What Seniors Need vs What Providers Deliver: A Cross-Country Perspective on Value (Mis)Alignment in Digital Transformation of Elderly Care in Poland and Sweden

Ella Kolkowska
Örebro University School of Business
Örebro,Sweden *ella.kolkowska@oru.se*

Ewa Soja *ewa.soja@uek.krakow.pl*
Piotr Soja *eisoja@cyf-kr.edu.pl*
Jakub Kanclerz *kanclerj@uek.krakow.pl*
Bartłomiej Balsamski *balsamb@uek.krakow.pl*
Krakow University of Economics
Kraków, Poland

Abstract

This explorative study examined how technology providers are meeting seniors' expectations for developing ICT solutions enabling digital transformation of elderly care in two contrasting socioeconomic settings: Poland and Sweden. To this end, we have analyzed the characteristics emphasized as important by technology providers on their websites and compared these factors with seniors' needs identified in previous research. Our preliminary findings suggest that technology providers in Poland and Sweden fall short to fully meet the diversity of seniors' needs or address their expectations. In this respect, it appears that technology providers focus mainly on those needs of seniors that are most strongly recognized and unmet in the context of the prevailing socio-economic conditions of a given country.

Keywords: Elderly Care, Digital Transformation, Value-based objectives, Providers.

1. Introduction

In response to a rapidly ageing global population and constrained resources, the elderly care sector faces urgent pressure to transform [3]. Traditional care models are overloaded, and digital technology is increasingly seen as a key enabler of sustainable, efficient care—improving outcomes without compromising quality. Across Europe, the adoption of technology-supported care models is common but varies depending on socioeconomic conditions, digital maturity, and national healthcare systems [2].

Various scholars argue that true digital transformation requires a shift in the entire care ecosystem and must be understood within its broader social context [12]. This includes recognizing the values, roles, and preferences of key stakeholders—seniors, care providers, policymakers, and technology developers [5], [9]. In this context, our study explores the value alignment—and misalignment—between two key stakeholders' groups in the digital transformation of elderly care: seniors and technology providers. In particular, our study seeks to answer the following research question: *How do technology providers in Poland and Sweden meet seniors' expectations regarding the use of modern technologies for healthy and independent ageing?*

We define digital technologies in this context as ICT-enabled products and services that deliver direct value to older adults, their families, and care providers by promoting health, independence, and well-being [3]. Technology providers are defined as organizations or companies that design, develop or distribute such technologies. To explore divergences between seniors' needs and technology providers' offerings, we compared value-based objectives previously identified as important for Swedish and Polish seniors

[14] with characteristics emphasized as important by technology providers on their websites. Existing studies suggest that providers aim to contribute to care improvement by delivering high-quality digital solutions [16], yet their underlying values and perspectives remain underexplored, especially outside highly developed economies.

Prior work by Nordgren [6] analyzed Swedish technology providers websites and found a focus on care efficiency and improved quality of life through monitoring technologies. However, he noted a lack of attention to seniors' real-life concerns and argued that the value of technology depends on individual experiences, e.g. some may prefer personal contact over independence, while others value autonomy more. Nordgren thus called for a more nuanced approach that reflects these differing perspectives.

While Nordgren's study was conducted in 2012, our preliminary research builds on his work by systematically comparing the characteristics emphasized as important by contemporary technology providers with the seniors' needs identified in previous research [14] as important for healthy and independent ageing. In so doing, we exploratively compare two distinct socioeconomic contexts: Poland, a transition economy, and Sweden, a highly developed one. As shown in prior studies, these countries differ significantly in how care systems are structured and financed, digital infrastructure, and the level of adoption of digital technologies in elderly care [2], [7, 8], [13].

2. Method

We started the data gathering process by conducting online searches using keywords such as "welfare technologies," "alarming technologies," "communication technologies," and "health monitoring technologies," in combination with terms like "senior," "older people," and "elderly." This allowed us to identify a number of technology providers websites in both Poland and Sweden. As this is an exploratory study, we used convenience sampling while also striving for representativeness by including both large and small companies.

Previous research [13] has shown that seniors in both countries particularly value technologies that support communication (COM), memory (MEM), personal safety e.g., alarming technologies (ALA) and health monitoring tools (MON). Based on these findings, we selected 13 technology providers from Poland and 15 from Sweden, ensuring a diverse range of offerings, as shown in Table 1.The analysis was guided by a predefined set of value-based objectives previously identified as important to Polish and Swedish seniors in the context of technology use for healthy and independent ageing [14]. Based on these findings, we developed definitions which were used as input prompts for the model to identify and extract relevant expressions across the providers' websites.

Table 1. Provider websites and offerings.

COUNTRY: [Type of technology* –Website]
POLAND: [ALA, MON, MEM, COM - https://bezpiecznarodzina.pl/opaski-sos/; https://opaska.teleopiekomat.pl; https://www.ekocentrum24.pl/kategoria-produktu/dla-seniora/bezpieczenstwo-seniora]; [ALA, MON, COM - https://www.mobicare.pl; https://teleopiekomat.pl]; [ALA, MON - https://bezpiecznysenior.pl/ https://www.comarch.pl/healthcare/produkty/zdalna-opieka-medyczna/; https://step2health.pl/ www.ekocentrum24.pl/produkt/opiekun-seniora-t2-gsm]; [ALA, COM - https://www.calmean.com]; [COM - https://smartfondlaseniora.pl]; [MON, MEM - https://www.medcontrol.pl/c/automatyczne-dozowniki-medcontrol] [ALA - https://seris.pl/blog/poradnik-bezpieczenstwa/jak-zadbac-o-bezpieczenstwo-seniorow]
SWEDEN: [MON, ALA - https://www.tunstall.se/; https://www.tena.nu/vardpersonal/innovation/smartcare-identifi/]; [ALA - https://www.posifon.com/; https://minifinder.se/; https://maricare.com/sv/sa-fungerar-det/elsi-smart-floor/; https://everon.se/; https://www.doro.com/sv-se/support/]; [COM - https://heedy.app/sv/enkel-social-app-for-aldre/; https://www.doro.com/sv-se/produkter/mobiltelefoner/; https://www.doro.com/sv-se/produkter/mobiltelefoner/]; [MEM- https://www.atea.se/valfardsteknik/medicinrobot/; https://www.atea.se/valfardsteknik/medicinrobot/]; [MEM, ALA - https://9solutions.com/sv/losningar/losning-for-sarskilda-boenden/]; [MON - https://www.egenmonitorering.se/]; [COM, MEM, ALA- https://www.abilia.com/sv]

Type of technology*: COM: communication, MEM: memory, ALA: alarming technologies, MON: health monitoring tools

The analysis of selected websites was conducted using vector encoding and similarity comparisons. Text data were collected, segmented, and structured to enable systematic evaluation against a predefined framework of value-based objectives [14]. Pre-processed content was transformed into vector representations using the "sentence-transformers/paraphrase-multilingual-MiniLM-L12-v2" model, which encodes text into a 384-dimensional space [11]. Relevance was assessed via calculating cosine similarity

between content vectors and vectors representation of value-based objective definitions.

Objectives were defined as concise, keyword-based sentences, serving as semantic benchmarks. The text was divided into two-sentence segments to maintain semantic integrity. Both content and objective definitions were encoded using the same model. Cosine similarity scores [4] quantified alignment between segments and objectives. Since cosine similarity scores can vary depending on the embedding model used [15], to the best trade-off between relevance and exclusion of noise, a similarity threshold of 0.6 was established iteratively, in line with Brandt's method [1]. The employed quantitative semantic similarity analysis initially identified a total of 3652 expressions corresponding to the value-based objectives defined in [14]. After applying the threshold filter, this number was reduced to 279. These remaining expressions were then manually reviewed and validated by two of the authors, resulting in a final set of 237 expressions aligned with the predefined value-based objectives.

3. Results

Table 2 includes results of the preliminary study on the realization of seniors' expectations regarding IT solutions supporting their healthy and independent ageing in the context of the proposed offers of providers of these solutions in Poland and Sweden. The objectives are divided into the most important, fundamental (ends) and means, as specified in [14].

Table 2. Fundamental and means value-based objectives in provider offers.

Fundamental value-based objectives	PL	SE	Means value-based objectives	PL	SE
Ensure seniors' dignity		◔	Create supporting environment		◕
Ensure seniors' privacy	◔		Ensure seniors' digital inclusion	◔	◑
Increase seniors' activity	◔	◔	Ensure solutions' availability		◔
Increase seniors' independence	◑	◕	Facilitate communication	◑	◑
Maintain seniors' health	◕	◔	Foster seniors' positive attitudes		◔
Maximize seniors' safety	◑	◔	Improve care quality	◕	●
Maximize usefulness for family	◑	◔	Increase seniors' technical skills and knowledge		
Minimize loneliness	◔	◕	Maximize alignment with seniors' needs	◔	◔
Notes: PL – Poland, SE – Sweden			Maximize solutions' quality	◔	◔
● high, ◕ medium, ◑ low, ◔ very low level, quartiles defined on the basis of frequency of occurrence			Maximize support for care personnel	●	◕
			Support seniors in daily activities		◔

In the case of fundamental value-based objectives, no value was found to be significantly (i.e. high or medium occurrence) realized by the suppliers' offers in both countries. In Poland, providers only to a limited extent address the need *Maintain seniors' health*, while in Sweden they address the needs *Increase seniors' independence* and *Minimize loneliness*. Three out of eight fundamental value-based objectives (*Ensure seniors' dignity*, *Ensure seniors' privacy* and *Increase seniors' activity*) are observed to a very low extent or not at all in the proposed offers of suppliers in both countries.

The results for means value-based objectives clearly show that the suppliers' offers to a large extent address the two values: *Improve care quality* and *Maximize support for care personnel*. The remaining nine means value-based objectives in Poland are present at best to a low degree or not at all in the proposed offers. In the case of Sweden, the situation is similar, except for one value *Create supporting environment*. It should be noted, however, that in Poland as many as five out of eleven means value-based objectives were not reflected in the offers, and in Sweden only one. This value is *Increase seniors' technical skills and knowledge*, which was the only one of all fundamental and means value-based objectives not visible in the offers of suppliers in both countries.

4. Discussion and Conclusion

Overall, based on our analysis, we might conclude that even if technology providers in Poland and Sweden meet some of the seniors' needs regarding the use of technology to support healthy and independent ageing, they fall short to fully meet the diversity of seniors' needs or address their expectations, thus hampering the successful digital transformation of elderly care in these countries.

One concerning observation is that the rhetoric on the providers' websites is predominantly aimed at caregivers rather than seniors themselves. This is evident in the frequent emphasis on objectives such as *Improve care quality*, *Maximize support for care personnel*, and in the Polish context, *Maximize usefulness for family*. This orientation aligns with limited offerings that directly address seniors' needs, such as *Ensure seniors' dignity*, *Ensure seniors' privacy*, or *Increase seniors' activity*.

Neglecting seniors' specific concerns and needs may undermine their willingness and ability to adopt new technologies [9]. When technologies are not designed with older users in mind—or when they fail to address concerns such as usability (*Maximize alignment with seniors' needs*), privacy (*Ensure seniors' privacy*), or affordability (*Ensure solutions' availability*)—they risk being perceived as irrelevant or even intimidating. This can lead to low adoption rates, reducing the impact of digital solutions intended to support independent and healthy ageing, and impeding digital transformation of care services. Therefore, for technology to effectively support digital transformation of elderly care, technology providers need to engage directly with seniors, understand their lived realities, and design the products with seniors' needs and values in mind.

Our analysis, consistent with Nordgren's [6] findings, shows that technology providers in both countries often overlook seniors' concerns regarding the practical use of these technologies in everyday contexts. These concerns are reflected in both fundamental and means value-based objectives, particularly those related to privacy and dignity (*Ensure seniors' dignity* or *Ensure seniors' privacy*), seniors' technical skills and knowledge (*Increase seniors' technical skills and knowledge*), fear of being excluded from the digital society (*Ensure seniors' digital inclusion*), fear and insecurity in using technology (*Foster seniors' positive attitudes*) and also concerns related to usefulness of technologies in supporting seniors' in their daily activities (*Support seniors in daily activities*).

Consequently, technology providers need to consider the context in which technology is used by offering training programs and support procurement, implementation, and daily use of the offered technologies. Such support could increase trust and improve adoption of these technologies, enhancing digital transformation of elderly care.

Finally, our analysis shows that there are some differences in how technology providers address seniors' needs in Poland and Sweden. For instance, Polish providers emphasize solutions supporting *Maintain seniors' health* and *Maximize usefulness for family*, while Swedish providers highlight *Increase seniors' independence* and *Minimize loneliness*. These differences can be traced to the differences in the care system existing in the two countries and to public rhetoric. In Poland only some care needs are satisfied by the government and care for seniors is largely provided by the family [7]. In Sweden, the system is based on state responsibility with a strong emphasis on the universality of public service, with lesser family support. One of biggest challenges is to support patients with mental illness, Alzheimer's disease and other dementias living at home [8]. Our preliminary study suggests that providers focus mainly on those needs of seniors that are strongly recognized and unmet in the context of the prevailing socio-economic conditions of a given country, but a more thorough analysis is needed to further explore these differences.

In addition to the implications for technology providers concerning design and user inclusion, this exploratory study highlights broader concerns that are critical for the successful digital transformation of elderly care—concerns that cannot be addressed by technology providers alone. While providers are responsible for delivering usable, reliable products that meet the needs of both seniors and their caregivers, they cannot alone fulfill all the goals outlined in the value-based objectives framework [14]. Objectives such as *ensuring seniors' digital inclusion*, *fostering positive attitudes toward technology, creating supportive environments, ensuring availability* (through affordable pricing or rental models), and *increasing seniors' technical skills and knowledge* require collective efforts of multiple stakeholders, including seniors, care providers, policymakers, and technology providers. Achieving these goals demands a shift in the entire socio-technical system [10].

However, each stakeholder group may hold different priorities and value different outcomes, making digital transformation a complex and multifaceted challenge. The value-based objectives framework applied in this study focuses exclusively on seniors' needs,

which simplifies the analysis. To fully capture the complexity of digital transformation, future work should integrate the values and perspectives of all relevant stakeholders, enabling a more comprehensive analysis. Moreover, this exploratory study focuses on the general offerings of technology providers expressed on their websites. However, to really understand the technology providers' values, goals and viewpoints on the use of technology for the digital transformation of elderly care, additional studies are required. In this respect, a promising avenue of future research involves a mixed-method approach and validation of the results with the help of quantitative semantic similarity analysis.

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