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The use of mobile technologies by the elderly as challenges for innovative companies

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Abstract: Dynamic changes that are taking place in contemporary companies and their environment, development of information and communications technologies (ICT) create new human expectations and needs. Due to the global ageing of societies, increasingly more companies are treating the elderly as a key factor of their success, looking at innovation from the perspective of customer value and improvement of internal processes. The purpose of the article is to formulate the challenges faced by companies in the context of older people, and an attempt to define the attitudes of seniors towards innovation in the area of mobile technologies. The study is cross-sectional and can be used to create marketing strategies for managers of innovative companies operating on the silver consumer market.

Keywords: innovations, company innovations, the elderly, silver market, mobile technologies

1. Introduction

It is expected that in 2050 the number of elderly people aged 65 and over will double and reach 1.5 billion. The global share of seniors above 65 years old increased from 6% in 1990 to 9% in 2019, and the percentage of elderly people aged 65 and over will reach up to 16% in 2050. This means that one in six people in the world will be aged 65 or over (World Population Ageing, 2019). In the light of the above-mentioned demographic processes of ageing societies, it is worth drawing companies' attention to broadening their offers in terms of the silvery economy. The basis for creating such a marketing strategy is to learn the needs and understand the behaviours of older people, because the behaviours of contemporary elderly differ vastly from those from years ago. Given that modern society is developing with participation from the elderly, innovative businesses should take into account the real needs of this social group and undertake ap-

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propriate actions together. Offers targeted at older people should result in their acceptance. Demographic criteria do not exhaust the topic of profiling offers for seniors, so it is worth building a more complete picture of an elderly person based on the way they spend free time, their interests, personality types, and even more detailed aspects, such as attitude to new technologies. Consumer attractiveness among the elderly is very diversified; however, it is worth noting that many people who are currently 60–65 years old earn more now than they did in the last dozen or so years of their life (Żurawski, 2015, pp. 6–8). One of the reasons for this is being released from credit obligations. An analysis of elderly consumers in the United States in 2000 showed that most of them felt 10–12 years younger than their chronological age (Szmigin and Carrigan, 2000, pp. 505–527). Similar studies on cognitive age—which is the age that older people specify and the age they feel they are—were conducted in 2013 in Great Britain. In this research, seniors perceived themselves as up to 20 years younger than their chronological age indicated (Lewis, 2012–2013, pp. 344–348). These studies may suggest that seniors prefer not to realise how old they actually are and that the older the respondent, the less likely they are to "feel their age". That is why, contrary to myths suggesting that the elderly, having more time (for example, after retiring), do not make the most of their opportunities contributing to their own progress and development, the inclusion of older people in contemporary social and economic processes related to meeting their needs should be much smoother than it once was. In the context of the changing demographic structure and the development of modern mobile technologies, the purpose of the article is to define the challenges faced by companies, and to attempt to delineate the specifics of the behaviours of the elderly in this process.

2. Key terms and definitions

The ongoing process of ageing societies concerns practically every country in the world and is a part of the human life cycle. Quoting a definition of old age according to E. Trafiałek, one should see "old age as a natural phase of life after youth and maturity, crowning the dynamic ageing process. Old age is referred to as the final third of life, is associated with a decrease in the body's efficiency, loss of mobility, weakening of immune forces (biological and physiological old age), decreased adaptability to change, and in the socioeconomic context, often pauperization, loneliness (mental old age), the need to use the help of others (economic old age) and being marginalized (social old age)" (Trafiałek, 2006, p. 269). The period of old age is very extended in time, and according to various sources, it begins between the age of 55 (old age in marketing terms) and 65, and lasts until death. According to the World Health Organization (WHO), the age of 60 is considered the beginning of old age, and three main stages can be distinguished in its course (WHO, 2020):

– 60–75 years—young old (early old age);
– 75–90 years—middle old (late old age);
– 90 years and above—old old (longevity).

The basic features characterizing old age include a significant decline in human adaptive abilities in the biological and psychosocial context, the progressive limitation of independence in life, and the gradual increase in dependence on the environment. The term *innovation* (Latin *in-*

novatio—innovare) means renewal, changing for the better what already exists, and is an introduction to a better solution to satisfy the new needs of recipients by way of improved products, processes or services. Although innovation is usually associated with technological change, according to P. Drucker, it is also an economic and social category (Drucker, 1992, p. 36). In many definitions, innovations are identified with novelty, and the creator of this theory is considered to be J. A. Schumpeter, who understood innovation as the introduction into production of new products or improved existing products (Schumpeter, 1960, p. 104). J. A. Schumpeter highlighted five cases of innovation (Wiśniewska, 2013, p. 10):

– creation of a new product;
– use of a new technology, production method;
– creation of a market;
– acquisition of raw materials that were previously unknown;
– reorganization of a specific sector of the industry.

Innovation can also mean the first practical application of a process, system, device or product. Three basic types of innovation are outlined (Niedzielski and Rychlik, 2006, pp. 23–24):

– product innovations related to changes involving the introduction of new products or the improvement of existing products;
– process innovations involving the introduction of new production processes or the improvement of existing production processes;
– service innovations related to the introduction of new services or the improvement of existing services as a result of, first and foremost, the increase of their role in contemporary economy.

Innovative activities require the ability to carefully observe the environment, and multidisciplinary knowledge in order for recipients to understand and accept the proposed solutions. Companies that are innovative are those that are able to continuously seek, implement and promote innovation (Golińska-Pieszyńska, 2011, p. 75) and are focused on development and continually strengthening their position on the market (Jelonek, 2014, p. 319). In the innovation process of companies, it is important to eliminate stereotypical thinking about elderly people, who usually hear that they do not keep up, that they are not familiar with mobile technologies, and that they are not a good match for young teams because they are not very easy-going and are unable to communicate in the language of generations Y and Z. In addition, there is also a belief that the elderly segment is characterized by low purchasing power, and so they are not worth marketers' time. Seniors, as people who are losing strength and ambition, are often thought of as lacking clear requirements for goods and services and satisfied with an offer that meets only the most-basic needs (Lewis, 2012–2013, p. 345). Often, elderly consumers are described as invisible buyers—market laggards lacking cognitive skills and extensive finances. The ageism present in the general awareness of companies should not be a reason for generalization and stereotypical thinking, because increasingly more research results are showing that contemporary seniors differ significantly from the old picture embedded in the broader awareness (Bondos, 2013, pp. 31–36; Badowska and Rogala, 2015, pp. 11–23). More and more frequently, innovative companies, when employing older people, are aware of their potential and ability to create new ideas or a new view of existing ideas. The elderly have exactly the same needs as youth, but a different qualitative and quantitative

dimension: they need more time, patience and understanding, are more likely to focus on the quality rather than the quantity of contacts, are slower to learn, but perform their tasks more accurately. In a way, it can be said that the use of sources of wisdom and experience of seniors in collaboration with younger generations is an innovative solution in the development of the silver economy.

A trend that should be discussed in the context of these deliberations refers to the education of the elderly and the need for lifelong learning, because in the era of technological progress, the period of practical knowledge once acquired is increasingly shorter. Problems with understanding mobile technologies, adaptation of innovative solutions, incorrect ergonomics of smartphones, music players or notebooks can all contribute to the social exclusion and marginalization of the significance of seniors in professional and social life. Wanting to create value that will be gradually promoted by older people, modern companies should know that the essence of educating seniors is independence and an individual's agency enabling them to make individual decisions. Skilful use of mobile technologies enables holistic learning and activation of all senses; it also brings joy from operating a device without assistance, and strengthens the feeling of own value because of the opportunity to correct mistakes. In the process of cooperation, it is important for the employer to be able to take into account changes typical of a given age, and individual factors arising from the psychophysical capabilities, temperament, professional experience and lifestyle of buyers.

The potential of innovations related to mobile technologies has contributed to the creation of communication platforms and mobile applications that enable the provision of services via multi-channel media without losing content quality. Companies with innovative technologies have very advanced adaptation abilities, which are key for the sudden market changes that have been clear during the time of the pandemic. Creating strategies using mobile technologies as a way of running a business can be thought of as a technological and social trend or era of mobility involving the transfer of activities that to date have been performed on stationary devices to mobile devices (Sznajder, 2014, p. 20). Communication and acquisition of information while performing various tasks in a company enables greater multitasking. Most tasks today revolve around the Internet, are unlimited in space and time, and their main tool is a smartphone, which, as J. Kall describes, combines the capabilities of a personal computer with mobility, which revolutionized behaviour, interactions, consumption styles and lifestyle. Modern consumers do not have to wait for the transmission of information mainly from the television or radio (Kall, 2015, p. 10). Mobile devices have an unprecedented impact on shaping the behaviour and attitudes of modern society, and their main benefits include (Łysik and Kutera, 2013, p. 2):

- the portable nature of the devices, their weight and small size;
- simple and intuitive operation;
- the personal nature of the smartphone, personalized applications that draw a lot of attention in observing and analyzing the behaviour of other users;
- multifunctionality—the smartphone is not only a phone, but one can also play music on it, it has a camera, a Bluetooth function for connecting with other modules, and GPS;
- interactivity, which allows you to quickly find what you need and make a booking or purchase of selected products or services.

3. The main barriers to the use of mobile technologies by the elderly

The degree to which a social group shows interest in innovative mobile technology solutions depends primarily on existing needs, the level of compatibility with their values, and previous experience. According to A. Parasuraman, technological readiness refers to an individual's acceptance of modern technologies in the context of achieving their professional and private goals. This is a multi-faceted design that includes four dimensions (Parasuraman, 2000, pp. 307–320):

1) optimism—a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives;
2) innovativeness—a tendency to be a technology pioneer;
3) discomfort—a perceived lack of control over technology and a feeling of being overwhelmed by it;
4) insecurity—distrust of technology and scepticism about its ability to work properly.

Optimism and innovativeness are key factors that encourage people to use new technologies, while discomfort and insecurity build consumers' reluctance to adopt new solutions in the field of modern technologies, causing feelings of anxiety, insecurity and discomfort (Parasuraman, 2000, p. 314). Although health-related mobile platforms and applications are perceived as promising technologies that can promote health behaviour, the readiness of older people to use mobile technologies can be problematic. The exclusion of the elderly caused by modern technology must be considered from the point of view of the behaviour and attitudes of seniors themselves, and the behaviour of those who offer goods and services (Frąckiewicz, 2019, pp. 50–52). Knowledge about how older people perceive mobile technology is the key aspect that should be taken into account by government institutions and innovative companies rendering services both by and for seniors. Older people are a social group that is prevented from using new technologies by a lack of knowledge about how to use them, a sense of loss of control over information about themselves, a fear of the device breaking, and therefore the high costs of repair. Given the sensory changes that occur in a person's life, such as poorer visual acuity and deteriorating hearing, mobile technologies should be adapted to seniors at a level of difficulty that will not be an obstacle to their use. With age, sensory hypersensitivity changes, and this means that older people start reacting excessively to stimuli, including touch, sound, sight and smell. Hypersensitivity to environmental stimuli makes seniors experience the world differently to younger people, and describe their everyday sensations as irritating, overwhelming, disrupting and distracting. These experiences mean that the elderly need more time to be able to deal with their responses to environmental stimuli, which often leads to a feeling of exhaustion, and even isolation (Kinnealey, Oliver and Wilbarger, 1995). Seniors are more likely to have incorrect colour perception, reduced sensitivity, and poorer resistance to glare. They are slower than young people at processing and recognizing patterns. Ageing people need better lighting to read properly, and with age, correct assessment of the localization of objects decreases. Although these limitations are present in up to 15–20% of the adult population, it is hearing loss that is the most common chronic condition reported by the elderly. Approximately 30–35% of people over the age of 65 have this type of ailment. Hearing impairment is associated with poorer hearing, and a lack of proper perception and lo-

calization of sounds; therefore, when designing an interface or website for seniors, the sound should fall within a certain frequency range. Table 1 shows the progression of the sense of sight and hearing during an individual's lifespan between 35 and 70 years old.

Table 1. Progression of sensory sensitivities across lifespan

Progression of sensory sensitivities across lifespan		Age at which the sensory ability starts to change
Sight	Enhanced need for light	35
	Decreasing accommodation width	40
	Increased glare sensitivity	40
	Reduced depth perception	40
	Reduced eyesight	50
	Reduced adaptation to darkness	55
	Restricted visual field	55
	Diminished colour perception	70
Hearing	Diminished hearing	35
	Distraction by background noises	45
	Diminished localization of sound	70
	Hearing loss of higher frequencies	70

S o u r c e: Author's own elaboration based on American Academy of Neurology, 2012.

4. The role of innovative companies in creating value in the field of mobile technologies

The role of innovative companies is to adapt their activities to the changes occurring in their market. The process of adopting technological innovations is different for each enterprise, and so companies considering selling on the silver market should take into account the fact that older people need more time to learn all of the applications of a device. The acceptance process described by K. Renaud and J. van Biljon is divided into five stages (Renaud, van Biljon, 2008, p. 215):

1. Knowledge stage—the individual gets to know the product.
2. Persuasion stage—the individual becomes persuaded of a need for the product.
3. Decision stage—leads to purchase.
4. Implementation stage—at this time, the product is used by the consumer.
5. Confirmation stage—the user decides whether the choice of device was appropriate or unnecessary.

Knowledge of seniors' preferences in the design of mobile devices is very important and, as highlighted by J. Wakefield, when focusing on the elderly, it is necessary to bridge the gap between the way technological innovations work and the skills of older people. For ex-

ample, the response time of an icon on an Apple device is 0.7 seconds, and the response time of a person over 65 years of age is approximately one second (Wakefield, 2015). Although existing touch screens in smartphones have the ability to set the degree of the screen's touch sensitivity, this is still insufficient for a person who has involuntary hand tremors when performing heavier touches. In such a situation, the mobile device will read it as a wave of the finger rather than touch. The presented problem related to the use of technology by elderly people should be solved so that the senior feels satisfaction from using a specific device or application. A good mobile application is one whose design will be based on the needs of a specific target group and takes its preferences into account. For an application to be considered attractive and interesting, it must be clear and convenient, and operation should be intuitive. Deeming the senior segment to be attractive and lucrative is one thing, but equally important is the preparation of marketing programmes in forms that relate to the modification of existing products to increase their usefulness and thinking about potential customers not only in terms of physical people, but also groups and organizations (Szukalski, 2012, pp. 6–11). K. Janasz and J. Wiśniewska write that a managerial challenge in the twenty-first century is the promotion of changes understood as an opportunity instead of a threat, following novelty and innovation, meaning their rational and effective use both inside and outside the organization (Janasz and Wiśniewska, 2014, p. 187). Therefore, companies operating on the silver market must be aware of the need to correctly overcome limitations that are related to the following barriers:

- psychological—relating to the sceptical approach to life and the environment, traditionalism, aversion to novelty, which can be questioned using the appropriate communications activities;
- medical—referring to the loss of physical ability, decreased cognitive skills (sight, sound, touch, taste);
- social—decreasing the social and professional role, weaker relations with people and family;
- economic—manifested by reduced income or changes in the structure of expenses.

It should be assumed that each company should be aware of the complexity of the innovation process, its costs and risks associated with the possibility of project failure. An important risk factor is the time taken to implement a project, because in the information and communications technologies sector change occurs rapidly. The conditions for the success of innovation have been well defined and presented in three points by P. Drucker (Drucker, 1992, p. 152):

- innovation is work that requires knowledge and often huge resourcefulness;
- wanting to achieve success, innovators must use their strength and be emotionally tuned in to innovation;
- innovation must always be close to the market, focused on the market and be inspired by the market.

The role of innovative companies is to create advanced mobile technologies that can improve quality of life for seniors. Examples of such devices include modern homes equipped with smart lighting systems, smart kitchens (systems that detect the failure of kitchen equipment) and automatic security systems. Human-device interaction (and even human-robot interaction) can be beneficial in extreme situations where immediate third-party help is needed.

An example of such a response is when an elderly person falls and as a result is unable to respond and ask for help. A smart home equipped with technological solutions can recognize the occurrence and inform the relevant services that first aid is required (Cesta et al., 2007, p. 230). An example of a social robot that facilitates relationships and evokes emotions among both children and older people is the Aibo dog, which was made in Japan in 1999 (first version). In addition to a set of sensors such as a camera, stereo sound, infrared and touch sensor, the robot is able to communicate and record video using mobile applications. Aibo moves based on 22 axes, and also has a pair of OLED eyes that are supposed to express its emotions. Artificial intelligence built into the robot enables it to recognize emotions and learn new tricks. For the 2018 version of the robot, Sony recommends additional applications for owners, allowing users to add games, take photos with a camera mounted on the robot, and an "aibone"—an electronic bone for Aibo (Sony-Aibo ERS-7, 2018).

5. Elderly people and innovations

The success of developing innovative products and services for older people is largely determined by their approach to innovation. For seniors, innovations are often associated with the use of the latest technologies, and their promotion requires the overcoming of barriers faced by the elderly. The author carried out a diagnosis of the state of knowledge on the topic of innovative solutions for seniors by referring to the results of studies conducted using the focus method by A. Barska and J. Śnihur on a sample of people 55 years old and over from the Lubusz region in 2017. The questionnaire comprised 15 closed-ended single and multiple choice questions. Before commencing the actual research, a pilot survey was conducted aimed at eliminating any irregularities. Cronbach's alpha test was used to assess the reliability of scales, assuming a value above 0.72 (Hinton et al., 2004), which indicates the correct reliability of the test results. From among 350 questionnaires, 345 correctly completed ones were chosen. The study group included 197 women, and one in three respondents lived in a rural area. The research results showed that only 7% of respondents stated that they do not buy any new products, and none of these were men. The seniors studied in the research demonstrated an openness to innovations, and in particular, those related to the market of food products. Seventy-two per cent of respondents focused on products with low sugar content that decrease the level of cholesterol in the body. The study showed that in making the right decisions, older people place particular value on informal sources of information (46.5%), while 30.2% accept formal sources. Informal sources include suggestions made by family and loved ones who have bought the given product or service before, as well as browsing information on online forums. Only 16.3% of respondents (of which 85% were women) expressed an emotional approach to shopping. Almost one-quarter boasted good knowledge of new products on the market (23%), while 41% were poorly informed in this regard and 36% were unable to answer the question. Table 2 presents the areas for development of innovative solutions that older people are most likely to use (Barska and Śnihur, 2017).

Table 2. Expected areas for development of innovative solutions for seniors

Expected areas for development of innovative solutions for older people	Percentage of respondents
Tourism and leisure	44%
Insurance services	33%
Clothing and footwear	30%
Food products	28%
Educational services (language courses, using a computer)	28%
Dietary supplements	23%
Bank services	16%
Household appliances	14%
Home electronics	12%
Telecommunications	2%

S o u r c e: Author's own elaboration based on Barska and Śnihur, 2017.

6. Summary

The presented research results indicate that older people participating in the study adopt new solutions rather positively, although successful implementation requires effective systems of communication, often also education and help from loved ones. Innovative companies should thoroughly examine communication barriers that exist with seniors to be able to get to know their needs and expectations even better. The results also showed that the elderly expect, first and foremost, innovative solutions related to tourism and leisure, as well as insurance services. The study did not list innovative solutions in the area of disease prevention, which is about the arrival of new ways of taking care of better well-being and, consequently, also health. The said research is preliminary and is the basis for further studies on, at least, the determinants of the diffusion of mobile technology innovations among the elderly. In the author's opinion, even though there is increasingly more development and implementation of innovative processes to consolidate correct habits of a healthy lifestyle and disease prevention, scientific studies assessing these solutions in the context of older people are still at the early stages. Undoubtedly, modern mobile technologies help the elderly remain in contact with their loved ones; enrich personal development without the need to leave the home; simplify health care; generate greater access to information, knowledge, culture, and entertainment; and increase social interaction, self-esteem and overall satisfaction with life (Gamberini et al., 2006). Thanks to their use of innovative solutions, seniors are able to be more independent and socially involved, which should be seen as an indispensable element of life that significantly revolutionizes their everyday being. In summary of the article and given the context of an ageing population, heterogeneity of the group and age-related health problems, the most important thing seems to be that for older people to be able to adapt to life in an innovative society, society must adapt to living with an increasing number of seniors.

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Wykorzystywanie technologii mobilnych przez osoby starsze jako wyzwania dla innowacyjnych przedsiębiorstw

Abstrakt: Dynamiczne zmiany, jakie zachodzą we współczesnych przedsiębiorstwach i w ich otoczeniu, oraz rozwój technologii informacyjno-komunikacyjnych (ICT) kreują nowe oczekiwania i potrzeby człowieka. W związku z globalnym procesem starzenia się społeczeństw coraz więcej przedsiębiorstw traktuje osoby starsze jako kluczowy czynnik swojego sukcesu, patrząc na innowacje z perspektywy wartości dla klienta oraz doskonalenia wewnętrznych procesów. Celem artykułu jest sformułowanie wyzwań stających przed firmami w kontekście osób starszych oraz próba określenia postaw seniorów wobec innowacji z obszaru technologii mobilnych. Opracowanie ma charakter przekrojowy i może służyć do formułowania strategii marketingowych dla managerów innowacyjnych przedsiębiorstw działających na rynku srebrnych konsumentów.

Słowa kluczowe: innowacje, innowacje przedsiębiorstw, osoby starsze, srebrny rynek, technologie mobilne