Ageing and Technology – Systematic Review of the Merger of Ageing & Technology in the New Normal Era

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Abstract. Technology is massive support in the current times in living our lives. Technology surrounds every day and every bit of our daily lives. The technological advancements and their acceptance also justify the need for a complete understanding across generations. We live in a society where older people are also an integral part of society. When we check them and their needs, especially during the COVID-19 pandemic and in these new normal times, we can see that their need and quick adaptation to the surrounding seem more obligatory. Therefore, the merger of technology with age is critical. Assessing their need and looking at their well-being and better living becomes the priority for every stakeholder living in our society. Technology comes as a powerful, liberating way of backing older adults. This research follows a systematic review of journal papers published between 2000–2022 and tries to check how other researchers looking for this merger of technology and ageing are reporting in this synthesis. A detailed scientific plan is followed in extraction and analysing the seminal work done in this area in the considered time period. The research identified and reported many diverse areas where researchers worked on understanding the merger between technology and ageing. The study reported the critical areas of the technology amalgamation with age and identified the gaps in the existing theories where the future direction of work can take place. The study also highlighted specific vital takeaways for the practitioner that can be considered the next big step in this advanced technology adoption in this new normal era.

Keywords: Ageing · Technology · Older · Elderly · New normal

1 Introduction

The United Nations Report on World Population Ageing 2020's recent statistics indicates 727 million older persons aged 65 or over in 2020. The number is projected to reach 1.5 billion, almost double by 2050 as per the report. Economic and social changes are happening very fast worldwide alongside the increasing ageing population. As a result, the society around us is going through many changes. A decline in fertility, changes in marriage pattern, cohabitation and divorce, continued rural-to-urban migration in search

of livelihood are in tandem with the rapidly growing economic development. Together, all of these are constantly reshaping and redefining the living arrangements of the elderly in our societies.

In many countries across the globe, intergenerational co-residence has declined drastically. Most older people live on their own, either singly or as an older couple or unmarried children. In the developing regions where there was a persistence of traditional family structures and a culture of multi-generations living together, people are now moving out to smaller families and household types. Thus the living conditions or surroundings of the older are critical determinants of their physical, psychological and life satisfaction indices. Here, the role of technology and particular affinity towards them becomes a crucial determinant in shaping and sustaining day-to-day lives. Since early 2020, the rapid spread of the COVID-19 has hugely impacted the living of the elderly in our society (Ghosh 2022). The pandemic has redefined the focus towards the living arrangements of older among families. Even government and policymakers are realigning their policies and supporting mechanisms to support the older in our society. The Sustainable Development Plan for all the segments living in our community and the inclusion of the most vulnerable, the older, is the critical focus. This research aims to develop a comprehensive understanding of the merger and the effectiveness of the older technology through a systematic review of the literature. The study will deep dive into the available literature and the studies in the past two decades and will try and assess closely the nature of the studies that have happened in an around elderly/older considering technology. Now, that can be technology adoption, acceptance, attitude towards technology, technological merger in the lives of the elderly (Goswami and Deshmukh 2018; Ghosh 2019, 2020) and many more, primarily looking and gauging the spectrum and the effectiveness through a preliminary assessment.

The discussion of all those dimensions related to the technology and the older will be put forth a holistic understanding that will lead the path forward for some futuristic studies which can be all-inclusive and supportive in the new normal era. Especially now, where every day is a new way and where the situation is so dynamic that the adaptability for the older is even more challenging. The paper will closely conclude with practical and theoretical implications that can substantially balance the social consequences through technological mergers.

2 Methodology

This research will employ a systematic literature review method that expresses seethrough and replicable recall of essential characteristics across a particular literature field, appropriately extracted and analysed (Boell and Cecez-Kecmanovic 2015). The initial search began with deciding on the appropriate time frame, keywords and classifying data sources in stages like planning, execution and analysing. Elsevier's Scopus database, the largest database of peer-reviewed literature, was skimmed through to retrieve the relevant publications for this review during the considered timeperiod. The detailed keyword combinations for the quest encompassed 'technology and elderly', 'technology adoption', 'technological adoption by older, 'elderly and online', 'older in

online platforms', and all sorts of possible amalgamations particulars forms were considered and applied. This study evaluated reviewing articles published over the period from 2000 to 2021.

Figure 1 displays the diverse stages for systematically reviewing the literature (Tranfield et al. 2003) – (a) *planning – here we are classifying the work using keywords in the considered timeframe*; (b) *execution is the stage which* involves rigorous data search and then choosing relevant publications, and (c) *analysis comprises* of reviewing and shortlisting of the qualified publications comprehensively and transparently to identify and report the patterns in the findings systematically.

3   Findings

After studying the literature, the key emerging areas where most of the work happened in the past two decades are summarised and documented below. The summary is also supported with the help of a word cloud derived through transcribing the abstracts of the considered pieces of literature run in a text mining software LIWC-22 (the word cloud is shown below in Fig. 2). Through the meticulous scrutiny and from the emerged word cloud, we could quickly come up with the significant subject matter or the area where most of the researchers in the past two decades have focussed on when we talk about the "older and technology". The study discusses those core areas in detail in the next section to get a comprehensive understanding.

a. Technology and Elderly – Elderly's Exposure to the Technology, Internet, Social Media and Digital Platforms

Most of the earlier studies focused on the modality, built-up, convenience, and technological adoption's recompense (Sandoiu 2020, Banerjee 2020, Macdonald and Hülür 2020). However, there have also been a significant amount of studies that discussed how technology helped make the lives of the elderly easy in a very detailed manner. They focussed primarily on educating or training the older on the use of technology, understanding the attitudes towards technology and how the acceptance of technology will help them live their lives in more convenient and accessible ways. The researchers in their work discussed thoroughly how the use of technology governs the way we live our lives, especially in our routine work, in taking care of our health, our needs, and interaction with the surroundings. Moreover, the technology has made existence relaxed and convenient as almost the whole thing around us is open and reachable with the adoption of some innovative technologies (Anikeeva et al. 2019; Baker et al. 2016; Chiu et al. 2019; Gerven et al. 2003; Ghosh 2019; Guner and Acarturk 2018; Marquié et al. 2002; Selwyn et al. 2003). Thus, these studies emphasised that technology adoption or understanding or learning how to access the internet, social media and digital platforms are rewarding for the elderly. It helps make their lives better and easier and also empowers them.

b. Assistive Technology as an aid in health Support for Older/Elderly

The next segment of work discusses the usage of smart/assistive technology in the lives of the elderly and how they can facilitate and ease their lives. This is the next level of discussion in the technology adoption for the ageing segment. The discussion in

various research centred around on adoption of assistive technologies, especially the assistive technologies usage as an aid in health services, in care-giving (Fernando et al. 2009; Kader et al. 2019; Philip et al. 2015; Sapci and Sapci 2019; Snodgrass et al. 2015; Silva et al. 2018; Tiberio et al. 2012; Verloo et al. 2016; Werner et al. 2020). Then some discussions and studies talked about the training and motivating further the elderly towards the acceptance, usage and adoption of smart or assistive technologies (Astell et al. 2019; Ejdys and Halicka 2018; Masumoto et al. 2017; Ozaki et al. 2017; Popescu et al. 2017). In addition, some discussions also included concerns around the safety and security that was alarmingly raised through the use of smart or assistive technologies and also discussed that the attitude of the older gets a little dicey when it comes to safety and security, and hence they become somewhat hesitant when it comes to adoption of smart technologies (Chen 2020; Gonzalez et al. 2021; Nguyen and Le 2021; Vandemeulebroucke et al. 2021).
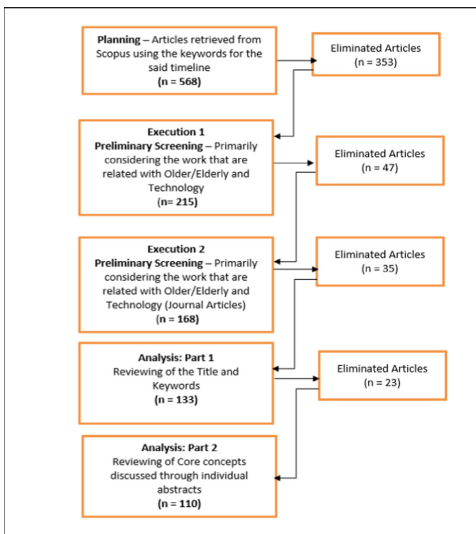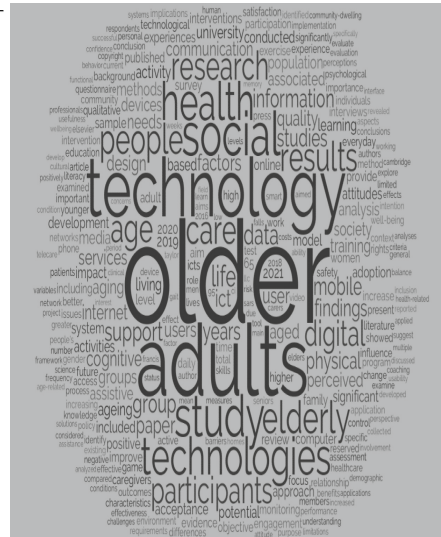

Fig. 1. Systematic literature review

Fig. 2. Word cloud from the extracted literatures

c. Perceived Communication as Stimulus of Technology Adoption by Older

The adoption of technology or smart technology, especially for the older segment, depends on how and what they have perceived about the technology through their interaction or people's experiences. Many researchers discussed in detail the role of perceived communication as an essential stimulus in the technology adoption by the older (Bosch and Currin 2015; Orellano-Colón et al. 2015; Kim et al. 2016; Myhre et al. 2017; Toms et al. 2019; Cho et al. 2020; Seifert et al. 2020). In the case of the elderly, it is evident through the studies that the older is more eager to adopt or accept technology when it is

firstly recommended by their social circles and secondly the convenience in the ease of use (Ghosh 2019).

d. Elderly and User-Friendly Technology Designs Motivates Technology Adoption
The adoption and acceptance of technology are also somehow dependent on the user design of the technology. Therefore, the researchers also discussed in-depth how the exploration of specific design interfaces some exciting features like gaming and automation drives the motivation towards the engagement with the technology (Ball and Postman 2020; Claypoole et al. 2016; Lozano Murciego et al. 2020; Outila and Kiuru 2021; Razmi 2018; Shore et al. 2019; Wong et al. 2021).

4   Discussion

The studies in this domain that were extracted and analysed of the past two decades on elderly and technology were also more tunnel-focused on the adoption and challenges of the online platforms digging and probing the underlying factors. They primarily looked at and discussed various factors that may lead to adopting and accepting technology/innovative technology. They also discussed how technology can benefit them in living their lives easier and how they can support them in the absence of their caregivers and their families. The studies also focused on the ease of accessibility, perceived communications, and exciting ways to entice them towards technological adoption. The hindrances, personal safety, and opportunities available were also some of the key discussion points that the researchers highlighted. However, a considerable gap exists where the study failed to look towards the amalgamation of social factors, primarily income and education, that may play a critical role in adopting and accepting technological aspects. While technologies make lives more convenient and manageable, they should also come in affordance. The smart homes that facilitate and ease the life of ailing older cannot be afforded universally by the masses.

Similarly, there is a substantial gap in the area focusing on technology adoption and acceptance by the female gender. Although, as reported by the WHO, 2020 report, the life expectancy of the older female is higher than the male, specific studies talking and discussing their needs specifically are lacking. This research aims to highlight these gaps and put forth the contexts on both social and technical elements to account for the interdependences stemming from the mergers and the interactions.

This study will also help practitioners look into the aspects beyond adoption, acceptance, and accessibility. The discussion spotted the need to look into the affordability of technology as a critical aspect. Making a technology or an innovation smarter, easier and more convenient is fine. However, the next step for the older should be an affordable, more secure and more customised technology that can quickly adapt to their needs. Then the mergers will be more organic and inclusive. In this new normal world, we have to be more cautious about inclusivity, which is impossible when the technology, along with being easy and convenient, is also affordable and accessible. Thus, this study expands beyond a typical literature review approach and comprises of a theoretically grounded yet practically appropriate background on the socio-technological structure to offer an all-inclusive review of literature on how the online environments around us can be more justifiable for the older living in our new normal society.

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