood donors	SPR	Non-commercial	Blood donation	
Kiertävä pysäkki	Finland	North Karelia Heart Association & Karelia University of Applied	Residents of North Karelia, Finland	Centre for Economic of North Karelia, Regional Council of North Karelia	Non-commercial	[PC, HCOUN] Tests: General health tests Other: Teaching first aid and fire-fighting	Local fire department and the border guard collaborates with health care.
Netti-Nysse	Finland	City of Tampere	Residents of Tampere, Finland	City of Tampere	Non-commercial	Other: Internet guidance	Free of charge.
Terveysnysse	Finland	City of Tampere	Residents of Tampere, Finland	City of Tampere	Non-commercial	[PC, HCOUN] Tests: Blood pressure Other: Internet guidance to health and social care service	Health nurse, social worker and secretary of media included.
Moving measurement unit of Pori	Finland	Porin Lääkäritalo	Health centers of Pori area, Finland	Porin Lääkäritalo	Commercial (municipality purchases service)	Tests: Various eye function measurements	Porin Lääkäritalo provides measurement services of specialized care to health care centers.
Moving sampling of Helsinki	Finland	HUSLab	Residents of Helsinki	HUS	-	Tests: Blood tests	Home sampling. Growing market.
Eric	UK		Youth of Isle of Wight	Individual organizations	-	[PC,MH] Tests: Pregnancy testing	
Mobile cancer support unit	UK	NHS	Cancer paroents at Wales who have cancer	NHS?	-	[PC, HCOUN, MH] Other: Legal services, wigs fit	Cancer treatments.
AIMS	India		Residents of rural areas		-	[PC, HCOUN, MH, TM]	
ISRO	India	ISRO	Residents of rural areas	ISRO	-	[PC, HCOUN, CDM, TM]	
Rabindranath Tagore International Institute of Cardiac Sciences	India		Heart patients of rural areas		-	[PC, CDM]	Health and heart inspections for the crowds at camps. Free of charge.
Hope project India	India		Children and youth in India	Private donors	-	[PC]	
Deen dayal chalit aspatal mobile units	India		Residents of rural areas	Private donors	-	[PC, HCOUN, VAC] Tests: The most common blood tests and measurements	Doctor,nurse, laboratory technician, pharmacist and driver available in the vehicle.

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a) Abbreviations for Services in the table: Primary health care = *PC*, Dental care = *DC*, Health counselling = *HCOUN*, Vaccinations = *VAC*, Chronic disease monitoring = *CDM*, Mental Health Services = *MH*, Health inspections of enterprises = *OC*, Telemedicine = *TM*

Project	Country	Coordinator	The target Customers	Funding	Public / Private	Offerign [services] Tests and Other info	Other information
Surgery buss of New Zealand	New Zealand		Surgery patients of rural areas of New Zealand		-	[PC]	Surgery as mobile concept.
Lorna mobile clinic	The Philippines		Residents of rural areas, Private sector		-	[PC, OC] Tests: The most common blood tests and measurements, X-ray	
Microscopy on wheels	The Philippines		Residents of rural areas of the Philippines		Non-commercial	[HCOUN] Tests: Tuberculosis Testing	Internationally awarded 2009
Women on Wawes	Universal		Women	Private donors	-	[HCOUN]	Enables medical abortions in countries, where abortion is prohibited.
World cup mobile medical unit	Universal		World Cup tourists		-	[PC]	Small temporal hospital in container during The FIFA World Cup.
Contra Costa County medical mobile clinics	USA		Homeless residents of Richmond		Non-commercial	[PC, VAC, CDM]	Nurse and economic advisor services.
Providence mobile clinic	USA		Chronical diseases patients of San Fernando Valley	Providence Health and Services & Health Net Foundation, private donors	-	[CDM]	Service charge $ 15.
The motion picture & television fund	USA		Personnel of Hollywood film studios		-	[PC, HCOUN, VAC, CDM] Tests: The most common blood tests and measurements, X-ray	Calendar based routes
Washington on wheels	USA		Uninsured people, Private sector		-	[PC, HCOUN, VAC, OC] Tests: The common blood tests	Calendar based routes
Family Van	USA	Linked to the Harvard University	Residents of Roxbury out of sufficient health care		Non-commercial	[PC, HCOUN] Tests: The common blood tests	Surcharges apply. Focus on preventive care.
Mobile health program	USA	Part of the University of Arizona	Uninsured residents of Southern Arizona		-	[PC, HCOUN, CDM, TM]	The aim to create sustainable health care systems.
Pinellas County health & human services	USA		Homeless and uninsured residents of Pinellas County	American Recovery and Reinvestement Act of 2009	-	[PC, HCOUN, VAC, CDM, OC] Tests: The common blood tests	Free of charge. No first aid services.

ª) Abbreviations for Services in the table: Primary health care = *PC*, Dental care = *DC*, Health counselling = *HCOUN*, Vaccinations = *VAC*, Chronic disease monitoring = *CDM*, Mental Health Services = *MH*, Health inspections of enterprises = *OC*, Telemedicine = *TM*

Project	Country	Coordinator	The target Customers	Funding	Public / Private	Offerign [services] Tests and Other info	Other information
Saint Joseph regional medical center	USA		Residents of Indiana ou of the ordinary health care		-	[PC, HCOUN, OC] Tests: Mammography	Calendar based routes
Tri-City healt center hope project	USA		Homeless residents of California	The Boston city scientific foundationt grant	Non-commercial	[PC, HCOUN, CDM]	
Ocean health intiatives mobile medical unit	USA		Residents lacking transportation in Ocean County		-	[PC, DH]	
The university of Chicago medicine: Comer children's hospital	USA		Children and youth of Chicago	Chicago Medicine comer children's hospital, private donors	-	[PC, HCOUN, VAC, CDM] Tests: The common blood tests	
Skippy Express, Children's Hospital, Austin	USA	Children's hospital of Austin	Children of Texas	Children's Hospital Foundation of Austin	-	[PC, VAC] Tests: General health tests	
NAH Care-A-Van	USA	NAH (Norwegian American hospital)	Children of Chicago	Private donations and various foundations	Non-commercial	[PC, HCOUN, VAC]	Social services. Planning to provide dental care.
Women's Health van	USA	The Lucile Packard Childrens Hospital	Pregnant women of Redwook and East Palo Alto out of health care		-	[PC, HCOUN, VAC] Tests: Pregnancy, sexually transmitted diseases	Free of charge
Smiling faces, going places	USA	New York University College of Dentistry	Indigent children of New York		-	[DH, HCOUN]	For everyone. X-ray services.
Puente a La Salud (Bridge to Health)	USA	St Joseph Hospital	Indigent children of Orange County of California		-	[DH, HCOUN]	Collaboration with schools and different organisations.
Ronald McDonald Care Mobile	USA/Univ ersal		Children		-	[PC, HCOUN, VAC] Tests: The essential tests of measuring child's growth	36 kinds of program of which 31 operates in the USA.
MOMmobile			Pregnant and indigent women of Miami-Dade area		-	[PC, HCOUN] Tests: Pregnancy tests	Most of customers have a foreign background.
UCLA Mobile Clinic		UCLA	Homeless residents of West Hollywood		Non-commercial	[PC, HCOUN]	Operated by students.

a) Abbreviations for Services in the table: Primary health care = *PC*, Dental care = *DC*, Health counselling = *HCOUN*, Vaccinations = *VAC*, Chronic disease monitoring = *CDM*, Mental Health Services = *MH*, Health inspections of enterprises = *OC*, Telemedicine = *TM*

4.2 The Mallu concept

An example of a mobile health care provider in Finland is the Social and Health District of South Karelia (EKSOTE), which provides public healthcare services in the South Karelia region. In addition to operating multiple hospitals and health care centres throughout the region, EKSOTE offers mobile healthcare services in the form of the Mallu-car (EKSOTE 2013a; EKSOTE 2013b; EKSOTE 2013c). Mobile healthcare services are provided in different population centres in Lappeenranta and in the towns of Lemi, Luumäki, Parikkala, Rautjärvi, Ruokolahti, Savitaipale and Taipalsaari. The mobile service unit operates under a timetable and a specific route, and it stops at places in cities and towns that are familiar to its citizens. It is possible to visit Mallu without making an appointment; however, making an appointment is recommended (EKSOTE 2013e)

Approximately 42,000 visits are made annually to health centres in rural districts and only 1,150 visits are made to the Mallu-car (adapted from Immonen et al. 2012, p. 23). The Mallu-car can provide a viable solution to alleviate the pressure that healthcare centres encounter. However, from the number of yearly visits, it can be concluded that this has not yet been achieved. There might be many explanations for this, including a lack of knowledge about the Mallu-car or that it doesn't yet meet customer needs. In order to enable the elderly to live in their own homes independently for as long as possible, mobile health care services as local service entities need to be offered more readily.

4.3 Development of the Mallu concept

The goal of EKSOTE is to increase the productivity of work by developing processes without decreasing the quality of care. EKSOTE is working to create new client-oriented and cost-effective service process that spans different professional areas so old municipal or organizational borders will not affect the planning process.

The strategic intent towards functionally integrated organization and service delivery initiated the development of the Mallu-car pilot in EKSOTE in 2010. MHSU was seen as a new supply mode to complement existing service channels (i.e. fixed high capacity service sites [hospitals], fixed low capacity service sites [homes] and electronic service channels). The MHSU was seen as playing an important role in supporting service delivery in sparsely populated areas. Since autumn 2010 (Phase I), when the MHSU started to deliver influenza vaccines, the initiative has gone through three iterative development phases (see Table 2). Each development cycle included problem identification, action planning, implementation, evaluation and reflection. The insights gained from the initial phase were fed into the planning of the next phase. Then, the action plan was modified and the development process was repeated. From mid-2011 onwards (Phase II), the MHSU has been used as a mobile nurse's clinic, stopping at appointed villages throughout the district and bringing social and healthcare services closer to clients. The forthcoming Phase III has an integrative focus to deliver multiform mobile health and social services, even enabling integrated care pathways on the mobile platform.

Active market creation for mobile health care is still needed in future. At present, mobile health and social care services markets are inefficient because the markets are geographically fragmented. The markets for mobile health care services within a single hospital district are clearly too narrow for effective market conditions to emerge. More importantly, the municipal health care system is decentralized and major issues will occur when concepts are transferred from one geographic or governance area to another. It seems that new control mechanisms are needed to break down the geographical and the governmental silos for the dissemination of new mobile health care approaches and the creation of sufficient prerequisites for market emergence.

Table 2. Development phases of the Mallu-concept

Implementation phases	Characterization	Year
Phase I: Prestudy and pilot phase	Assessment of initial customer needs; Testing the functionality of the required technologies; Testing service logistics, routes and staging posts; Experimenting with various health and social services offerings; Assessing possibilities for broader applicability; Identification of co-creation networks and partners	Autumn 2010 – mid-2011
Phase II: Single service segments	Emphasis on single service segments (e.g. a reception unit, dental care); Coordination of health and social service delivery; Operational integration to the health and social services system; Focus on the accessibility and complementarities of services	Mid-2011 onwards
Phase III: Integrated service solutions	Multiform mobile health and social services; Enabling integrated service solutions; Enabling integrated care pathways; Focus on substitutive forms of service delivery	Late 2013 onwards

5 RESEARCH PROCESS AND METHODS

This exploratory research was conducted utilizing social network analysis (SNA) for analysing service offerings from a customer perspective (Ratio 2007). Social network analysis has recently taken place in marketing, economics, and industrial engineering to explain patterns in relationships among interacting units of industrial networks.

5.1 Research process

This research is an analysis of the value and content of local service offerings that enable longer periods of living at home for elderly people. A research process consisting of three main phases was applied for this purpose. During the process, elderly customers were segmented, the importance of services was rated and service offerings were defined. The data analysis for creating empirical observations followed the phases are presented in the Figure 2.
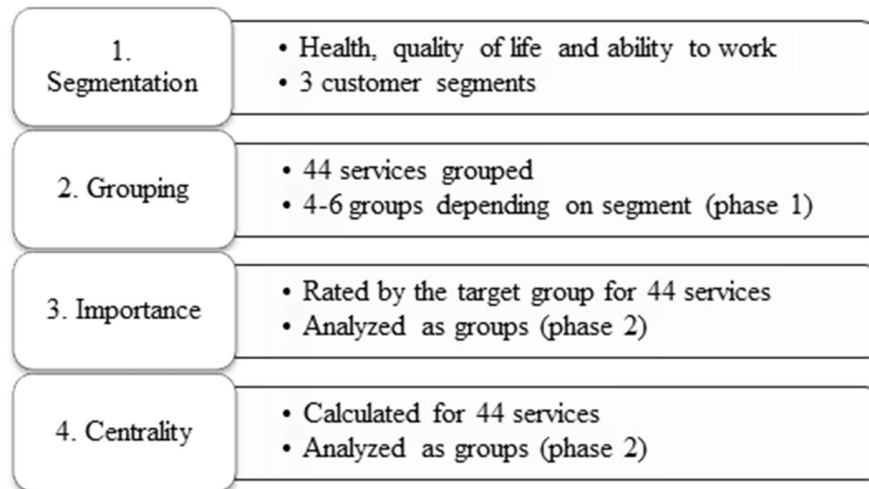
Figure 2. Data analysis process of the study

5.2 Survey research

Empirical evidence consists of a cross-sectional mail survey collected from the South-Eastern part of Finland in the first quarter of 2012. The study was targeted to 60 to 90-year-old inhabitants in rural and suburban areas of South-Eastern Finland. The areas were separated by postal codes. A stratified random sample of 3,000 people was drawn from the Finnish Population Register. The sample frame was based on the population age distribution divided into five-year categories. A total of 1,121 valid responses were received and the resulting age distribution was representative, indicating no statistical difference compared to the true age distribution in the population. The gender distribution was also in line with the target population; the share of female respondents was 53.8% (55.1 in the overall population). Due to incomplete responses, the effective sample used in the analysis was n=1006).

5.3 Segmentation

Segmentation was based on respondent self-rated health, self-rated quality of life and self-rated functional ability. Self-rated health and quality of life scales are based on Zung's self-rated depression scale; from this, eight items were selected for this research (Kitamura et al. 2004; Colasanti et al. 2010) Self-rated health measures a

person's self-assessed feelings regarding current health status and activity in comparison to the reference group. Self-rated quality of life measures experiences of depression, general mental health status and cognitive function. In the questionnaire, respondents were advised to rate their answers to statements on a Likert scale varying from 1 'totally agree' to 7 'totally disagree'. The functional ability involves the basic and instrumental activities of everyday life such as cleaning, cooking, eating, and laundry and getting out of bed (Verbrugge and Yang 2002; Sintonen and Immonen 2013) The measurement of functional ability consists of eight items that were measured on a Likert type scale varying from 1 'manage independently' to 7 'do not manage at all'. Measurement reliabilities for the segmentation variables are presented in Table 3. Thus, higher values in functional ability mean increased limitations for one's ability to survive independently in everyday life. The target group was segmented into four groups by the K-mean clustering method using IBM's SPSS Statistics 20. Applicability of the segmentation was re-evaluated for the purpose revealing potential invariances of needs and usage behaviour between customer segments. Finally, two segments indicating slightly decreased health and functionality were combined for the final analysis, which was accomplished using three customer groups.

Table 3. Reliability of the clustering variables

	Number of items	Alpha
Self-rated health	4	0.853
Self-rated quality of life	4	0.878
Functional ability	8	0.862

5.4 Network analysis

SNA focuses on relationships among network entities, for example, transactions between corporations or communications within user groups. Two essential units in SNA are actors and ties. Actors are presented as nodes in a network that are linked together with ties (Wasserman and Faust 1994, p. 3–4).

5.4.1 Measuring importance

The respondents were advised to consider how important it is to have different services provided close to their homes in order to facilitate living at home for the next five years. These questions resulted in requests for services related to health care, free time and errands. The important at the present time of having guidance on the use of specific services was also asked. In total, 44 service needs were presented (Table 4) and respondents were advised to rate the service's importance on a Likert scale varying from 1 'not important' to 7 'very important'. Respondents rated services based on their own needs. The mean of importance for each service for each customer segment was calculated using SPSS Statistics 20.

Table 4. Services evaluated by respondents

Health care	Free time and errands	Guidance
Prescription renewal	Social insurance institution	Social insurance
Prescription medicines, home delivery	Bank	Local health and social care district
Pharmacy	Post office	Third sector
Treatment equipment (home delivery)	Groceries	Forms
Assistive devices (delivery)	Social services	Services by companies
Assistive devices (guidance)	Assistance in banking	E-services
Assistive devices (repair)	Groceries (home delivery)	
Assistive devices (returns)	Physical training	
Doctor's appointments	Culture	
Doctor's remote appointments	Library	
Health examination	Congregations	
Small scale medical operations	Third sector services	
Guidance on chronic deceases	Barber/hairdresser	
Health guidance	Beauty	
Mental health service	Massage	
Intoxicant guidance		
Dentist		
Dental hygienist		
Laboratory sample		
Laboratory results		
Physical therapy		
Occupational therapy		
Pedicure		

5.4.2 Correlation between service items

The correlation analysis was focused on to explore differences and patterns of demand based on importance ratings. The bivariate-method from SPSS 20 was utilized for creating correlation matrices from the queried services for each customer segment. The correlation matrices were later applied in the network analysis. The correlation coefficient, **r**, indicates the dependence between two variables in numerical form. This coefficient receives values between -1 and 1. A correlation close to 0 indicates weak or no relationship between the variables, whereas values 1 and -1 indicate perfect linear correlation (Vilkka 2007, p. 130). The positive values indicate that two variables behave in the same direction, i.e. when the first variable (v_1) grows, the second variable (v_1) increases by equation $dv_2 = r \times v_1$. The negative values of r indicate that the two variables behave in opposite directions when the relationship takes the form $dv_2 = -r \times v_1$. When dealing with human sciences, correlation coefficient values over 0.8 are considered very high, values from .6 to .8 are high and values from .4 to .6 are moderate (Metsämuuronen 2009, p. 371).

5.4.3 Centrality of service items

Centrality measures an actor's position in a network through a count of direct ties to other actors in the Figure 3. A circle network does not have central actors because all actors have the same amount of connections, while a star network has clear central actor that has the highest count of ties. The actor situated in the middle of a star figure is the only one with connections with all other actors, while the remaining actors only have single tie to the actor in the centre (Wasserman and Faust 1994, p. 178).

To put it simply, centrality answers the question of *who* is the most important or central actor in the network (Blume and Durlauf 2008). When data is in binary form, degree centrality calculates the number of ties. If the data is in valued form, then the received value centrality will consist of the sum of the values of the ties (UCINET Help 2013). The calculation of degree of centrality provides results in integer form

when the data used is in binary form. In this study, the constructed correlation matrixes were in value form instead of binary form; thus, the received results are not integers. Degree centrality (degree) for each service in customer segment's was calculated using the UCINET 6 degree centrality method. With the centrality analysis, each service can be characterized by its position in contrast to customer needs and by its importance for value creation in a service system.
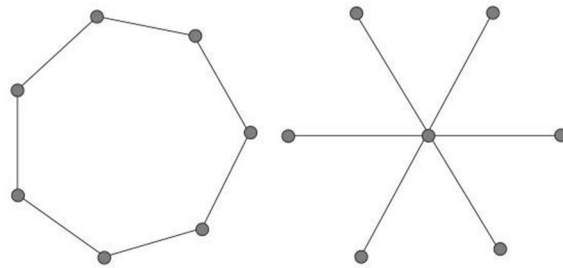
Figure 3. Centrality in circle (left) and star networks (right), Adapted from Wey et al. 2008.

5.4.4 Service clusters

The service clustering was conducted using UCINET 6 function optimization clustering. This method produces clusters on the basis of optimizing the distances and similarities between data classes in which similarity of actors refers to patterns of connections to the network. The algorithm requires pre-defined count of clusters that can be determined by theory or by iteration to find the maximal explanatory power of the cluster model.

6 RESULTS

The results of the analysis are reported in this chapter. First, the customer segments are defined. Second, the identified service clusters are identified and analysed based on importance and centrality.

6.1 Customer segments

The segmentation was done using self-rated health, self-rated quality of life and functional ability as clustering variables (Figure 4). The biggest customer segment is **independent** (segment 2, 48.7% of respondents) (Table 3) which perceives health, quality of life and ability to function as good. The second biggest customer segment is **activity deficit** (segment 1, 41.5% of respondents). In this segment, individuals have slightly decreased perceived health, yet they are able to manage everyday tasks and they are enjoying life. The smallest segment is **frail** (segment 3, 9.8% of respondents) in which individuals are in the weakest position in that perceived health, quality of life and ability to function have decreased. In case of all segmentation variables, the group difference is statistically significant at $p<.001$ (Table 5)
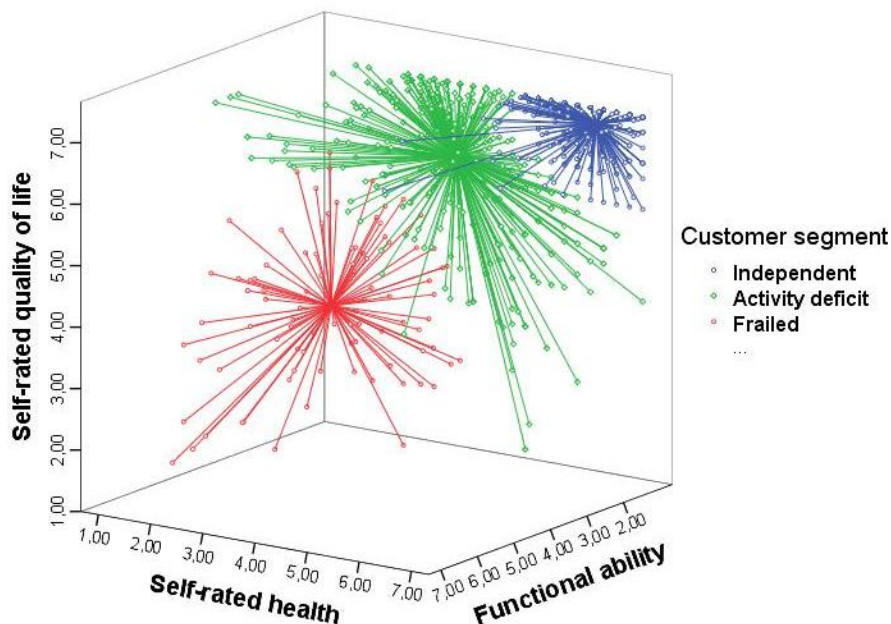
Figure 4. Variance of the clustering variables within customer segments

Table 5. Means and standard deviations for the segmentation variables

Segment % of sample	Activity deficit (41.5%)	Independent (48.7%)	Frail (9.8%)
	Ave SD	Ave SD	Ave SD
Self-rated health[***]	3.77 0.66	6.20 1.02	2.04 0.78
Self-rated quality of life [***]	5.96 0.35	6.79 1.10	3.49 1.22
Functional ability[***(a)]	1.49 0.88	1.12 0.45	2.46 1.36

[***]Statistically significant differences between all groups p<.001
[(a)] Low values indicate higher ability to function

Independent customers are maintaining an active lifestyle to which they are accustomed. The services that help to maintain good health and spirit in order prevent health from deteriorating are essential for individuals in the independent segment. The activity deficit segment needs services that help to maintaining health at a manageable level and foster meaningful life despite possible diseases. Finally, the frail elderly face trouble coping with everyday life. They need services to treat diseases, support daily tasks and activities and avoid depression. Continuous health monitoring is also an important service for the frail elderly to avoid further deterioration of health and/or hospitalization.

Descriptive information about the segments is provided in the ***Table 6***; the statistical significance of differences between segments is reported by χ^2-statistics. It can be seen that women, people over 80 years old and disease and disability become more common in the poorly coping segments. Indeed, the amount of women is emphasized in the frail segment due to longer life expectancy. Individuals in the independent and the activity deficit segments are most likely to live with their spouses, but the ratio is shifting toward living alone, especially amongst poorly coping elders. Almost half of individuals are living alone in the frail segment and 53.8% are living alone or with someone other than their spouse for different reasons. In addition, one third of those in the frail segment are widows. Furthermore, it is noticeable that over 95% of the frail segment takes regular medication, indicating common diseases and disabilities.

Table 6. Segment descriptive factors

Descriptive factor		*Independent*	*Activity deficit*	*Frail*
		%	%	%
Gender	Male	47.6	47.4	33.3
Chi= 6.805, p=.033	Female	52.4	52.6	66.7
Age groups	60–65	38.2	29.5	20.4
Chi =61.408, p=.000	66–70	29.9	26.7	17.2
	71–75	9.7	10.8	7.5
	76–80	8.1	6.7	9.7
	81–85	9.0	19.7	25.8
	Over 86	5.2	6.7	19.4
Regular medication	Yes	69.3	85.5	96.8
Chi =52.244, p=.000	No	30.7	14.5	3.2
Marital status	Married or cohabitating	75.9	62.2	46.2
Chi =41.035, p=.000	Divorced	5.9	9.0	14.0
	Unmarried	5.9	8.2	7.5
	Widowed	12.3	20.6	32.3
Living companions	Alone	21.7	33.9	50
Chi =38.046, p=.000	Spouse	68.9	57.3	41.3
	Spouse and other relatives	4.8	4.4	3.3
	Other relatives	3.2	3.9	4.3
	Other individuals	1.4	0.5	1.1
Living area	City centre	3.9	2.8	4.3
Chi =2.682,p=.848	Suburb	23.6	24.3	27.2
	Municipal centre	34.5	33.9	27.2
	Countryside	38.1	39.0	41.3
Living quarters	Apartment building	15.1	16.0	24.7
Chi =14.721,p=.023	Row house	19.2	17.6	15.1
	Detached house	65.7	66.4	59.1
Working status	Working	16.4	8.6	0
Chi =20.814, p=.000	Not working	83.6	91.4	100
Working position	Employer	1.2	0.5	0.9
Chi =47.537, p=.000	Sole trader	16.5	20.4	19.2
	Upper clerical worker	20.8	12.3	15.3
	Middle management	21.5	20.1	19.9
	Employee	37.8	42.4	40.7
	Worked at home	2.1	4.3	4.0
Need for transportation	Yes	7.7	25.3	55.6
	No	92.3	74.7	44.4
Chi =20.814, p=.000				
Car in household	Yes	887	78.2	56.7
Chi =54.029,p=.000	No	11.3	21.8	43.3

6.2 Service clusters

For each segment and for the entire target group, the service grouping was conducted with UCINET 6, using an iterative process. The iterations for clustering analysis were repeated with an increasing cluster count until the r^2 reached its limiting value (***Table 7***). In the other words, increasing the number of clusters does not provide more explanatory power for the cluster model. The conducted clustering analysis resulted in count of service clusters for customer segments as follows: independent 5, activity deficit 4, frail 5 and entire target group 4. This again indicates that different customer segments have different needs. After service grouping, the next phases identified each service's importance and centrality.

In the following subsections, the formed service clusters are discussed, first for the whole target group and then with an analysis of the each of the three customer segments. Service clusters names are based on the nature of the services they provide, and key descriptive figures are provided for each service bundle. Importance is an indicator of the need to have services close to home, and centrality describes the sum of the values of the ties the given service has with other services offered.

Table 7. Results of the optimization clustering

Iteration round	Number of clusters	Independent	Activity deficit	Frail	All respondents
		r-square			
1	2	0.307	0.258	0.178	0.360
2	3	0.360	0.300	0.243	0.410
3	4	0.398	**0.334**	0.279	**0.425**
4	5	**0.424**	0.351	**0.304**	0.431
5	6	0.433		0.313	

6.2.1   Service clusters for elderly people in general

This subsection's focus is on the service clusters that were identified for the whole target group. On the basis of the conducted clustering analysis, one clearly larger and three smaller service groups could be identified (*Table 8*). These include **time passing services** and **oral hygiene**, **telemedicine and rare guidance**, **essential healthcare and everyday life services** (essentials).

Seven hobby and culture-related services, such as culture, library and physical training, construct the time passing cluster. Oral hygiene entails, as in previous clusters, services provided by dentists and dental hygienists. Telemedicine and guidance entails three services: doctor's remote appointments, intoxicant and e-service guidance. In addition to these three smaller clusters, the essentials cluster was identified, which entails 32 healthcare, free time and errands. This cluster also includes guidance-related services, such as assistive device, different health guidance and laboratory services, banking, postal and grocery-related errands, and access to guidance services, such as social insurance and local health and social care districts. The the importance values for the identified service clusters can be arranged from less important to more important as follows: telemedicine and rare guidance (3.07), time passing (3.49), essentials (4.90), oral hygiene (5.58).

Table 8. Service clustering based on whole data

Cluster name	Cluster metrics		Service content
Service cluster 1: **Telemedicine and guidance**	Importance 2.87 Centrality 9.09	*Guidance*	E-Services
		Health care	Doctor's remote appointments Intoxicant guidance
Service cluster 2: **Time passing**	Importance 3.49 Centrality10.02	*Free time/ errands*	Beauty Congregations Culture Library Physical training Third sector services
		Guidance	Third sector
Service cluster 3: **Oral hygiene**	Importance 5.58 Centrality 11.90	*Health care*	Dentist Dental hygienist
Service cluster 4: **Essentials**	Importance 4.90 Centrality15.49	*Free time/ errands*	Assistance in banking Bank Barber/hairdresser Groceries Groceries (home delivery) Massage Post office Social services Social insurance institution
		Guidance	Forms Local health and social care districts Services by companies
		Health care	Social insurance Assistive devices (delivery) Assistive devices (guidance) Assistive devices (repair) Assistive devices (returns) Doctor's appointment Guidance on chronicle deceases Health guidance Health examination Laboratory results Laboratory sample Mental health service Occupational therapy Pedicure Pharmacy Physical therapy Prescription renewal Small scale medical operations Treatment equip (home deliv.) Prescrpt. medicines (home deliv.)

6.2.2 Service clusters for independent

Services were clustered into five groups for the independent segment (***Table 9***). **Time passing services** entail seven services, including culture and library services, all clearly related to free time and spending time alone or with a companion. **Telemedicine and oral hygiene** entails services provided by dentist and dental hygienist as well as doctor's remote appointments. Guidance services entail e-service guidance and intoxicant guidance. Another guidance cluster called **everyday guidance** entails five different guidance-related services that focus on, for example, social insurance and the local health and social care district. These four groups are small in size. The fifth cluster, **essential health care and everyday life** services (essentials), is clearly larger. Essentials consist of almost all the queried health care services, such as different assistive devices services, health guidance and laboratory services. In addition to these health care services, banking, postal, grocery and other everyday life services are included.

The service clusters can be organized from less important to more important in the following order: guidance (3.05), everyday guidance (3.37), time passing (3.91), telemedicine and oral hygiene (4.83) and essentials (4.85). Telemedicine and oral hygiene and essentials are clearly required service groups for individuals belonging to the independent segment in order to enable their living at home. Individuals in this segment are able to find the needed information from the Internet, from offices or from younger relatives; this makes guidance-related services less important. Relatively healthy customers have no need for guidance to medical incidents or social insurance. In addition, centrality in this group received the highest values, indicating convergent demands. Centrality values range from 6.57 to 17.02.

Table 9. Service packages for independent customer segment

Cluster name	Cluster metrics		Service content	Role
Cluster 1: **Time passing**	Importance 3.91 Centrality 12.21	*Free time/ errands*	Beauty	S
			Congregation	S
			Culture	S
			Library	S
			Massage	S
			Physical training	S
			Third sector services	S
Cluster 2: **Telemedicine and oral hygiene**	Importance 4.83 Centrality 11.75	*Health care*	**Dental hygienist**	**C**
			Dentist	**C**
			GP's remote appointment	**C**
Cluster 3: **Guidance**	Importance 3.05 Centrality 6.57	*Guidance*	E-services	F
		Health care	Intoxicant guidance	S
Cluster 4: **Everyday guidance**	Importance 3.37 Centrality 13.82	*Guidance*	Third sector	F
			Forms	F
			Local health and social care district	F
			Services by companies Social insurance	F
Cluster 5: **Essential everyday health care & errands**	Importance 4.85 Centrality 17.02	*Free time/ errands*	**Assistance to bank**	**C**
			Bank	**C**
			Barber/hairdresser	S
			Groceries	**C**
			Groceries (home delivered)	S
			Post office	**C**
			Social services	S
			The social Insurances	S
		Health care	Assistive devices (delivery)	S
			Assistive devices (guidance)	S
			Assistive devices (repair)	S
			Assistive devices (returns)	S
			Doctor's appointment	S
			Guidance on chronic deceases	**C**
			Health guidance	**C**
			Health examination	**C**
			Laboratory results	S
			Laboratory samples	S
			Mental health service	**C**
			Occupational therapy	S
			Pedicure	S
			Pharmacy	**C**
			Physical therapy	S
			Prescription renewal	**C**
			Small scale medical operations	**C**
			Treatment equip (home deliv.)	S
			Prescrpt. medicines (home deliv.)	S

[a]C/S/F indicates whether the service is core = **C**, supporting = **S** or facilitating = **F**

The independents perceive their health, life and ability to function as good. Indeed, age is emphasized in the under 70-year-old group and only 70% take regular medication. Independents might have some chronic diseases or disabilities but are coping on their own. Hence, the need for services focuses on maintaining health and functional ability. Maintaining current level of health, spirit and functional ability can be seen as a primary need. A secondary need would be to live independently at home. In other words, it is essential to offer them core and supporting services that satisfy both primary and secondary needs and thus produce value for them.

Core services help to maintain good health (guidance and information) and are related to everyday life errands (grocery, banking and postal services) in this segment. Availability of health care services is important for individuals who are willing to use both traditional and remote appointments (video conference). Unexpectedly, telemedicine was not rated as important; this may be explained by novelty and low penetration of services amongst elderly people. On the other hand, elderly individuals prefer to handle their errands face-to-face due to perceived convenience, which is another explanatory factor.

Supporting services are directed to ease daily errands or to provide substance to people's lives. The services that support everyday life are found in the time passing, life supporting and guidance categories. Time passing consists of services that are not used on a daily basis, but they provide ways to pass time and facilitate social interactions. The life-supporting services provide value, since the benefits of routine is high, as those are needed on regular basis, such as getting groceries, laboratory samples and results, assistive devices-related services, medicines or treatment equipment. Indeed, supporting services are also needed occasionally for social services, assistance with banking, barbers/hairdressers and physical and occupational therapy. Intoxicant guidance was not rated as important. It would be beneficial if threshold to use is made as low as possible.

Facilitating services improved user experience and the penetration of services in the independent segment, such as guidance on local health and social care, social insurances and filling forms or e-services.

6.2.3 Service clusters for activity deficit

Four service groups were identified for the activity deficit segments, which are essentials, time passing, basic care and guidance and care (see Table 10). The essentials include services relating to medicines, assistive devices, health related guidance and laboratory services. In addition to healthcare-related services, free time and errand services, such as social services and visiting the social insurance institution is integrated into the essential cluster. The essentials cluster also involves guidance services about social insurance, forms and the local health and social care district. The six services constructing time passing comprise services such as physical training, culture and library services. Similar to the independent segment, these services are related to hobbies and free time. An interesting cluster is the basic care cluster, which consists of banking, postal, grocery, and barber or hairdresser services, are all clearly related to running errands. A doctor's appointment is part of the basic care cluster. In guidance and care, one can find, in addition to dental and dental hygienist services, doctor's remote appointments and e-service guidance.

The service clusters can be organized in the following order from less important to more important: time passing (3.40), guidance and care (4.51), essentials (4.91) and basic care (6.05). Adequate access to the healthcare-related services is important for the activity deficit segment, which comprises a group of individuals with slight diseases. Due to possible constraints on mobility, accessibility and availability of services at close proximity increases. Centrality values range from 8.76 to 14.81 when the essentials are the most central (14.81). This is followed by basic care (11.48), time passing (10.60) and guidance and care (8.76). The cluster metrics indicate that importance for core services grow during natural aging, but needs become more focused, emphasizing that particular health-based problems are being faced.

Table 10. Table service packages for activity deficit customer segment

Cluster name	Cluster metrics		Service content	Role
Cluster 1: Guidance & Care	Importance 4.51 Centrality 8.76	*Guidance*	E-services	F
		Health care	**Dental hygienist**	**C/S**
			Dentist	**C/S**
			Doctor's remote appointments	**C/S**
Cluster 2: Basic Care	Importance 6.05 Centrality 11.48	*Free time/ errands*	Bank	S
			Barber/hairdresser	S
			Groceries	S
			Post office	S
		Health care	**Doctor's appointment**	**C/S**
Cluster 3: Essential everyday health care & errands	Importance 4.91 Centrality 14.81	*Free time/ errands*	Assistance to bank	S
			Groceries (home delivered)	S
			Massage	S
			Social services	S
			The Social Insurances	S
		Health care	**Assistive devices (delivery)**	**C**
			Assistive devices (guidance)	**C**
			Assistive devices (repair)	**C**
			Assistive devices (returns)	**C**
			Guidance on chronicle deceases	**C**
			Health guidance	**C**
			Health examination	**C**
			Laboratory results	**C**
			Laboratory sample	**C**
			Mental health service	**C**
			Occupational therapy	**C**
			Pedicure	**C**
			Pharmacy	**C**
			Physical therapy	**C**
			Prescription renewal	**C**
			Small scale medical operations	**C**
			Treatment equip (home deliv.)	**C**
			Prescrpt. medicines (home deliv.)	**C**
		Guidance	Third sector	F
			Forms	F
			Local health and social services	F
			Services by companies	F
			Social insurance	F
Cluster 4: Time passing	Importance 3,40 Centrality10,60	*Free time/errands*	Beauty	S
			Congregations	S
			Culture	S
			Library	S
			Physical training	S
			Third sector services	S
		Health care	Intoxicant guidance	S

[a]C/S/F indicates whether the service is core = **C**, supporting = **S** or facilitating = **F**

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Individuals in this segment have slightly decreased perceived health, yet they are able to manage everyday tasks, and they are enjoying life. Their age varies evenly from 60 to 85 years; a third of them are living alone, and 85% have regular medication. A majority live alone due to their marital status being unmarried or widowed. The oldest ones who are living alone particularly require services to be in close proximity to home, since they do not have the strength to walk long distances. This segment's individuals require services that help them maintain their health at a manageable level and enable them have a meaningful life despite their illnesses. The *primary needs of the activity deficit group* are maintenance of current health status and prevention or alleviation of future diseases. Their *secondary need* is to have substance and ease in their everyday lives that contrast their troubles.

Core services in the activity deficit segment intertwine around activities to support disease management and to alleviate functional decline. A doctor's appointment is a core or a supporting service depending on the health of the customer. For better coping, a doctor's appointment is a supporting service, but if the person's condition is poorer, it should be considered a core service. For the activity deficit segment, the primary needs are health laboratory services, health examination, pharmacy services, health-related guidance, occupational and physical therapy, mental health services, home-delivered treatment equipment, small-scale medical operations, pedicure and assistive device-related services; these are core services.

Supporting services cover activities from time passing to health care and errands. Time passing services for the activity deficit segment alleviate social isolation, enabling regular meetings with friends, relatives or other peer groups. The health care services (dentist, dental hygienist and doctor's remote appointments) are supporting services in the customer segment, but there is variation depending on health status with this segment. Errands-related services are clearly supporting services, since they enable easier everyday life. Errands relating to massage, the social insurance institution, social services, home-delivered groceries and assistance in banking are

supporting services, since they ease the everyday life of individuals in the activity deficits segment.

E-service guidance is a facilitating service. It can be argued that for well-coping Activity deficits, this service package consists of supporting and facilitating services. However, for the individuals with poorer health, this package consists of three core services and one facilitating service. Guidance relating to local health and social care district, social insurance, forms and services by companies and the third sector are facilitating services, as the information received from them enables the use of core services.

6.2.4 Service clusters for the frail

Five service clusters was identified for the frail segment (*Table 11*). The **background service** cluster entails services relating to free time and errands, guidance and health care. These are services that are 'in the background' of other services; they are not so important but are used every day and therefore still necessary. **Culture and guidance** is a cluster comprising culture, library and intoxicant guidance services. **Basic care** is a cluster containing services that are important in managing basic condition and life in general, including banking and postal services, the social insurance institution and different health care services that are needed somewhat often. In **keeping up**, one can find services for spending time (massage, physical training) and maintaining health (health guidance and different therapy services), which are related to keeping the spirit and condition up.

Table 11   ***Table Service packages for the frail customer segment***

Cluster name	Cluster metrics		Service content	Role[a]
Cluster 1: Background	Importance 3.13 Centrality 5.21	*Free time/ errands*	Congregations	S
			Third sector services	S
		Guidance	E-services	F
			Services by companies	F
			Third sector	F
		Health care	**Doctor's remote appointments**	**C**
Cluster 2: Culture & Guidance	Importance 3.31 Centrality 0.72	*Free time/errands*	Culture	S
			Library	S
		Health care	Intoxicant guidance	S
Cluster 3: Basic care	Importance 5.99 Centrality 6.51	*Free time/ errands*	**Bank**	**C**
			Groceries	**C**
			Post office	**C**
			Social insurance institution	**C**
		Health care	**Dental hygienist**	**C**
			Dentist	**C**
			Guidance on chronicle deceases	**C**
			Health examination	**C**
			Laboratory results	**C**
			Laboratory sample	**C**
Cluster 4: Keeping up	Importance 4.58 Centrality 7,74	*Free time/errands*	Barber/hairdresser	S
			Beauty	S
			Massage	S
			Physical training	**C**
		Health care	**Health guidance**	**C**
			Mental health service	**C**
			Occupational therapy	**C**
			Pedicure	**C**
			Physical therapy	**C**
Cluster 5: Essentials	Importance 5.62 Centrality 9.42	*Free time /errands*	**Assistance in banking**	**C**
			Groceries (home deliv.)	**C**
			Social services	**C**
		Guidance	Forms	F
			Local health/social care district	F
			Social insurance institution	F
		Health care	**Assistive devices (delivery)**	**C**
			Assistive devices (guidance)	**C**
			Assistive devices (repair)	**C**
			Assistive devices (returns)	**C**
			Doctor's appointments	**C**
			Pharmacy	**C**
			Prescrpt. medicines (home deliv.)	**C**
			Prescription renewal	**C**
			Small scale medical operations	**C**
			Treatment equip (home deliv.)	**C**

[a]C/S/F indicates whether the service is core = **C**, supporting = **S** or facilitating = **F**

The essentials service cluster can also be identified for the frail segment, but it is much smaller than the two previously mentioned essentials clusters. This is because the individuals have more diseases, which limit daily activities. The services the frail segment requires appear most often in this cluster. This service cluster entails errands services (home-delivered groceries, social services and assistance in banking), guidance on forms and regarding different health authorities, health care services relating to assistive devices, medicines, doctor's appointments, medical operations and home-delivered treatment equipment. Overall, clusters containing health care services are the most important in terms of proximity to the home.

Individuals in the frail segment perceive their health and quality of life, as well as their functional ability, to be low. The age distribution is as follows: 40% are 60–70 years old, 15% are 70–80 years old and 40% are over 80 years old. Thus, the frail segment does not comprise individuals from a homogenous age group; level of disease determines whether a person belongs to this segment. Half of them are living alone due to being unmarried or widowed. Almost all individuals in this segment take regular medication, which indicates the existence of disease or disability. Furthermore, over half of the individuals in this segment require transportation, whereas mobility is not such a serious issue in independent and the activity deficits segments.

The frail segment needs more services just to manage diseases and disabilities. The *primary need* of the individuals in the frail segment is to manage diseases without being hospitalized, and the *secondary need* is to have substance in their lives.

All the health care services clearly satisfy the primary need of managing diseases and preventing deterioration in the frail segment. It can be argued that the 10 health care and three errand services are core services because the frail require help in many of life's aspects. Healthcare services are medicine-related services, assistive devices-related services, home-delivered treatment equipment, small-scale medical operations and doctor's appointment. Errands are social services, assistance in banking and

home-delivered groceries; guidance is concerned with forms, the social insurance institution and local health and social care districts. A doctor's remote appointment can be seen as a core service because these individuals require much more medical attention compared to those in the independent and activity deficits segments due to their illnesses and disabilities. Although they might not be used to telemedicine and might prefer face-to-face service, a doctor's remote appointment is essential if a regular doctor's appointment is not possible. Keeping up, essentials and basic care are the most important service packages to have in close proximity. Based on the determined primary and secondary need, the basic care service package is a package of core services. All of the nine services discussed are very important for those individuals in the frail segment, since they have trouble moving on their own and need a considerable amount of help; therefore, all of these services should be accessed easily. Physical training is arguably a core service because it is needed to maintain good general health, which helps the human body to cope better.

Supporting services bring substance to lives of those in the frail segment. Cultural services, such as barber/hairdresser, beauty and massage, bring substance to lives. Intoxicant guidance provides supporting health care services if the need for this kind of service emerges. Three guidance services are facilitating services, but their role differs from other segments because those involve care processes and compliance with care plans. Guidance services, as in the previous cases, are facilitating services, since they make it possible for individuals in the frail segment to use core services.

7 DISCUSSION AND CONCLUSIONS

The aim of this research was to answer to the research question, 'How do we bundle services based on different customer needs?' This research is an analysis of the value and content of local service offerings that enable longer periods of living at home for elderly people. A research process consisting of three main phases was applied for this purpose. During this process, elderly customers were segmented, the importance of services was rated and service offerings were defined. The analysis relies on

survey research conducted for those 60–90 years in age living in South-Eastern Finland. The service analysis was accomplished using a social network analysis method that focuses on relationships between network entities—service items in this case. Finally, customer oriented local service offerings were described regarding core, supporting and facilitating services needed.

Service offering should consist of a service concept, a service package, which entails core, facilitating and supporting services, and the actual offering in which the service package is tied to its delivery and consumption (Grönroos 2000). From value perspective, the service concept means the benefits provided to the customer by the provider (Edvardsson and Olson 1996). Edvardsson and Olson maintain customer satisfaction is fully gained when both primary and secondary needs are satisfied. The core service is the reason for the company to operate in a given market, and this should also satisfy customers' primary needs. Supporting services satisfy customers' secondary needs. In other words, in order to produce the maximum value to the customer, the provider's offering needs to fulfil the customer's primary and secondary needs in a way that the service provider is providing more benefits than losses.

The value being generated varies in service provision because customers compare outputs to the features that are valuable in fulfilling their needs. Therefore, service providers must be able to customize the service functions when producing services or offerings. It also worth noting that service production is not limited to particular activities; it needs interaction and achievements to provide comforting experiences. Customers are seen co-creators in the value in service provision, and they make an effort to create the value they receive. For instance, the value received from a health examination is jointly produced in mobile clinics. The customer has to use their time and effort towards transportation by coming to the healthcare clinic's location (fixed or mobile), answering questions asked by medical professionals and performing tasks required by that medical professional (opening one's mouth, undressing or giving permission to conduct different tests). The overall value is perceived by the customer

as a balance between health benefits they receive and the sacrifices (transport time, expenses) and discomfort of service they experience during usage.

Service can be produced and consumed three ways, self-service, pre-service and traditional service, which do not depend on whether services are individual activities or bundles. A service bundle comprises all these three service characteristics. It can be a homogenous bundle or a mixture of two. Pre-service means that the service providers perform some tasks that were previously the customer's to handle. Self-service is the opposite of this; the customer is both the provider and the consumer. Traditional service indicates a service encounter where service is produced in co-operation with the customer and the provider. These are strategies from which the service provider can choose, but they should all focus on satisfying customer needs and providing value to the customer. In this research, the mobile health services provide a way to implement a direct service strategy efficiently, and this is seen as important in health care contexts.

The empirical analysis shows that each customer segment needs to be discussed individually regarding the provided needs, demands and service content. Different customer needs require different services in order to have their primary and secondary needs satisfied or to perceive customer value. Therefore, the outcome is not identical for every segment. The service clustering process was also first conducted for the general population of elderly people. However, it is trivial to discuss which services are core or supporting because the primary and secondary needs cannot be sufficiently defined for whole target group. However, we found that four service packages (telemedicine and guidance, time passing, oral hygiene and essentials) are important to have in close proximity.

The segment-specific service analysis and comparisons reveal features of service demand in population. We note that functional disabilities set higher standards for service accessibility because the highest cluster importance is found in the activity deficit and the frail segments, which were clearly higher than independent. The

generic service combinations seem to be in the essential health care and everyday life services, which can be found both in the independent and in the activity deficit segments. The activity deficits' essential service contains almost all the queried health care services as the independent segment. However, the content of the essentials cluster differs slightly between independent and activity deficit customer segments due to varying primary service needs. It is also important to notice that the average value of the most important service package is significantly higher in the activity deficit segment than in that of the independent segment. The most remarkable feature of service demand in the frail segment is an emphasized need for acute health care and active support in daily living because of clear declines in health status.

The centralities of service activities were analysed to recognize components which are influential to workable service construction. The highest centrality measurements vary from 17.02 for independents to 9.42 for the frail segment 15.49; activity deficit (14.81) and whole target group (15.49) are in the middle range. The results show demands are more focused amongst elders of lower health status; this can be seen in decreasing average centrality when moving from the well coping to poorly coping segments. Furthermore, an unambiguous definition for valuable service bundles is difficult for well coping individuals, because demand is scattered and multiple service combinations are likely to fit different needs. The Frail segment is opposite from bundle definition perspective, because primary needs cover limited number of health related services.

This research has certain limitations. First, customer segmentation is based on self-rated measures for which influence of functional decline is not absolute because individuals perceive their health differently regardless of diseases observed. On the other hand, those coping well might not have answered the questionnaire, since they may have found it irrelevant or unimportant. Likewise, some of the poorly coping did not answer due to their health conditions, or their answers were excluded due to incomplete answers. Second, customer segments differ considerably in size. This might cause some inconsistencies in the frail segment's results, since it is such a

small segment. Third, the analysed services were bound to the given field of health care, and importance ratings are likely to be biased, depending on a particular living context.

8   RECOMMENDATIONS FOR PRACTICE

The service analysis shows that elderly people are not a homogeneous group to which similar services can be offered. Needs based on respondent health, quality of life and ability to function vary significantly and require unique service bundles for each segment in order to satisfy primary and secondary needs. Therefore, customer segment identification is key to service bundling. The findings show different customer needs lead to different core and supporting services, and three aspects of implementation lead to different service bundles. We argue that following four steps must be taken to create truly valuable services in health services.

(1) Find out what customers need and want

(2) Segment customers based on their background and health status

(3) Identify the primary and secondary needs of each segment

(4) Form service packages to cover core, facilitating and supporting services

We found several customer-based factors to use as a future service package definition; this will enable more advanced service experiences for health service users. Assessment of the customer health status and potential depression is a key factor. The service offering need to function for different segments as follows:

(1) The well-coping elderly value wide service offerings with multiple functions.

(2) The frail elderly benefit most from services focused on particular problems.

(3) Value is created through ease of tailoring to fit services to health status.

The service packages that include core services are those that the service provider should always provide. In addition, facilitating services need to be offered, since they enable the customer to use and benefit from the core services. We argue that

providing services equal to customer value expectations requires a combination of core services and facilitating services. The supporting services can be offered to complement core and facilitating services if increasing the service level provides additional benefits to the customer. Ease of access is also important factor in terms of the perceived value of a service package offered. Thus, the service provider needs to be easily reachable and the service must be easily consumable. Service providers should provide sufficient opening hours, staff members, easy access to the service location and ease of communication to provide value for the customer.

Finally, the creation of unique value and the recognition of attractive offerings may require long term assessment of the customers; this can done in two ways:

(1) Analysing customer characteristics and segmenting customer (demography, health status, etc.) to build generic service offerings fitting broad markets
(2) Analysing usage behaviour to provide a basis for profound understanding on features of offerings and for profiling customers to enable targeted service provision

The profiling of customers is a more agile approach that helps to develop a more acceptable service model for a mobile healthcare unit. By profiling, the service provider can combine the information received from the customer, such as diseases, medicines and allergies that may influence the patient's further behaviour and needs. Profiling may provide a method to improve the value of a service experienced if profiles are linked to care processes. For example, appointments at mobile clinics can be tailored to the patients prior to actual service encounters. The service in this case focuses better on actual problems of the customers when it is connected to other service the customers most likely need. Hence, services based on profiling would better answer the customer's needs and also provide unique satisfaction and value in health care applications.

In summary, different logics for profiling customers can be applied to create various complementary operational modes for mobile clinics. This enables us to propose three operational modes that differ by their locus of services and the ability to integrate operations as follows.

(1) Single service mode
(2) Bundle mode
(3) Integrated service mode

Single service mode represents the current predominant logic for organizing mobile units' service provision. Service emphasis is on single service contents (e.g. dental care) at the time. Further, the scope of activities is often limited and integrated care paths are not directly supported by this mode. Bundle mode involves grouping of services into one offering within the mobile service unit. Bundle mode enables answering mixtures of customer needs that is customers can make use several services while visiting a mobile unit. The main distinction of the integrated service mode, in relation to the two earlier modes, is in that it supports the realization of integrated care pathways. A mobile clinic operates as a mobile health station. This means combining core and complementary services along with the pre-service, service, after-service continuum. The selection of an appropriate mobility strategy in service provision requires that a profound customer profiling is combined with the overall service supply network. Customer acceptable mobile service models might require a mixed-mode approach, where different mobile units perform a substitutive or complementary role in relation to fixed and electronic service channels.

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