2 Theoretical foundations of silver agers and user involvement

2.1 Demographic changes and the establishment of the silver market

2.1.1 Ageing societies

Most countries, and Western countries in particular, are experiencing the demographic ageing that results from increased life expectancy and/or decreased fertility rates. This trend poses a challenge for societies on many levels. First of all, the share of the population who are in the active workforce will decrease under the current retirement legislation. This leads to a projected increase in dependency ratio in Europe from 42 retirees above 65 years per 100 workers to 65 in 2060 (Samuel, 2016). Dependency ratio is the ratio of the number of people claiming retirement benefits versus the number of people paying income tax. Furthermore, governments have to bear the higher social healthcare costs of an ageing population. Higher pension obligations and healthcare costs put pressure on taxation levels for the remaining working population, i.e. income tax payers. Another controversial issue is the impact of demographic ageing on the supply of skilled workers. A widely held position is that without significant immigration, companies will face a shortage of workers ('Fachkräftemangel', Allmendinger & Ebner, 2006). Others argue that technological progress, e.g. through the digitisation trend, will make some work activities obsolete, reducing the need for labour (Hank & Meck, 2016).

Despite these challenges, an economic opportunity is emerging. The new target group can be addressed by both consumer products and services, including age-based, specialised designs, such as rollators, and universal products marketed specifically to silver agers, such as travel offerings. Due to longer life expectancy and more active lifestyles, in combination with sufficient purchasing power, this silver-ager generation sets itself apart from previous generations. Thus, silver agers present an attractive target group and business opportunity for consumer product or service companies. The detailed characteristics of silver agers are elaborated in the next section.

2.1.2 Characterisation of silver agers

Attempting to draw a unitary picture of the silver ager is difficult as they are a very heterogeneous group (Kohlbacher et al., 2011). Instead, this chapter aims to look at silver agers from different perspectives. *Silver agers* is not the only term for this target group of elderly consumers. They are also known as *Generation 55+, Best Agers* or *Golden Agers*. Besides different names, there are also different approaches to delineate this market segment. Chronological age is the most obvious method of segmentation. Here, a

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frequently applied threshold is the retirement age, which is between 60 and 67 years in most countries. Retiring imposes significant changes on peoples' personal lives. It marks a transformation from a period of maturity, earning and responsibility (dubbed 'second age') to a phase of more individualistic personal achievement and fulfilment, called 'third age', followed by a 'fourth age' of dependency and decrepitude (Laslett, 1987). The historian Laslett (1987) introduced the idea of this so-called third age, which emerged in the 1950s after life expectancy rose far above retirement age. However, Laslett does not provide fixed chronological age thresholds for the commencement of the third age or silver age. For several reasons, age thresholds are not undisputed. First of all, people age at different speeds. Thus, the older people are chronologically, the more varied the spread in 'real' age terms. This raises the issue of cognitive age versus chronological age. The concept of cognitive age challenges the 'predictive power' of chronological age to accurately describe elderly people (Barak & Schiffman, 1981; Eastman & Iyer, 2005). Cognitive age represents self-perceived age in terms of the subcategories of emotions, biological status, societal perception and intellectual capabilities (Barak, 2009) and has been shown to explain the behaviour of older consumers (Kohlbacher & Chéron, 2012). Older people tend to perceive themselves as eight to fifteen years younger than they chronologically are (Cleaver & Muller, 2002). Nevertheless, as cognitive age is non-observable, marketers face difficulties in addressing silver agers by cognitive age segmentation. Thus, for the course of this study, I acknowledge the limitations of silver-ager target group delineation by chronological age but define silver agers as being above 65 years for reasons of simplicity.

Silver agers are an attractive customer group. Demographic ageing in the developed world is increasing the number of silver agers. By 2030, the share of silver agers aged 65 and above will almost double, from 18% in 2000 to 30% in 2030 (United Nations, 2013). Whereas demographic ageing started years ago in the developed world, it is now also gathering pace in less developed regions (ibid.). Silver agers are considered to be financially well situated, making them a good target for consumer product companies. This is borne out by statistics showing that disposable income peaks right before retirement due to steadily increasing incomes and relatively low housing costs (e.g. more than 50% of over-65s own a mortgage-free house, compared to 26% on average (Foster, 2015)). However, income equality is greatest for silver agers (Crystal & Shea, 1990). On average, silver-ager households had a private consumption spending level of €26,779 per household in Germany in 2013 (Statistisches Bundesamt, 2013). This is 91% of the average household income in Germany (not shown), which can be attributed to the lower

average number of persons per household (1.5 for silver agers vs. 2.0 on average for all households). Thirty-eight per cent of this consumption spend can be attributed to Living, which includes housing costs (see Figure 3). Food (13%), Leisure & Entertainment (11%) and Mobility (11%) are the next subcategories, in descending order.

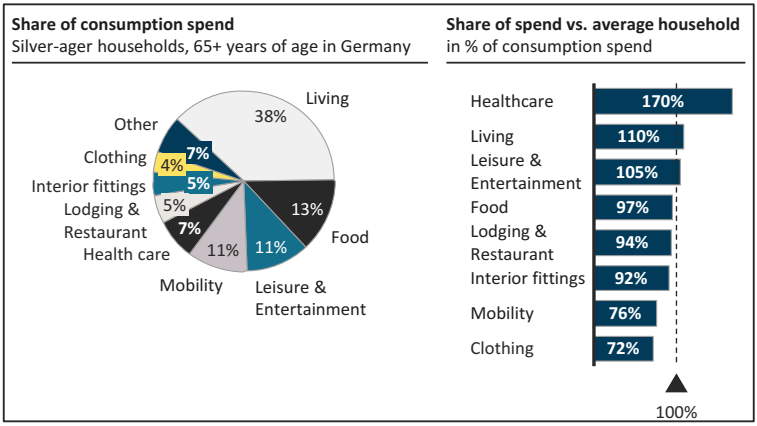

Figure 3: Silver-ager consumption, source: own depiction based on Statistisches Bundesamt (2013)

The right-hand side of Figure 3 shows the differences in consumption between silver agers and average households (adjusted to total consumption). As expected, healthcare spending is 170% of the average household spend; this includes both goods and services. Interestingly, Leisure & Entertainment is higher than for average households (105%). Therein, the largest subcategory is all-inclusive holidays, whose share is 140% of average household consumption. At the lower end are Interior fittings (92%), Mobility (76%) and Clothing (72%). Thus, it can be concluded that, per capita, silver agers have significant consumption wealth at their command, which is spent selectively. As most silver agers receive retirement benefits, their consumption behaviour is less dependent on economic cyclicality (Pompe, 2011).

Silver agers are exposed to physiological changes over time. This results in a perceived and actual physical, cognitive and mental health decline (Peine et al., 2014). Cognitive decline can lead to lowered cognitive flexibility, problem-solving abilities and motivation (Reinicke & Blessing, 2007). This is caused by an increase in crystalline intelligence and a decrease in fluid intelligence, which is associated with deductive reasoning and the ability to solve problems (Anderson, Funke, & Plata, 2007). In product development, this

is reflected through the approaches of biological gerontology and human factor research, which results in product development guidelines and recommendations taking into account lower ability/strength levels in new product development (Fisk, 2009; Howard & Howard, 1997). Product philosophies such as inclusive or universal design (Demirbilek & Demirkan, 2004; Farage, Miller, Ajayi, & Hutchins, 2012) aim to incorporate potential customer limitations in order to increase the potential reach of new products or services. Inclusive design is defined as "the design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible without the need for special adaption or specialised design" (British Standards Institute, 2005). However, the potential issue with these physical and/or mental ability centred approaches is that they give a simplified picture of customer needs by excluding wants and wishes that are not related to physical decline.

Silver agers or elderly persons are assigned with typical characteristics or behaviour patterns which can be subsumed as stereotypes; these can have positive as well as negative attributes. In the latter case, a recall of elderly people's characteristics is solely focused on negative, deficiency centred attributes. This is referred to as ageism (Minichiello, Browne, & Kendig, 2000). With the *Ageing Semantic Differential,* there is even a validated scale to assess the stereotypical attitudes young people have towards older adults (Gonzales, Tan, & Morrow-Howell, 2010). These include, of course, an impression of mental and physical limitations, but also reluctance to learn, which was also found for product developers (Hummert, 1994). They are also perceived to be 'quickly overburdened', lacking the ability to 'think conceptually' and as giving 'please-me answers' as opposed to their real opinion (Neven, 2011). Experimental studies proved that young people have negative associations with the idea of being old (Perdue & Gurtman, 1990).

In conclusion, the silver-ager market provides ample opportunity for consumer product and service companies. The silver-ager target group appears to be highly heterogeneous, and this has to be taken into account in product development, including, for instance, ageing-related declining physical and mental abilities. Ageism and stereotypical views are widespread. Universal and inclusive design are design philosophies that include silver agers as product and service consumers. However, focusing on customer limitations would seem to be short-sighted, as silver agers perceive themselves, on average, as younger than they are, which implies with fewer limitations.

2.1.3 Silver agers as a distant target group

Silver agers are adduced as an example of a distant target in this study. Here, the question emerges as to what creates this distance. Studies on the reasons for distance between people emerged as early as the beginning of the nineteenth century. Bogardus (1933) developed a scale for the measurement of social distance and attitudes towards different races, jobs and religions. The underlying principle behind the Bogardus scale is that the more prejudiced an individual is against a particular group, the less that person will wish to interact with members of that group (Dawes, 1972; Geisinger, 2010). As discussed above, ageism is a widespread phenomenon that is potentially associated with social distance. In addition to the above-mentioned factors, social class and nationality dimensions were also found to be determinants of social distance eventually leading to prejudice (Triandis & Triandis, 1960). Generally, attributes of members of social groups are memorised less well if they are distant, i.e. not perceived as an in-group member (Park & Rothbart, 1982) in any dimension, which includes age.

Silver agers are defined as being above 65 years of age for the course of this study. The effective retirement age in Germany is 62.7 (OECD, 2014). Thus, silver agers are unlikely to still be part of the workforce, and product developers are unlikely to have them as colleagues.

2.1.4 Age-based innovation for silver agers

Innovation by definition connotes an element of newness (Rogers, 2003; Van de Ven, 1986) and refers to new products, services, software or processes. Successful innovations create value, i.e. providing a solution for a customer need (Terwiesch & Ulrich, 2009). An innovation comprises of an invention, as innovating means establishing inventions on the market (Gaubinger, Rabl, Swan, & Werani, 2015). Age-based innovation delineates itself as the market focus is on older people, which does not automatically exclude other target groups (Iffländer, Levsen, Lorscheid, Pakur, & Wellner, 2012). In the light of the physical or mental limitations of the silver-ager target group, Kohlbacher et al. (2011) stress the fact that this target group's customer needs differ from the wants of younger customer groups. Thus, they put forth the overarching theme of *need for autonomy* that is satisfied with age-based innovations (ibid.). One example would be an innovation in the area of luggage trolleys at airports, which would allow potentially weaker silver agers to be able to travel independently. For the course of this study, age-based innovation is not limited to autonomy regaining facets of innovation as this would implicitly exclude innovations that solely aim to increase general customer value for silver agers, irrespective of any

limitations they might be exposed to. Thus, 'age-based' is defined as "products and services developed and marketed taking into account needs and preferences of people of old age" (Iffländer et al., 2012, p. 13).

2.2 User involvement in new product development

This section introduces and defines the central terms related to new corporate product development and gives an introduction to user-involvement activities and approaches.

2.2.1 Innovation management, fuzzy front-end of innovation and idea generation

New product development and portfolio management is paramount for company success (Cooper, Edgett, & Kleinschmidt, 2001). Hence, balanced product portfolios should contain a certain share of new products. Innovation comprises the development and implementation of new ideas by people in organisations (Van de Ven, 1986). Innovation is the process of bringing inventions (new products or services) to the market; this emphasises its commercial and operational character (Gaubinger et al., 2015). There are many approaches to structuring innovation in organisations, and different concepts have evolved over time (Rothwell, 1994). One renowned process model is the Stage-Gate process by Cooper (1990). This process consists of several stages, in which innovation activities take place, and gates, in which go/no-go decisions on the follow-up of ideas or projects are made. It requires the generation or acquisition of valuable ideas, concepts or prototypes and the pursuit of them up until market introduction (see Figure 4).

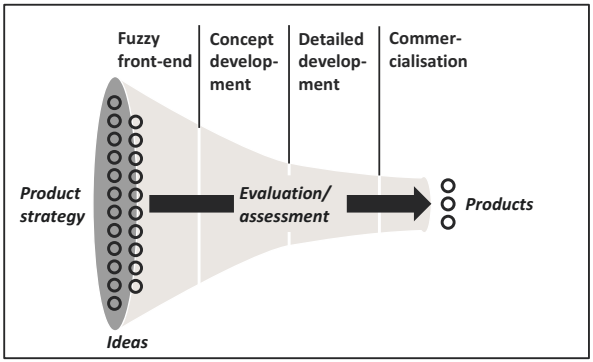

Figure 4: Ideas-to-products, source: own depiction

The initial stage is often referred to as the fuzzy front-end of innovation, due to the high degree of uncertainty in this early phase of development. Improvements at this stage are

associated with the highest benefits concerning overall innovation success (Cooper & Kleinschmidt, 1994; Khurana & Rosenthal, 1998). It is characterised through product strategy formulation, opportunity identification and assessment, idea generation, product definition and project planning (ibid.). It closes with an executive review ('gate'), which dismisses unpromising initiatives. The concept development phase and the detail development phase follow (see Figure 4) and also close with go/no-go decision gates.

The fuzzy front-end of innovation revolves around two central activities: generating new ideas and concepts and selecting the most promising ones to be pursued further (O'Hern & Rindfleisch, 2009). Idea generation in this context can be characterised as the systematic search for new product ideas. If these appropriately address customer needs,[2] they are a critical success factor for the future financial success of the product (Cooper & Kleinschmidt, 1987). Both idea generation and assessment are in focus of this dissertation.

2.2.2 Meeting customer requirements

Innovating companies are urged to integrate the 'voice of the customer' into new product development (Griffin & Hauser, 1993), i.e. to translate specific customer needs into product specifications. Failure to meet customer needs, i.e. to build products or services on false assumptions, can result in dramatic losses. A classic case of not meeting customer demands and the resulting failure is the introduction of the Ford Motor Company's Edsel model in 1957. Although market research and sales measures were undertaken, the model did not sell. The cause was that company managers overlooked the fact that consumer preferences had shifted towards more lifestyle orientation (Brooks, 2014; Drucker, 2014). Production was stopped two years later and, as a result, Ford's losses increased to the level that, for every car sold, they made an additional loss equivalent to the sale price of that car (Brooks, 2014).

The process of creating an accurate customer-centric representation in ideation involves the internalisation of customer needs. This empathising process does not take place in a vacuum but depends on existing customer knowledge, individual life experience paths and cognition. Identified needs, in conjunction with adequate customer representation, are reflected in new products or services that are supposed to cater for these needs in the best possible manner. From this perspective, the resulting products and services can be regarded as physical or virtual materialisations based on these individual customer

[2] Customer needs/requirements are used interchangeably in this dissertation

representations. Needless to say, the materialisation in the design can deviate from the actual needs, e.g. through initial misperception of needs leading to wrong user representations or through imprecise translation into the actual product. Additionally, developers embed a specific usability pattern, i.e. how they envision the customer using the product, into the design (the so-called 'script') (Akrich, 1992), which may or may not fit the actual usability preference of the user. In conclusion, the correctness of the user representation has a significant impact on customer-centric new product designs, leading to product innovation success or failure.

2.2.3 User involvement to meet customer needs

User involvement is defined as systematic approaches or interactions with users in order to provide user-need knowledge for use in new product development. Innovation literature in this field lacks conceptual clarity in the definition of central terms, e.g. user involvement and co-creation are partially used interchangeably (Gemser & Perks, 2015). For the course of this work, I define co-creation as a specific form of user involvement, i.e. as a user-involvement approach in which the user *actively* contributes to the creation and selection of new product or service offerings (O'Hern & Rindfleisch, 2009). In contrast, analysing collected customer data for new product development, such as complaints, represents a form of passive, non-co-creating user involvement (Brockhoff, 2003).

User involvement leads to interactions with users in the fuzzy front-end of the process and can help to reduce the fuzziness in corporate innovation processes (Alam, 2006). Projects conducted with a high intensity of user involvement in ideation have a significantly increased chance of project success (Gruner & Homburg, 2000). From an individual product developer's perspective, user involvement supports the creation of accurate representations of users through the accumulation of knowledge on customer needs.

2.2.3.1 Development history of user involvement in new product development

User involvement has been practised for several decades. As early as the 1970s, Hippel (1976) reports of users of scientific instruments contributing to new product development. Apart from in industries with highly specialised products or services, user involvement, in terms of user input into the product development process, was barely evident until the 1960s (Rothwell, 1994). New product development processes were structured linearly, like manufacturing belts, satisfying soaring product demand in the years after World War II. By the 1970s, when the years of supply shortages were finally over, the consumer product markets shifted to a more demand-driven state in which

there was an excess of product supply, giving consumers a choice as to which product to buy. Thus, rivalry increased, leading to producers competing for market share by addressing customer needs more precisely with their products. As a consequence, product variety greatly increased. In parallel, this change was mirrored in corporate innovation practice as 'market pull' and iterative new product development processes were introduced (Rothwell, 1994), emphasising customer focus. Furthermore, user-involvement practice evolved in terms of the stage of the new product development process at which user input was sought, from user tests right before market launch to user involvement in the early phases of product development. Until then, it had been implicit practice that integrating the voice of the customer into new product development was left to the product developers (McDonagh-Philp & Formosa, 2011). With increasing product variety and increased research and development efforts, reducing the number of market failures was of preeminent importance. Subsequently, prototype and concept testing with users prior to market launch were intensified. Supported by concepts like user-centred design, user-involvement practice was gradually shifted into earlier phases of new product development process, including the fuzzy front-end, e.g. through co-creation in ideation (ibid.). Nowadays, user involvement is practised in all phases of innovation (Kaulio, 1998), from product (Gruner & Homburg, 2000) and service innovation (Alam, 2002) to business-to-business (Herstatt & Hippel, 1992) and business-to-consumer settings (Franke & Shah, 2003).

2.2.3.2 Effects of user involvement

The effects of user involvement are well conceptualised in theory, but a literature screening showed that empirical evidence is fragmentary. Generally, user involvement is positively linked to success measures like project success (Gruner & Homburg, 2000) or product market performance (Lau, Tang, & Yam, 2010). It also helps to increase the effectiveness and efficiency of the innovation process (Enkel, Perez-Freije, & Gassmann, 2005), especially for highly innovative products (Salomo, Steinhoff, & Trommsdorff, 2003), and reduces the risk of failure (Chesbrough, 2003). Additionally, user involvement is related to user satisfaction (Kujala, 2003). Further objectives include support of the market acceptance and diffusion process, strengthening long-term relations with key customers, user education and improved public relations prior to market launch (Alam, 2002).

Against these positive attributes of user involvement, a stream of literature criticises the use of customers in product development, specifically in the fuzzy front-end of

innovation. So-called *design-driven innovation* literature claims that expert designers should lead and make the decisions in product development (Verganti, 2008). In this paradigm, experts supply the solutions to the customer rather than co-designing them with users, which grants the designer interpretational sovereignty of what will be needed by the customer. This view is especially evident in the case of radical innovation design, in which the non-experts are not expected to be able to look beyond the horizon of established solutions and usability patterns of currently existing products, which could lead to a stalemate (Bennett & Cooper, 1981) and a disincentive for established companies to embark on the exploration of technologies outside their current frame of reference (Christensen & Bower, 1996).

To conclude, this thesis takes a customer-pull perspective, adopted by many innovation scholars (Hippel, 1978), in which customers take an active role in innovation, because the focus of this study is on exploring the antecedents of what influences the accurate representation of current users.

2.2.3.3 Typology of user involvement

User involvement's theoretical foundation is an eclectic mix of several streams of literature. Ives and Olson (1984) note its grounding in the theory and research of organisational behaviour, specifically in-group problem-solving, interpersonal behaviour and individual motivation. Nonetheless, this association was made from a management information systems literature perspective in which the object of study is, for example, the introduction of a new enterprise software system. Thus, both producer (e.g. IT engineer) and user (e.g., ordinary employee using the system) are within the boundary of the same organisation. Here, the individual user's behaviour is bound to organisational conditions, motives and incentives. Thus, these theories are hardly applicable to the focus of this dissertation, which characterises the user-producer relationship as an organisational boundary spanning interaction.

Innovation management literature has frequently viewed user involvement from a theoretical knowledge perspective (Hippel, 1994; Lüthje & Herstatt, 2004; Magnusson, 2009). Here, knowledge is treated as a resource which is not equally available or distributed between product users and corporate developers. Innovation-related knowledge is segmented into need and solution components. Need knowledge refers to insight into what users or customers want and desire in products and services and is highly related to use experience. This knowledge typically resides with the user. Solution knowledge is linked to product realisation, i.e. how to technically implement product or

service innovations and subsequently bring them to the market (Piller, Ihl, & Vossen, 2011). Thus, user involvement in corporate product innovation serves to augment the innovating company's stock of knowledge with critical need knowledge. In between these (theoretical) extreme cases of knowledge allocation, i.e. all need knowledge with users and all solution knowledge with the manufacturer, extant literature paints a more nuanced picture, e.g. in the frequently cited example of lead users (Herstatt & Hippel, 1992) and embedded lead users (Schweisfurth & Raasch, 2015), who are users with solution knowledge and corporate developers with a high level of need knowledge.

For the course of this study, user involvement is defined as all means to incorporate the 'voice of the customer' into corporate product development processes. This includes user innovations, i.e. solutions created by non-professional users (Lüthje, Herstatt, & Hippel, 2005).

User involvement and the literature thereof is discussed in a plethora of ways (see Figure 5) and is influenced by different fields of study, such as innovation management, information systems, marketing, engineering and design studies. Some characteristics relevant for the course of this study are discussed in the following paragraph.

User-involvement criteria	Characteristics			
Cost of UI	Low	Medium	High	
Degree/intensity of UI	Passive input	Feedback	Extensive consultation	Represen-tation
Holistic UI approaches	User-centred design	Participatory design	Ethnography	Contextual design
Initiative of UI	Unsolicited contribution		Solicited cooperation	
Locus of innovation	Firm	Market	Consumer	
Methodologies of UI	Interviews	Observation	Focus groups	…
Methodological purpose	Qualitative, low reach		Quantitative, high reach	
Objective/purpose	Product/ser-vice quality	Process quality	User relationships	Improved PR
Outcome of UI	Incremental ideas		Radical ideas	
User contribution	Need knowledge		Solution knowledge	
User role	Inventor	(Co-) developer active	(Co-) developer passive	
Setting of UI	B2B		B2C	
Stage of NPD process	Fuzzy front-end	Concept	Prototype	Market launch

Figure 5: Morphological box of user-involvement criteria, source: own depiction

A widely discussed characteristic of user involvement is whether users and their input are included by active participation or passively (Prahalad & Ramaswamy, 2000; Walcher, 2007). Although all approaches share the goal of increasing customer centricity in product development, how the actual user is approached by the innovating company differs strongly. Passive user involvement can be characterised as *listening to* the user (Bosch-Sijtsema & Bosch, 2015), which does not require the user to be proactive. Passive user involvement is facilitated in several ways, e.g. by means of observation, surveys or desk research (Janssen & Dankbaar, 2008). In contrast, active user involvement includes an explicit collaboration with the user (Bosch-Sijtsema & Bosch, 2015), e.g. in co-design (Pals, Steen, Langley, & Kort, 2008). As a result, users are fully *represented* in the product development process (Alam, 2002). The terms degree or intensity of user involvement describe this continuum of approaches from passive to active user involvement. Its effect is described in the next section in more detail.

The locus of innovation refers to the place where innovation and value are actually created – from only at corporate grounds to innovations that can originate by customers as well. This is framed by the paradigmatic shift from manufacturer- to customer-active

paradigm as the source of innovation (Hippel, 1978). Along these lines, high degrees of user involvement present ways for companies to appropriate value from user innovativeness. Prahalad and Ramaswamy (2004) advance this perspective by individualising the user experience in value creation and extraction from market offerings of companies which can be co-created uniquely by the users.

User involvement is realised by the application of various formal and non-formal methods. These range from traditional methods like sole need elicitation approaches such as focus groups (McDonagh-Philp & Langford, 2003) to user innovation sourcing lead-user approaches (Herstatt & Hippel, 1992) to virtual or web-based approaches (Dahan & Hauser, 2002). These originate from different areas or schools of thought (Pals et al., 2008; Sanders & Stappers, 2008) and have an emphasis on different aspects, e.g. on democratic participation (participatory design) or usability (user-centred design) (Kujala, 2003).

Companies' objectives when they engage in user-involvement activities encompass manifold goals. Primarily, these activities can increase the effectiveness and efficiency of the innovation process, as found by Enkel et al. (2005) in a meta-study, as they result in superior and differentiated solutions and reduced development cycle times. Further objectives include support of the market acceptance and diffusion process, strengthening long-term relations with key customers and user education and improved public relations prior to market launch (Alam, 2002).

Studies of user involvement are predominantly reported in business-to-business settings (Kristensson & Magnusson, 2010), e.g. for scientific instruments (Hippel, 1976). Nevertheless, there are also business-to-consumer user-involvement cases, e.g. equipment for various outdoor sports such as snowboarding, kayaking, mountain biking and kiting (e.g. Franke & Shah, 2003; Lüthje, Herstatt, & von Hippel, 2005; Hienerth, 2006) or in the development of new computer games (Jeppesen & Molin, 2003). Notably, the specificity of solutions due to the potential number of customers differs between business-to-consumer and business-to-business settings. This influences user-involvement practice and choice of approach as solutions have to fit, for example, one million potential customers compared to just one customer in an individual business-to-business user-involvement setting.

Finally, the impact of the stage at which user involvement takes place should be elaborated here. User involvement differs significantly throughout the stages of the

development process (cf. Figure 4) due to the purpose of each stage (e.g. generating product ideas, selecting promising projects, customising products) and the inherent specificity of the idea/product (from unspecific in the fuzzy front-end to very specific prior to market launch). Therefore, user-involvement approaches in the early phases tend to be rather need driven, i.e. aiming to identify rather abstract customer needs, independent of particular references to products or services. These approaches tend to produce more open and unconstrained, but less actionable, results. Product-driven user involvement involves stimulus-based approaches, e.g. discussing a certain product (prototype) in focus groups. These yield more tangible needs that are more easily picked up by developers, albeit at the expense of potentially blocking out-of-the-box needs or thoughts through fixation on an existing product or service. Product-driven user-involvement approaches are predominantly used in the later stages of the product development cycle or after market launch (e.g. mass customisation efforts with the help of tool kits (Piller & Walcher, 2006; van Kleef, van Trijp, & Luning, 2005).

This paragraph delineates the major classification criteria of user-involvement research. The user-involvement approach of this study can be anchored in the fuzzy front-end of innovation, specifically in the idea generation phase and the first idea screening in a business-to-consumer setting. Thus, user involvement is considered more for the sake of innovation than for customisation (Kristensson, Gustafsson, & Archer, 2004). The purpose of this study's user-involvement application is to maximise the customer value ideas that can potentially be followed up. The locus of innovation is on the manufacturer's side as the effect of user involvement is measured through the individual developer, i.e. the output of the developer is measured. One main variable in the experimental study is the effect of the degree of user involvement, i.e. whether higher user involvement leads to different outcomes than lower user involvement.

2.2.3.4 Frameworks on the degree of user involvement

After the analysis of the major dimensions of user-involvement research in the previous section, here the degree of user involvement will be dissected in more detail. The degree of user involvement can be characterised as a continuum from passive user participation to participative decision-making (Alam, 2002) and becomes apparent in the application of certain user-involvement approaches. Passive user-participation approaches are characterised by the analysis of distant, mostly large-quantity data sets of user input (e.g. complaints data or secondary market research data). Approaches incorporating participative decision-making facilitate close interaction with the user, providing specific

input for new product development processes (e.g. co-design activities or the lead-user method).

The aim of this section is to analyse current findings on the scientific application of different degrees of user involvement and to use this as a basis for the experimental main study of this dissertation. Therefore, a thorough search of extant literature was conducted for contributions covering more than one degree or intensity of user involvement; journal papers covering only one level of user involvement (e.g. high involvement by means of lead-user method) have not been considered.

Degrees or intensity of user involvement have been studied and discussed in extant scientific literature in various ways. As early as the 1980s, authors started to conceptualise different degrees of user involvement. Ives and Olson (1984) use a six-item categorisation of user-involvement degrees, from *no* involvement to *involvement by doing/strong control*. However, these first studies have a strong IT system implementation focus, with customers from inside the same organisation, which is why they are not included in the following framework. Relevant current studies differ in terms of the structural user-involvement dimensions analysed, industry/methodological context, the specific measurement of the degree of user involvement and the analysis level of degrees of user involvement (see Table 1).

The *structural dimensions* in most studies differentiate user involvement based on the stage or phase of the innovation process – from fuzzy front-end to prototype or market launch phase. Fuchs and Schreier (2011) analyse user involvement both in the idea creation and idea selection phases, and measure the effects of perceived customer orientation on the whole company. Similarly, Gruner and Homburg (2000) analyse top/flop projects by new product success, distinguishing between six stages of product development. Pals et al. (2008) link three user-involvement approaches to different development goals that occur in different stages of new product development. Most other studies build frameworks, mapping user-involvement approaches, among other user-involvement characteristics, to different stages (Alam, 2002; Bosch-Sijtsema & Bosch, 2015; Hemetsberger & Füller, 2009; Kaulio, 1998; Piller et al., 2011; Sawhney, Verona, & Prandelli, 2005). Thus, it can be concluded that both the applicability of user-involvement approaches (Piller et al., 2011) and the success of using user involvement (Gruner & Homburg, 2000) highly depend on the stage of new product development. Different to these papers, other authors focus solely on degrees of user involvement in the fuzzy front-end (Kristensson et al., 2004; Witell et al., 2011).

Table 1: Framework of degrees of user involvement, source: own analysis

Source	User-involvement structural dimensions	Industry/ Methodology/ Publication type	Content/Findings	Operationalisation of degree of user involvement	Analysis level of UI degree
Al-Zu'bi & Tsinopoulos, 2012	- NPD stages - Collaboration intensity with suppliers - Collaboration intensity with (lead) users	- Manufacturing companies - Quantitative survey (n=313) - Journal, innovation management (Google scholar citations: 20)	Increasing the extent of (lead) user collaboration in NPD increases product variety	Measured with original 8-item collaboration scale (Likert)	High, quant.
Fuchs & Schreier, 2011	- UI (empowerment) in idea creation and selection	- Consumer goods - Experimental study via survey (treatments) - Journal, innovation management (scholar: 231)	(Study 1:) Companies are perceived as more customer-oriented with customer empowerment (especially in ideation)	Participants are primed before evaluation: with/without UI in creation/selection phase of NPD	High, quant.
Gruner & Homburg, 2000	- Intensity of customer interaction - NPD stages	- B2B machinery industry - Quantitative survey (n=310) - Journal, management (scholar: 660)	Effect of intensity of interaction on product success, depending on involved user characteristics	Measurement of intensity of customer interaction with 6-item formative compound construct	High, quant.
Kristensson et al., 2004	- UI degrees by type of ideating participants	- Consumer telco services - Quasi-experimental design - Journal, innovation management (scholar: 395)	Ordinary users (vs. advanced and professionals) create most original and valuable ideas; realisability higher for advanced/professionals	Degree of UI by ideator type (ordinary vs. advanced vs. professional)	High, quant.
Lau et al., 2010	- Product co-design/ information sharing with suppliers - Product co-design/ information sharing with customers	- B2B/B2C electronics, toys, plastics - Quantitative survey (n=251) - Journal, innovation management (scholar: 182)	Supplier & customer involvement increase product performance (among others)	Measurement of customer co-creation with 3 items (product design, engineering, operations)	High, quant.

Alam, 2002	- Objective/ purpose of UI - NPD stages - Intensity of UI - Modes of UI	- B2B financial services industry - Case research (12 cases) - Journal, marketing field (scholar: 588)	Identification of key elements of UI and development of activities for UI	Measured as UI intensity, from passive acquisition of input to representation	Low, qual.
Bosch-Sijtsema & Bosch, 2015	- NPD stages - UI methodology - Type and amount of data elicited - Conscious/ unconscious elicitation	- Software, automotive, telco industry - Case studies (8 cases) - Journal, innovation management (scholar: 15)	Conceptual framework of UI along stages	not applicable	Low, qual.
Brockhoff, 2003	- Solicited (supplier) vs. unsolicited (customer) UI - Degree of UI	- Conceptual paper - Journal, innovation management (scholar: 255)	User perspective in UI, better planning of UI campaigns	Measurement of degree of UI (no, advice,..., made to order)	Low, qual.
Kaulio, 1998	- Type of UI - NPD stages	- Conceptual paper - Journal, quality management/engineering (scholar: 419)	Analysis of 7 different UI methods and mapping to stages and type of UI	Conceptualisation as type of UI (Design for/with/by)	Low, qual.
Pals et al., 2008	- UI categories - NPD stages	- B2C consumer products - Case studies/conceptual paper (2 cases) - Journal, innovation management (scholar: 33)	Analysis of 3 UI approaches in terms of applicability in stages and for key design questions; find complementarity of approaches	Measured as category of UI (without direct UI, with reactive UI, with active UI)	Low, qual.
Piller et al., 2011	- Modes/intensities of UI - Degrees of collaboration - Degrees of freedom - Front-end/back-end	- Conceptual paper - Book chapter, innovation management	Typology of UI, in particular, co-creation methods	Three modes of using and generating customer information ('Listen into', 'Ask', 'Build')	Low, qual.

Sawhney et al., 2005	- NPD stages - Level of UI	- B2C focus - Case studies (2: Ducati & Eli Lilly) - Journal, marketing management (scholar: 741)	Benefits of internet-based collaboration for user collaboration	Measured as level of UI (dichotomous: low/broad - high/rich)	Low, qual.
Hemetsberger & Füller, 2009	- NPD stages - Knowledge exchanged (intensity of UI)	- Conceptual paper - Book chapter, innovation management	Linking UI methods to stages and knowledge exchange type	Degree of UI represented as type of knowledge exchange	Low, qual.
Witell et al., 2011	- Proactive vs. reactive market research techniques	- Several industries - Quantitative survey + experiment - Journal, management (scholar: 132)	Higher levels of activation (e.g. through co-creation) lead to better performance	Measurement of degree to which the customer is activated	Low, quant.

All the papers have in common a conceptualisation of the degree of user involvement. *High* level papers (cf. right column of Table 1) are studies which either address degrees of user involvement on an organisational level (one user-involvement score for a whole organisation, e.g. Lau et al., 2010) or use a dichotomous user-involvement measure (with/without user involvement, e.g. Fuchs & Schreier, 2011). *Low* level papers sketch a nuanced picture of user-involvement measures and consider which types of user-involvement approach (e.g. focus groups, co-creation, ideation by customers) are applied; the level of analysis is mostly focused on the individual idea or project (Kristensson et al., 2004; Witell et al., 2011).

Concerning the outcomes of user involvement, results are diverse. Lau et al. (2010) find positive effects of higher degrees of user involvement on product performance but not on product innovativeness. However, this study suffers from common-source bias, as the same respondents rated both user-involvement practice and success. Witell et al. (2011) reported a dual study, of which one part was based on a quantitative survey and the other on an experimental one. For the quantitative survey, they found that proactive user involvement (here, use of lead-user approach vs. reactive: use of customer interviews) is positively related to profit margin. The experimental study found a positive relationship between proactive user involvement (i.e. co-creation for others) and the originality of generated ideas but ambiguous results for customer value. The remaining studies either only conceptualise user-involvement degrees theoretically or employ qualitative approaches which do not allow inferential statements on the effectiveness of different degrees of user involvement in practice.

The studies considered employ different scales for degrees of user involvement (see Figure 6). Terminologies used in the literature differ in terms of focus. Intensity (Alam, 2002), degree (Brockhoff, 2003) and type (Pals et al., 2008) of customer- or user-involvement stress their ordinal character, i.e. growing levels of user involvement. Piller et al. (2011) name their framework as ‘modes of using and generating customer information’, emphasising the information acquisition aspect of user involvement. Witell et al. (2011) stress the activity level required by companies engaging in user involvement.

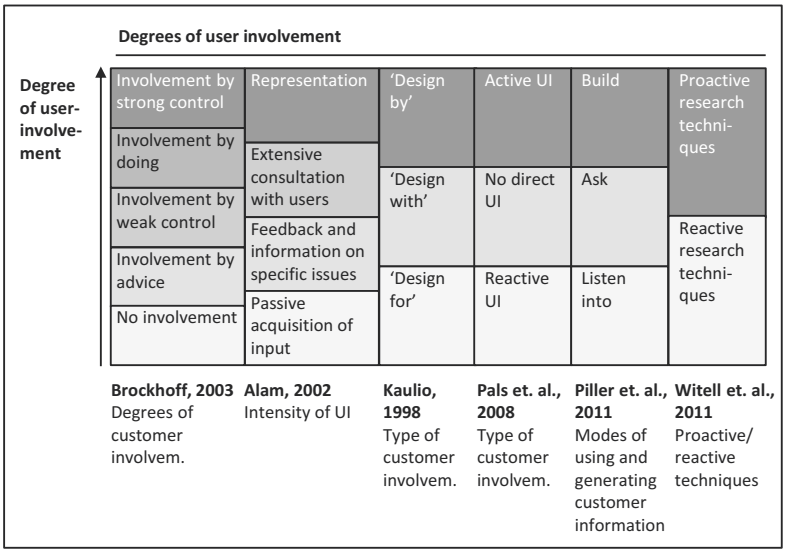

Figure 6: Degrees of user involvement in literature, source: own depiction

Degrees of user involvement are divided into two (Witell et al., 2011) to five (Brockhoff, 2003) subcategories. A low degree of user involvement is termed *no-involvement*, *passive acquisition of input*, *design for [users]*, *reactive user involvement* or *listen into*. These approaches share several themes. First of all, users are not activated to explicitly contribute to the new product development process (*reactive*, e.g. in Pals et al., 2008). Secondly, a certain paternalistic stance towards the customer (Peine et al., 2014) is expressed (Kaulio, 1998). This means that designers or product developers assume customer needs instead of asking to find out. Thirdly, *passively* or *listening into* refers to low effort in acquiring customer needs.

High degrees of user involvement are characterised by *representation* (Alam, 2002), which highlights the users' closeness or embeddedness in new product development. *Design by* and *build,* as the highest forms of user involvement, go even further and describe the shift from a manufacturer/company-centred development solution finding activity towards user innovation (Morrison, Roberts, & Hippel, 2000). *Active user involvement* or *proactive research techniques* underline specifically triggered activities engagement designed to bring the customer perspective closer into new product

development. Generally, it can be stated that the higher the user involvement, e.g. in co-creation settings, the richer the knowledge exchange for development (Fredberg & Piller, 2011). In line with Piller et al. (2011), I keep a company-centric innovation perspective, with interaction between users and the company. Thus, even in high user-involvement degree settings (like the lead-user approach), the company provides instruments, tools and incentives to engage users in co-creating activities instead of solely screening and sourcing already developed prototypes in the marketplace.

In conclusion, all approaches share a kind of ascending order of user involvement, ranging from low to high degrees. As detailed in Table 1, most studies also have a methodological focus in their analysis of the degree of user involvement (with *low detail level* focus). Thus, certain methods and techniques are linked to specific degrees of user involvement, e.g. focus groups to a lower degree and co-creation activity to a higher degree of user involvement (Witell et al., 2011).

Therefore, the impact of degrees of user involvement can be empirically linked to innovation outcomes through the application of certain methods and techniques.

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