

# Technology and decent work in elderly care: a case study

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## Abstract

**Purpose** – This paper aims at proposing an integrative framework on technology adoption in elderly care. The framework complements transformative service research (TSR) with socio-technical systems (STS) theory to address calls for research investigating technology adoption as promoting decent work and employee wellbeing.

**Design/methodology/approach** – Research is based on a case study focusing on an Italian nursing home that adopted voice assistants in its operations. Secondary and primary data (semi-structured interviews and a group meeting) were collected and results were systematised into an integrative framework.

**Findings** – The framework, by integrating TSR and STS together with empirical data, shows that technology adoption requires considering both technical and social aspects along the technological life cycle made up of technology introduction and use phases. In particular, this framework shows that integrating social and technical systems requires leveraging a set of enabling factors (e.g. participative leadership style; joint optimisation). By so doing, it would be possible to promote decent work, resulting in the development of employees' wellbeing.

**Research limitations/implications** – This research is based on a case study, which restricts its generalisability. Hence, future research should verify the framework in other cases and the adoption of a participatory action research approach would make it possible to further refine the integrative framework.

**Practical implications** – This framework suggests that technology introduction and usage integrating social and technical systems requires the adoption of a participatory approach involving different stakeholders belonging to the service ecosystem; moreover, the establishment of organisational roles facilitating communication among stakeholders, and the promotion of formal and informal training is necessary.

**Social implications** – This study highlights that in an elderly care context, technology can be truly beneficial if it promotes decent work and fosters the achievement of staff wellbeing which, potentially, generates guests wellbeing. Thus, it is fundamental that both technological factors as well as social factors are consistently taken into consideration for technology adoption to be successful.

**Originality/value** – This research integrates TSR and STS, two perspectives that, so far, have never been applied in conjunction to the study of technology adoption in elderly care. Moreover, this research provides novel insights on a rather under-researched area: the impact of technology on nursing home employees.

**Keywords** Employee wellbeing, Transformative service research (TSR), Socio technical system theory, Case study method, Decent work

**Paper type** Research paper

## Introduction

Transformative service research (TSR) is a paradigm aimed at creating “uplifting changes and improvements in the wellbeing of consumer entities: individuals (consumers and employees), communities and the ecosystem” (Anderson *et al.*, 2013, p. 3) typically focusing on consumers who are physically, socially or mentally vulnerable, and introducing a higher purpose for service research beyond profit to improving human wellbeing (Alkire *et al.*, 2023). TSR is rooted in the concept of service inclusion, which implies that all consumers should have equal opportunities to access the resources inherent in the marketplace exchange system (Boenigk *et al.*, 2021; Fisk *et al.*, 2020). Guaranteeing service inclusion and wellbeing is particularly critical in settings where consumers might

experience a lack of control and agency (Anderson *et al.*, 2013; Johns and Davey, 2019), specifically, those of health and elderly care. In these contexts, technology could provide an invaluable contribution (Caridà *et al.*, 2024). Indeed, various types of technologies (i.e. social robots, social assistive technologies, self-service technologies and AI) offer cost-effective pathways to service excellence (Čaić *et al.*, 2018; Khaksar *et al.*, 2017), along with having a transformative potential and a positive impact on a person's autonomy and wellbeing (Bianchi, 2021; Hammedi *et al.*, 2017; Henkel *et al.*, 2020). Therefore, technological innovations represent a prime opportunity for making a service transformative (Ungaro *et al.*, 2024) and supporting equity

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(Hasni *et al.*, 2025). However, technology on its own is not sufficient for improving consumer wellbeing. Indeed, as TSR indicated, consumer wellbeing and value are co-created through the interactions between consumers and a diverse range of stakeholders which make up the service ecosystem (e.g. families, service providers' employees, formal caregivers, etc.) (Bast *et al.*, 2024; Carlini, 2025). Thus, the role of the service ecosystem in relation to technology adoption in health and elderly care proves to be pivotal since, for instance, employees of a nursing home are essential in enabling the use of technology, offering technical assistance and promoting social interactions that improve technology efficacy and, thus, support the overall wellbeing of older adults (Kelly *et al.*, 2023; Peek *et al.*, 2014). Although TSR has been applied to study the health and elderly care sectors, this has been carried out mainly from a service-driven perspective, i.e. the focus is on the service providers and what they can do so that the patients' wellbeing is achieved (Gallan *et al.*, 2019). This means that the patients' outcomes are at the core, but considering the service ecosystem and its role in technology adoption, it is also necessary to study employee wellbeing and how it is impacted by technology. In fact, technology may improve staff wellbeing, since it provides the opportunity of replacing "dirty" and unfulfilling tasks (Russell-Bennett *et al.*, 2024), and, as a result, promotes decent work for employees (Russell-Bennett and Rosenbaum, 2022). By so doing, employees can better dedicate themselves to the care of the elderly, with the final outcome that the overall wellbeing of older adults is improved. Thus, it is fundamental to study the impact that technology has in facilitating decent work and employee wellbeing, and this is an area on which calls for research have been raised (Anderson *et al.*, 2013; Subramony and Rosenbaum, 2024).

This paper addresses the aforementioned shortcomings by complementing TSR with the socio-technical system (STS) theory (Emery and Trist, 1965; Trist and Bamforth, 1951). STS is a theory based on the idea that organisations are complex systems in which social elements (such as individuals, relationships, values, structure, work-related elements and associations), and technical elements (such as tools, techniques, skills and devices that workers need to fulfil an organisational task) coexist and must be both taken into account if organisations want to succeed (Trist and Bamforth, 1951; Emery, 1993; Pasmore *et al.*, 1982). We believe that STS could contribute to filling the evidenced gaps in the TSR literature – i.e. the lack of an employee-based perspective and the focus on technology adoption and the related decent working conditions as a driver of the ecosystem's wellbeing – for various reasons. Firstly, because STS theory has always shown a strong connection to quality of working life (QWL) (Guest *et al.*, 2022), as a precursor of decent work. Secondly, because the STS approach adopts a multi-stakeholder perspective as a preliminary condition for guaranteeing individual and societal wellbeing (Pasmore *et al.*, 2019), aligning to the TSR principles (Rosenbaum *et al.*, 2011; Finsterwalder *et al.*, 2017). Furthermore, the STS approach has been extended to service, in response to the recent calls to adopt an employee perspective in service ecosystems and to investigate how technology can complement human service qualities (Larivière *et al.*, 2017; Marinova *et al.*, 2017). However, while recent studies revealed how technologies

augment service work (Waelbers *et al.*, 2026), with STS theory identified as a potential solution for improving employee wellbeing (Phillips *et al.*, 2025), so far no studies actually provided operational guidelines on how the STS principles can be extended to the context of elderly care to favour decent work through technology adoption to ultimately elevate the ecosystem's wellbeing.

This research, based on a case study of a nursing home adopting voice assistants, aims at integrating the TSR and STS lenses to extend their principles to services for the elderly. By adopting a service ecosystem perspective, a framework is presented that highlights factors enabling the integration of social and technical sub-systems, across the various stages of the technological life cycle (i.e. technology introduction and use), and organisational roles that should support technology adoption.

The paper is articulated as follows. Firstly, the literature review analyses TSR with a focus on the entire service ecosystem and the role of mediators in guaranteeing wellbeing in the context of elderly care. Then, based on the transformative potential of technology and on its impact on stakeholders' wellbeing, we reviewed the literature on technology adoption in elderly care, with a specific focus on the role of staff. Finally, we briefly review the literature on STS theory, focusing on the contributions that are correlated to the Quality of Working Life. Following this, the methodology presents the case study and the procedure adopted for data collection. We then report the main results of our case study and the theoretical framework. Managerial implication, limitations and future directions of our research are then included in the final section.

## Literature background

### Transformative service research

TSR is an approach that aims at providing individuals (consumers and employees), organisations and, more broadly, service ecosystems with improvements in their wellbeing through service interactions (Anderson *et al.*, 2013; Giraldo *et al.*, 2026; Fisk *et al.*, 2020). The concept of service ecosystem – understood as the network of interacting actors and resources (Finsterwalder *et al.*, 2017) – is central within TSR, according to which wellbeing is generated through exchanges among stakeholders belonging to the broad service ecosystem and not just between consumers and service providers (Rosenbaum *et al.*, 2011; Caridà *et al.*, 2024). Examples of these stakeholders in the service ecosystem, depending on the service being delivered, are consumers, end users of a service, families, caregivers, service providers' employees and volunteers (Bast *et al.*, 2024; Carlini, 2025). The role of these stakeholders is pivotal in services aimed at vulnerable consumers, for instance those receiving health care or services aimed at the elderly, since these individuals often face a diminished sense of control and agency (Anderson *et al.*, 2013; Johns and Davey, 2019) and they may not be able to participate in the co-creation of value without the support of another person (Bianchi, 2021). For instance, Gallan *et al.* (2019) highlighted the pivotal part that doctors, nurses, families and patients play in the provision of services in healthcare. More specifically, in these contexts, stakeholders are mediators who may execute different

functions in the service ecosystem as recent research has demonstrated (Keating *et al.*, 2025; Bast *et al.*, 2024).

Since a service ecosystem is populated by such a varied range of stakeholders, difficulties may arise, in that different stakeholders may have diverging objectives, they may present power imbalances, and they may lack a shared vision; with the consequence that these difficulties may negatively affect stakeholder wellbeing (Hasni *et al.*, 2025). Among the various stakeholders, service providers' employees play a key role due to their direct relationship with patients and the elderly but TSR, although it is service-driven – i.e. focused on the service provider who can facilitate the development of customer wellbeing (Finsterwalder *et al.*, 2017) – still tends to be more focused on the customers' outcomes. For instance, in a research in the healthcare sector, Gallan *et al.* (2019) proposed the Patient Ecosystem Management process aimed at achieving patient wellbeing. However, as it was pointed out by Edgar *et al.* (2017) it is also necessary to take into account employee wellbeing, since they impact on the service delivery and, as a result, on consumer wellbeing; for this reason, research on the employees perspective started developing (Nasr and Fisk, 2019).

In the TSR service ecosystem, not only actors are important, but also material and immaterial resources should be taken into consideration (Chen *et al.*, 2023). Specifically, Russell-Bennett *et al.* (2019) highlighted technology as an element that, together with organisations and people, contributes to the co-creation of wellbeing. However, according to Finsterwalder *et al.* (2017) TSR falls short at including resources, and technology is one resource requiring further research. For instance, Fisk *et al.* (2018) proposed a number of questions for advancing research on social inclusion and among them were included further studies on how technology can facilitate the design of inclusive services. In this case, although the focus is on service providers, since technology should support service delivery, the final outcome receiving attention refers to consumers. More recently, other calls for further research have been proposed to study how technology can contribute to the development of wellbeing (Rosenbaum and Russell-Bennett, 2021). Furthermore, the need to research the impact of technology on service employee wellbeing has been highlighted, as well as the management of interactions between employees and technologies (Ostrom *et al.*, 2021). These calls for additional research are particularly relevant in the context of care, where studies have been mainly focused on the users' perspectives, while the employees' perspective has been largely neglected (for instance, Tsoli *et al.*, 2018). As a consequence, due to the role of employees in service delivery and technology that can support employees in achieving decent work and, subsequently, in improving patient wellbeing, it is necessary to study the impact of technology on employee wellbeing and decent work.

### Technology and elderly care: the role of staff

Technology in elderly care allows the improvement of decision-making processes as well as the reduction of administrative burdens, resulting in additional time and energy that can be devoted to relational work with nursing home guests (Curtis and Brooks, 2020; Wilson *et al.*, 2020). However, the successful implementation of technology in this context does

not happen on its own. Implementation science research has consistently shown that contextual factors – including organisational readiness and the characteristics of the individuals involved – are as decisive as the properties of the technology itself (Damschroder *et al.*, 2009). For instance, the successful integration of technologies requires that staff are prepared, are adequately trained and have opportunities to experiment with devices while preserving humanised care (Li *et al.*, 2022). In addition to this, within nursing homes there must be a technology-friendly culture, as well as robust data protection practices (Li *et al.*, 2022; Ko *et al.*, 2018; Curtis and Brooks, 2020). Where these conditions are missing, staff are more likely to experience technology as a source of disruption (McDonald *et al.*, 2019); indeed, research has shown that many promising technological innovations in health and social care are characterised by non-adoption or abandonment when organisational complexity and staff conditions are not adequately addressed (Greenhalgh *et al.*, 2017). This is particularly evident in elderly care settings, where barriers to technology adoption include not only inadequate training and technical issues, but also systemic fragmentation, misalignment between service supply and staff needs, and persistent workforce shortages that undermine the conditions for sustainable implementation (Meixia *et al.*, 2026). Hence, lack of employee training, along with technical issues and heavy workloads, are all factors that hinder the adoption of technology because they increase the employees' scepticism and resistance towards technology (Cao *et al.*, 2022; Cutler *et al.*, 2022; Lee and Coughlin, 2015).

Furthermore, previous research has also shown that technology adoption cannot be disentangled from staffing patterns and working conditions. For instance, in smaller nursing homes, where staff-to-resident ratios are perceived as adequate, employees are able to use digital tools in ways that support person-centered care; while in larger nursing homes, those same tools are viewed as an additional burden to the daily workload (Curtis and Brooks, 2020; Ko *et al.*, 2018).

Hence, the adoption of technology in elderly care cannot be separated from the employees' working conditions, indeed, technology should support the development of employee wellbeing along with that of nursing home guests (Russell-Bennett *et al.*, 2024). For this reason, recent calls for research aimed at studying decent work and employee wellbeing, in conjunction with technological design and service performance, have been advanced (Colurcio *et al.*, 2025). In this context, the role of decent work referring to fair wages, contractual stability, professional development opportunities, decision-making autonomy and work–life balance is fundamental (Della Lucia *et al.*, 2025). From a decent work-oriented TSR perspective, digital innovation in elderly care is only successful when it simultaneously improves the lives of nursing home guests and increases the dignity, safety and development opportunities of the staff who provide care on a daily basis (Subramony and Rosenbaum, 2024; Russell-Bennett *et al.*, 2024).

This is coherent with sociotechnical perspectives on co-design in digital health, which have demonstrated that technology change efforts fail when they focus exclusively on the technical interface without reshaping the broader work

organisational environment and practices (Papoutsis *et al.*, 2021).

### The socio-technical system (STS) theory

The socio-technical approach can be defined as a “method of viewing organisations which emphasises the interrelations of the functioning of the social and technological subsystems and the relations of the organisation as a whole to the environment in which it operates” (Pasmore *et al.*, 1982, p. 1182). Developed in the mining industry in 1950s (Emery and Trist, 1965; Trist and Bamforth, 1951), this approach was further developed in response to dominant technocratic models characterised by techno-centrism and ignoring human factors (Kling, 1980; Trist, 1981). STS theory, indeed, states that the success of the socio-technical system is a product of the interactions between the two systems, with the social subsystem consisting of the individuals that constitute an organisation as well as the relationships, values, structure, work-related elements and associations formed by organisational members, and the technical subsystem comprising tools, techniques, skills and devices that workers need to fulfil organisational tasks (Trist and Bamforth, 1951; Emery, 1993; Pasmore *et al.*, 1982).

The STS paradigm thus embraces a perspective where individuals are viewed as “resources to be developed”, empowered by collaboration, collegiality, commitment, and supported by flat organisations based on self-regulation, and participative style (Trist, 1981). Since the social system is necessary for rebalancing the technological hegemony typical of the technocentric approach, the STS theory has always shown a strong connection to QWL (Guest *et al.*, 2022), and, consequently, to decent work. QWL includes characteristics such as: adequate and fair compensation; safe and healthy working conditions; opportunity to use and develop human capabilities; opportunities for continued growth and security; social integration in the work organisation, work and life balance (Walton, 1973). Since the outcome of QWL is the achievement of wellbeing at work and beyond (Guest *et al.*, 2022), QWL can represent a precursor of today’s decent work (Su and Chan, 2023).

Although various studies highlighted how the adoption of an STS approach resulted in improvements in QWL (Cherns, 1976; Miller, 1975), over the years, the application of STS and QWL have faced considerable challenges. Research on STS and QWL gained recent renewed attention due to the development of digital technology (Guest *et al.*, 2022). Despite the assumption that technology represents one of the primary drivers of successful digital transformation (Kane, 2019), many cases demonstrated how technologies alone neither improve productivity, nor generate healthy workplaces. As a result, the integration of social and technical systems seems to be more relevant than ever in a contemporary society driven by technological change (Guest *et al.*, 2022), with new technologies rapidly outpacing the development of new organisational designs (Pasmore *et al.*, 2019).

To be adapted to the present social and technical disruption (Pasmore *et al.*, 2019) the theoretical development and practical implementation of STS and QWL should be driven by renewed guiding principles (Guest *et al.*, 2022), many of which are aligned to the TSR perspective (Rosenbaum *et al.*, 2011;

Finsterwalder *et al.*, 2017) (i.e. mutual interests to be optimised, and the need for awareness of a stakeholder perspective as potentially leading to different outcomes such as individual wellbeing, organisational effectiveness and societal wellbeing).

Among the various contributions extending the STS theory to the new digital technologies, some scholars recently expanded this theory to fit the contemporary purposes and to better achieve QWL. Specifically, Parker *et al.* (2025) introduced the concept of Co-evolving Socio-Technical System (CeSTS). The adoption of a co-evolving approach to the STS expands thinking across time, in that it posits the necessity of considering social and technical aspects affecting each other along the entire technology life cycle (i.e. in the steps of technology design, development and use). This approach contemporarily embraces a multi-level approach, recommending considering social and technical factors at different levels (i.e. at the individual, team, organisation and society level). These tenets of the CeSTS approach, attention to the technology life cycle and to the multiple levels at which socio-technical factors operate, provide the analytical backbone of the framework developed in this paper.

To proactively address global challenges such as the UN’s Sustainable Development Goals (SDGs) or future workplace design, recent contributions showed how the STS theory can be further supported by specific operational directions. Specifically, Davis *et al.* (2025) discussed the need to extend the stakeholders’ categories to include the wide range of individuals, groups and organisations involved in contemporary design challenges, remarking the extended multi-stakeholder perspective already emphasised in the previously mentioned studies, as well as in the TSR theory (Rosenbaum *et al.*, 2011; Finsterwalder *et al.*, 2017). Secondly, they highlight the importance of socio-digital learning as enabler of effective socio-technical systems, observing the centrality of peer networks and informal learning to support the development of shared competencies and skills, and suggest social structures and groups within organisation, in addition to more formalised training to develop socio-digital capabilities. Finally, they argue the necessity of adopting the role of expert facilitators to aid collaboration, of upskilling in stakeholder management, and of identifying and developing new socio-digital skills.

In response to the recent calls to adopt an employee perspective in service ecosystems and to investigate how technology can complement human service qualities (Larivière *et al.*, 2017; Marinova *et al.*, 2017), Waelbers *et al.* (2026) demonstrated how service outcomes depend on the way technical and social subsystems work together. Indeed, in the service context, technologies complement human strengths, such as empathy, judgement and contextual adaptation, with technologies shaping emotion regulation, monitoring and wellbeing, as central to the employee experience (Bakker and Demerouti, 2007).

As a result, recent contributions adopted a socio-technical perspective to better support the adoption of new technologies in the field of digital health and health informatics, as well as in long-term care settings.

Consistently with the renewed precepts of STS, these contributions confirm the importance of framing participation

and consultation as active components of workplace engagement (Åhlin *et al.*, 2022) to improve care providers' experiences and their ability to deliver high-quality care (Sundgren *et al.*, 2020). In long-term care specifically, sociotechnical research has shown that a consultative and participative work environment, adequate time to deliver high-quality care and efficient allocation of human resources are the key enabling conditions for successful technology integration (Chiu and Hsieh, 2025). Furthermore, since employee knowledge and professional skills are considered to be key resources for organisations (Harte *et al.*, 2017), providing specialised training as well as clear role definition for social and community workers are recommended as being necessary for enhancing their professionalism and effectiveness within the smart care ecosystem (Meixia *et al.*, 2026).

## Method

### Research setting

The research team studied one nursing home in the North of Italy because it was the first such facility in the country in which voice assistants were piloted. These devices were installed with the aim of allowing their use by guests and their families, but also by employees of the nursing home. The main objective for using these devices was to improve the social life of guests who could use them for making videocalls with their families, reading the news and so forth. Hence, the usage of the device was not strictly related to medical purposes. This makes our study different from previous research that focused on voice assistants for detecting and diagnosing conditions (Philip *et al.*, 2017; Tanaka *et al.*, 2017; Rehman *et al.*, 2020), monitoring behaviour and delivering interventions (Maharjan *et al.*, 2019; Vora *et al.*, 2017). Furthermore, the nursing home was included in a service ecosystem in which technological resources were embedded. The service ecosystem was composed of a number of organisations such as a facility management company that was responsible for delivering services in the nursing home (e.g. laundry service, etc.); the voice assistant provider; and an IT business that was in charge of the installation of the devices, as well as of the collection and analysis of data from the device. Since the nursing home was included in a service ecosystem, it was suited for the study of both TSR and STS principles.

The pilot project through which the nursing home was given 20 voice assistants started in February 2023 and the nursing home was chosen because it met two essential conditions, i.e. it had a stable Internet connection, and there were guests who had cognitive capabilities sufficient for using the devices. These devices were installed in the shared rooms, some of the guests' bedrooms and the staff rooms. Hence, the devices could be used by both nursing home guests and staff.

### Data collection and analysis

Due to the dearth of previous studies on the role played by technology in the facilitation of decent work, this research was based on a case study which made it possible to research a unit of study within its context (Yin, 2017). By applying a case study approach, it was possible to collect a diverse range of data and, in this way, gain a thorough understanding of the phenomenon under investigation (Ebneyamini and Sadeghi Moghadam, 2018).

Data comprised: analytics from the devices that were used to highlight the devices usage, semi-structured interviews and a group meeting with staff from the various organisations involved in the project (see Table 1).

As far as data analytics are concerned, two sets of data were available: one from the IT business that developed *ad hoc* functionalities for the nursing home and one from the device provider. With regard to the former, data covered the period ranging from the beginning of February to the end of September 2023 with a total of 481 utilisations; while with regard to the latter, data covered the period ranging from mid-May to the end of September 2023, for a total of 6,996 utilisations. The two sets of data covered different periods of time, because the device provider did not have any data to share from the initial stages of the project due to technical issues.

With regard to the qualitative data, semi-structured interviews with nursing home staff were carried out. Furthermore, a group meeting with representatives of the different organisations of the service ecosystem was organised.

As far as interviews are concerned, a total of ten interviews with nine people were carried out (the nursing home scheduled the interviews considering the interviewees' work schedule and the head nurse attended two different interviews). Semi-structured interviews were based on an interview protocol that was developed by the research team and that included questions inspired by previous research in ageing studies, TSR and STS (Li *et al.*, 2022; McDonald *et al.*, 2019; Ostrom *et al.*, 2021; Waycott *et al.*, 2022; Parker *et al.*, 2025). Informed consent was requested and obtained upon their participation, and all interviews were recorded and transcribed *verbatim*. Interview transcripts were then analysed.

Furthermore, a group meeting was attended by nine people from the nursing home and the facility management business. The research team took notes during the meeting and these were subsequently analysed.

The interviews and the group meeting took place between July 2023 and February 2025, thus allowing the team to take into account any changes that occurred over time. Indeed, since data collection took place over several months, it was possible to ask interviewees about any changes that took place in the usage of the devices. Moreover, since we interviewed some staff members who were working at the nursing home when the project started, it was possible to have insights on how the project was created and how it developed over time.

This research was based on the principles of "adaptive theory", requiring that both inductive and deductive approaches were adopted at the same time, meaning that our framework was developed from pre-existing theories, which were reflexively adapted from data (Layder, 1998). In addition to this, further developments to the framework were considered while analysing data and, finally, new constructs emerging from the analysis of the data were also added to our framework.

More precisely, interview transcripts and notes from the group meeting were analysed through structural and descriptive coding. The former allowed for the coding of interviews according to the topics of TSR and STS (Saldaña, 2009); while the latter allowed for the coding of all of the portions of text that were not directly related to the aforementioned theories. Following this, elaborative coding was carried out (Saldaña, 2009) with the aim of refining our

Table 1 Overview of primary data collection

| Id  | Organisation                 | Role                                                                             | Interview | Group meeting |
|-----|------------------------------|----------------------------------------------------------------------------------|-----------|---------------|
| I01 | Facility management business | Manager                                                                          | X         | X             |
| I02 | Facility management business | One of the 'managers' assistant                                                  |           | X             |
| I03 | Device provider              | Business developer                                                               | X         |               |
| I04 | Facility management business | Manager                                                                          |           | X             |
| I05 | Facility management business | Manager                                                                          |           | X             |
| I06 | Nursing home                 | Administrative, former healthcare assistant                                      | X         |               |
| I07 | Nursing home                 | Administrative director                                                          | X         |               |
| I08 | Nursing home                 | Former administrative director (in charge during the adoption of the technology) |           | X             |
| I09 | Nursing home                 | Educator                                                                         | X         | X             |
| I10 | Nursing home                 | Educator                                                                         | X         | X             |
| I11 | Nursing home                 | Head of nurses                                                                   | X*        | X             |
| I12 | Nursing home                 | MD                                                                               | X         | X             |
| I13 | Nursing home                 | Physiotherapist                                                                  | X         |               |

Note(s): \*Person interviewed twice

Source(s): Authors' own work

framework. Throughout this process, codes were changed and added when analysing the interviews.

## Results

Analytics from the devices show that in the first months of usage the most used functions specifically developed for the nursing home referred to the menus, daily activities carried out in the nursing home and to the guests' birthdays (Table 2); while with regard to more general type of usage, audio services were the most used (Table 3).

However, from the analytics it is not possible to distinguish whether the devices were used by a guest, a staff member or by one of the guests' relatives. It is only possible to state that all three groups of people were using the devices, and the families were probably keen on knowing what their family member was eating or doing during the day.

Overall, results show that the smart voice assistant was not used very often, especially with regard to *ad hoc* functions for

the nursing home, and from our analysis of qualitative data, several issues have been identified which could explain this low usage. In particular, from our data it was possible to distinguish issues related to two stages:

- 1 technology introduction which referred to the installation of the devices and their use during the first week of the project, in which employees from the different organisations were present in the nursing home; and
- 2 technology use referred to the weeks following the first one, and in which the nursing home staff was working on its own with the devices.

### Technology introduction

The introduction of voice assistants in the nursing home entailed that several organisations were involved in the project, such as the facility management business, the device provider, the IT business and the nursing home. However, several employees of the nursing home highlighted how much the adoption of the devices was felt to be imposed upon them, for instance, one of the interviewees said:

This thing [the devices] was imposed upon us. One day we were told, "look, you will be part of this project through which voice assistants will be installed", but we were all sceptical about this. [...] We were not given the chance to say whether it made sense or not. No, there are these devices, let's start with this projec (I11).

Similarly, other interviewees highlighted:

They [i.e., the staff of the IT business] had not much time to launch the project, I don't know who set the deadline, but I know that they had to speed up because they had a deadline to meet. Hence, [the project] was presented in a rush. I think that partially it was due to the fact that our nursing home was living a post-COVID period and that it was not particularly calm from a work point of view, we were caught unaware (I07).

It was not a choice, it was not a decision shared with us. [...] The overall idea didn't start from us, our needs, it came as an external proposal to use it during the activities, with the invitation to use it as much as possible, but it wasn't a choice (I10).

Thus, from interviews it emerged that the adoption of voice assistants was done through an autocratic approach (Trist, 1981), imposed top-down, and without receiving any feedback from the people who were using them. As a consequence, a techno-centric view prevailed, i.e. IT developers took their own

Table 2 Analytics from the voice assistant devices (February–September 2023) – functions developed by the IT business

| Functions for the nursing home<br>(developed by the IT business) | # times a function<br>was used |
|------------------------------------------------------------------|--------------------------------|
| Menu                                                             | 225                            |
| Daily activities                                                 | 106                            |
| Room number                                                      | 62 <sup>a</sup>                |
| Birthdays                                                        | 30                             |
| Tell me something                                                | 18                             |
| New visitor has arrived                                          | 17 <sup>a</sup>                |
| Time of lunch/dinner                                             | 12                             |
| What time is it?                                                 | 5                              |
| General information                                              | 3                              |
| How to connect to the Wi-Fi                                      | 3                              |
| Total                                                            | 481                            |

Note(s): <sup>a</sup>Data include tests carried out by staff of the IT business

Source(s): Authors' own work

**Table 3** Analytics from the voice assistant devices (May–September 2023) – functions developed by the device provider

| Generic functions (developed by the device provider)                                           | # times a function was used |
|------------------------------------------------------------------------------------------------|-----------------------------|
| Audio (i.e. music and audiobooks)                                                              | 2,066                       |
| Other requests                                                                                 | 1,694                       |
| Funny stories and jokes                                                                        | 205                         |
| General questions (not related to the nursing home E.g. questions on history, geography, etc.) | 133                         |
| Videos                                                                                         | 133                         |
| Home productivity (e.g. alarm clock)                                                           | 62                          |
| Communications between devices                                                                 | 21                          |
| Daily news from the world                                                                      | 18                          |
| Smart home (e.g. requests to control other smart devices)                                      | 8                           |
| Language services (e.g. translation)                                                           | 6                           |
| Games                                                                                          | 2                           |
| Any request outside from the above categories (e.g. to stop the device doing something, etc.)  | 2,648                       |
| <b>Total</b>                                                                                   | <b>6,996</b>                |

Source(s): Authors' own work

decisions without investigating the needs and wants of other stakeholders, in particular the nursing 'home's employees.

As a result of this, the businesses involved lacked a general understanding of the nursing home itself; for instance, one interviewee mentioned:

They [the facility management business managers] came here to see the nursing home but the initial presentation [of the project] was based on a completely different type of facility. I remember that the manager X was talking about foreign facilities made up of small flats in which there is not even an MD because they are hospitality structures, providing support and not healthcare. Instead, we are more similar to a general medicine hospital unit (I12).

The above quote shows the impact that the organisational environment in which managers were working (i.e. a multinational organisation providing services to nursing homes in different countries) had on their behaviour. In particular, it became evident from the interviews that the specific context of the Italian nursing homes was ignored. Indeed, the sector is heavily regulated by national and regional laws; moreover, culturally, the Italians prefer to take care of the elderly at home so that they can enjoy their house and their family, while a nursing home is considered the last resort when health conditions deteriorate so much that keeping the person at home is no longer feasible. Related to this lack of knowledge from managers is also the fact that they ignored the health conditions of guests who were in the nursing home. Indeed, as the employees of the nursing home stressed in several occasions, the general health conditions of guests have declined over the years, negatively affecting their chances to interact with voice assistants: for instance, one of the interviewees stated:

At the moment, the situation is that guests are extremely cognitively weak, they are not able to interact with the voice assistant (I12).

All the aforementioned examples can be explained by a focus towards the purpose of the external organisations (in this case, represented by the IT business, the facility management business and the device provider), disregarding the purpose of other stakeholders (Guest *et al.*, 2022; Parker *et al.*, 2025) such as the nursing home and its members, i.e. the nursing home's employees. This is the result of the different mindsets and perspectives of the people involved in the project (Guest *et al.*, 2022; Parker *et al.*, 2025), which were not fully integrated.

All the above quotes highlight how much a technological imperative (Trist, 1981) was developed, i.e. technical aspects prevailed over social ones. Indeed, the IT developers heavily focused on the technology itself; while the nursing home employees considered their daily activities and the specific context of the nursing home.

The adoption of this top-down approach resulted in a lack of commitment to the project from the nursing home employees who did not promote the usage of the devices once all voice assistants were installed.

### Technology use

Once all devices were installed in the nursing home, employees received some initial support from the IT business, especially with regard to the programming of the device in relation to the update of the daily menu of guests, activities taking place in the nursing home and guests' birthdays. However, the level of the employees' training was limited. For instance, different employees highlighted that they were given a leaflet describing the main functionalities of the devices (e.g. how to ask for the time; how to ask for the daily menu, etc.), but this piece of information was the same that was given to the guests' families; no *ad hoc* training sessions were organised for them.

Another issue that emerged during the usage of the device was the varying technology literacy of employees and guests. With regard to the former, it appeared that those who had voice assistants at home were able to help other employees who were not familiar with them. For instance, one interviewee mentioned:

I don't have a voice assistant [at home] and I don't have an interest in it. Thus, I didn't know how to use the voice assistant and I don't know how to use it particularly well. Some colleagues who were able to use it better than me gave me some suggestions (I09).

While, with regard to the nursing home's guests, technology literacy was generally low, but this was considered to be normal, since current guests are from a generation that did not have technologies throughout their lives. Nevertheless, in the interviews it was highlighted that there were a few guests who were autonomous in the usage of the voice assistants because

they were already using technology in their daily lives (e.g. a smartphone). For instance, one interviewee mentioned:

There is Miss Y who uses Facebook on the phone and we even had to take the phone from her at night, otherwise she would use it until late. Since she is already into technology, she uses the voice assistant (I12).

This suggests that it was not taken into account the fact that employees might have needed *ad hoc* training to fill the gap in their simple narrow skills (Pasmore, 1988; Parker *et al.*, 2025; Davis *et al.*, 2025), insufficient for managing the devices and to provide adequate support to the guests who wanted to use them.

Moreover, what was made clear at the beginning of the technology use was that the nursing home employees had to take care of the programming of the voice assistants. Indeed, two interviewees mentioned:

I07: They [the IT business] supported us in the sense that they gave to some employees, those who could update the voice assistant, the credentials in order to be able to do it and they showed them [what to do].

I11: Yes, they programmed it [the voice assistant] when they connected it during the first week and they said, “we have programmed the first month, then you will have to take care of it”.

The second quote exemplifies an issue that employees raised in several occasions, i.e. the amount of work necessary to program the different functions of the devices. For example, voice assistants could also be used for communicating activities taking place in the nursing home and make people aware of these, but this entailed that the voice assistant had to be programmed accordingly. For instance, one interviewee stated:

[...] The only activity I personally programmed is the weekly Mass and half an hour before it takes place, all devices say “In half an hour the Mass will take place in the Church on the ground floor”. Thus, I programmed this activity for every Wednesday at 9:30 am, but that is a kind of programming that you do once and then you do not change it. Instead, if the menu is seasonal, then you need to change it. The birthdays have to be changed, because you have to take out the birthdays of guests who passed away and you have to add the birthdays of new guests. It’s a lot of work! (I07).

Hence, the programming of the device and the related time necessary for performing this task were felt to be particularly heavy, with the result that the voice assistant was not perceived as very beneficial, especially by the nurses and the healthcare assistants. Indeed, as one interviewee mentioned:

[...] Time is limited and, unfortunately, the amount of bureaucracy we have to face is really high. You have to write the diaries [of guests], record each activity, everything, all this is time-consuming. Thus, it would be interesting if I could talk to the voice assistant and it would update the guests’ care reports, this would make the device more appealing and it would help in lowering our work a bit, but this would be an internal usage, not a service to the guests (I11).

Another function of the devices was related to the daily menus of guests that could be uploaded on the voice assistants (Table 2). In this way, it was possible to ask what the menu for a specific day was, thus satisfying the information needs of families. However, when a member of the nursing home staff tried to do it, she found out that the task was not particularly easy, as she said:

[...] To update the menu [...] you need to take one day to do it, create the database, which is not a big issue. The real problem is that you cannot delete the previous menu all at once, but you have to enter [in the system] each day and each time you have to make the changes. This is terrible (I09).

These quotes are another example showing the extent to which the external organisations did not know the operations of a nursing home, with particular regard to the bureaucratic tasks

that employees must carry out by law, such as the daily update of the guests’ care reports which must be filled in by both nurses and educators. Hence, the voice assistants, rather than being devices that could support the employees’ job, they were, instead, aggravating their daily job.

Overall, employees were clear in voicing their frustration towards the devices. They were alienated (Trist, 1981), since voice assistants were seen as something that was creating more work on top of the work that employees were already doing. Moreover, for making technology more efficient, employees had to carry out several tasks which were repetitive, boring and required too many small tasks, in STS terms, it is possible to state that there was multi-task breakdown (Trist and Bamforth, 1951).

More broadly, it was acknowledged that following the initial presentation of the project, the nursing home staff members were never contacted to be asked how things were going and whether or not the device was used, there was a general feeling of being abandoned. Interestingly, in the interviews employees highlighted that there were other occasions in which they asked for support from the businesses, but they never received any help. In these cases, the final result was that the technology remained unused because employees were simply waiting for the businesses to come up with the needed solutions. Indeed, not all employees were given the necessary credentials for programming the device, with the result that a limited number of staff members were allowed to do it. Similarly, with reference to the relationships between the nursing home and the IT business staff, one employee was nominated to be the person in charge of this. However, as it was reported in our interviews, the support received by the IT business was mainly related to the initial stages of the project or to technical issues. In one instance, one of the devices stopped working and the IT business replaced it with a new one. Instead, for any questions or issues encountered during the usage, the nursing home had to contact the IT business whose staff had to investigate the issue raised or had to check whether a specific task could be performed, but on several occasions, nursing home staff members said that they were never given a solution.

These are clear examples of a service ecosystem based on external controls (Trist, 1981), i.e. the nursing home was dependent on the other businesses for fixing any issues they were encountering. Such a situation meant that employees did not control the technology, with the consequence that their job autonomy and discretion was affected, in that they could not deal with the problems that arose (Trist and Bamforth, 1951; Pasmore *et al.*, 2019; Parker *et al.*, 2025).

Issues with usage of the devices emerged also in relation to other functions that did not require any sort of programming. For instance, although the educators admitted that the devices had great potential as a tool supporting their job with guests, the reality was that both the hardware and the software were not adapted to suit a senior user. From a hardware point of view, the voice assistants were required to be constantly plugged in in the electricity, thus reducing the chance to move them near those guests who had hearing problems. From a software point of view, even if the devices had incorporated a number of free games, they were not suitable for the elderly, as one educator stated in the interview:

[...] We tried to carry out some activities and the voice assistant proposes some games and I tried to use them. However, it understands very little of what you are trying to ask it, then when it gives you to answer, it is not suitable to the hearing problems of our guests. For example, if you want to play the game “names, things, cities” it forms the team, that’s great, but then the guests answer and the voice assistant doesn’t hear the answer, or you have to repeat the question to the guests and the device hears you while you are repeating the question and it thinks you are answering. [...] It is not feasible using it because its times are not suitable for a senior person. [...] Playing with guests and the voice assistant is interesting and the guests were surprised about this thing, but then you have to keep the device connected to the electricity which means that you cannot move it close to the person who is speaking, but in any case, this person is not able to interact on his/her own with it (I09).

Together with this issue, there was also the difficulty that guests had in pronouncing the name of the voice assistant with the result that the device did not work, for instance it was mentioned that:

The voice assistant is interesting, but if you want the guests to use it, it is difficult because they don’t hear properly, they don’t understand what the voice assistant is and they call it with a wrong name, so the voice assistant doesn’t answer (I10).

The consequence arising from all the aforementioned issues was that the device usage was very limited, mainly related to listening to the music (as shown in Table 3). However, also in that area, employees experienced issues; indeed, following the first months of usage they were not able to request music from specific artists, but they could only request a music genre or listen to the radio and, once again, this was an issue that was raised to the businesses during the group meeting, but nobody resolved the problem. This issue also had an impact on the work of educators, because at the beginning they were using the voice assistants to play music games with guests, but this activity could not be proposed in a continuous way, unless the educators used other devices. Thus, the majority of employees listened to the music when they were carrying out repetitive tasks, mainly when they were not with guests. Healthcare assistants and physiotherapists were among the employees who used the devices for listening to music while being with guests (with the former using them more frequently than the latter). On this point two interviewees stated:

[...] The voice assistant is mainly used for listening to music during the hygiene [of guests] and as a support to help guests relax (I06).

I sometimes used music when I was treating guests who were in bed in the afternoon and it came to my mind to put on some music [...], but sometimes it is annoying. For example, I could use it during the group gymnastics but it might bother them [the guests], so from that perspective, I never used it (I13).

Additionally, the chance to update the guests’ health reports through the voice assistant was discussed during the group meeting. On that occasion, contrary to what the nursing home’s employees reported in the interviews, staff found out that due to a change in regulations, it would have been possible to connect the voice assistants and the guests’ health reports, so that the devices could be used for that purpose. However, following the group meeting, no feedback to the nursing home’s staff was given and this request remained unmet.

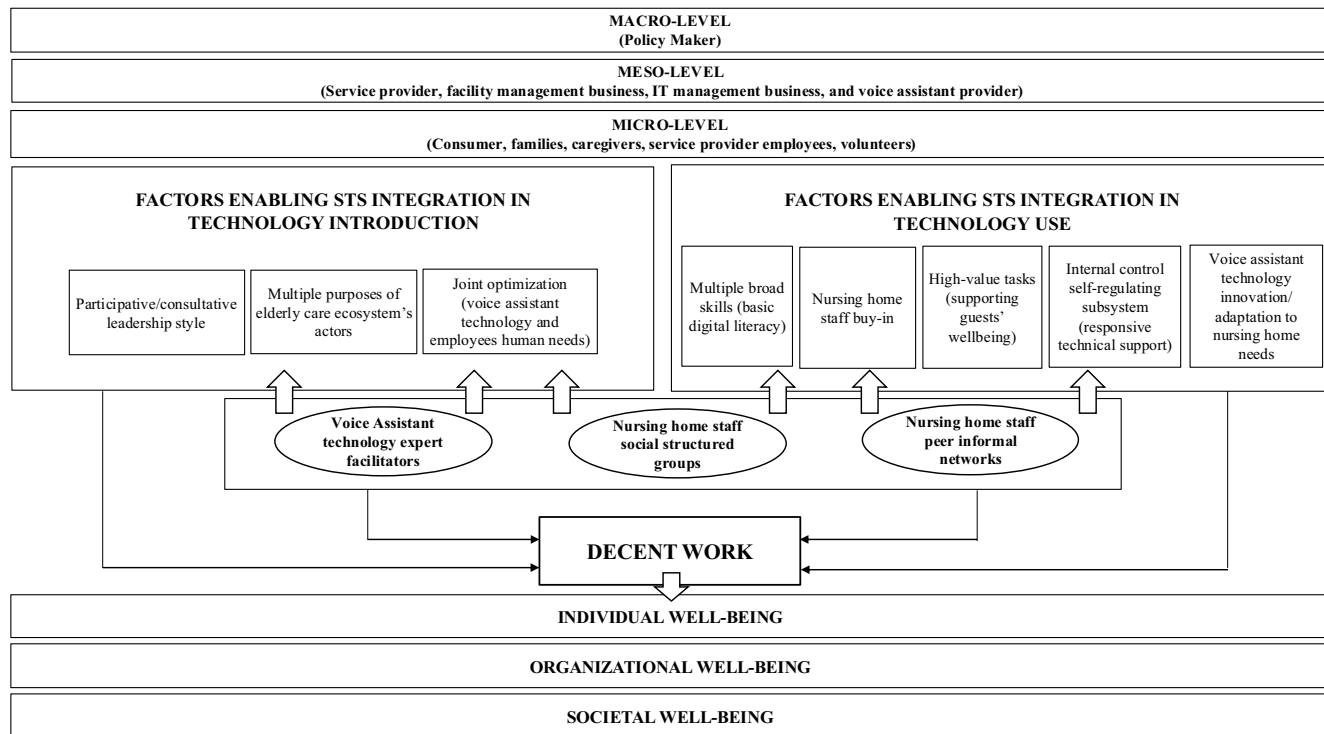
As a result, the technology was given to the nursing home in its original state, and no innovation/adaptation (Trist, 1981; Pasmore *et al.*, 2019) to make the technology more aligned to the needs of the people effectively using it (e.g. the employees), was introduced.

## Theoretical contribution

This paper aims at filling some gaps emerging in the TSR literature, namely, the lack of an employee-based perspective within the service ecosystem and the limited focus on technology as a resource facilitating decent working conditions and, consequently, employee wellbeing. By so doing, our paper contributes to the TSR literature by addressing recent calls for frameworks that incorporate digital equity into transformative service models (Hasni *et al.*, 2025), considering the centrality of technological innovations in making services transformative (Ungaro *et al.*, 2024; Colurcio *et al.*, 2025). In particular, our research aimed at proposing an integrative framework (Figure 1) developed by complementing TSR and STS theory. STS was integrated since it postulates that technical aspects of a technology must be integrated with social aspects and in so doing, the theory is particularly relevant in today’s world in which technology is developing at a fast pace. Furthermore, our framework adopts a co-evolving perspective (Parker *et al.*, 2025), since it emphasises, not only the need to consider the interactions of both social and technical sub-systems but also the various phases of the technology life cycle (i.e. technology introduction and technology use).

To address our aim, we carried out an empirical analysis based on a case study of an Italian nursing home that recently adopted voice assistants as a support for their guests’ wellbeing. Results pointed out that the lack of integration between social and technical sub-systems was due to a misalignment of objectives among the diverse actors of the service ecosystem. As a result, neither the employees’ wellbeing, nor the wellbeing of the overall service ecosystem was created or strengthened through the adoption of the voice assistants.

By incorporating a service ecosystem perspective (Anderson *et al.*, 2013; Giraldo *et al.*, 2026; Fisk *et al.*, 2020), our framework is articulated in multiple levels adapted to elderly care. These levels include: the individual level (i.e. guests, families, caregivers, service providers employees and volunteers); the meso level (i.e. the nursing home, facility management company, voice assistant provider and IT business); and the macro level (policymakers). In so doing, our framework aligns with the TSR perspective and with the recent adaptations of the STS theory (Pasmore *et al.*, 2019; Parker *et al.*, 2025). This articulation in three levels leads to three different potential outcomes, namely, individual, organisational and societal wellbeing (Guest *et al.*, 2022). Moreover, based on the evidences from our case study uncovering various obstacles limiting socio-technical sub-systems integration, our framework identifies the factors enabling such integration, thus favouring decent working conditions in the nursing home. Both sets of factors are grouped according to the specific step of the technology life cycle to which they refer (i.e. technology introduction and use). With regard to technology introduction, the integration of social and technical sub-systems should be addressed through a participative leadership style (Trist, 1981) as a way to fulfil, not only the individual organisations’ purposes but also the multiple, albeit diverging, purposes of all the actors of the service ecosystem. This approach should make it possible to overcome the main issues deriving from the predominance of an autocratic style (Trist, 1981), according to which technology is imposed through a top-down approach. Alongside the

**Figure 1** The framework

Source: Authors' own work

autocratic style, technology introduction was also challenged by the predominance of a technological imperative (Trist, 1981). This means that technology is the only priority and the impact that it has on employees is not taken into account. Instead, in light of the STS approach, our framework recommends joint optimisation (Trist and Bamforth, 1951; Pasmore *et al.*, 2019), where technology embraces the human needs in a continuous process of social adaptations. This is consistent with the STS principle of considering the social subsystem (i.e. the humans) as complementary to technology rather than an extension of it (Trist, 1981; Pasmore *et al.*, 2019). Collaborative environments as well as a consultative and participative work environment are thus recognised as being central in the literature on home care settings (Åhlin *et al.*, 2022; Chiu and Hsieh, 2025). Framing participation and consultation as active components of workplace engagement surely contributes to mitigating stress and enhancing job satisfaction in caregiving professions (Sundgren *et al.*, 2020), thus improving care providers' experiences and their ability to deliver high-quality care (Chiu and Hsieh, 2025).

For what concerns technology usage, a factor that hinders socio-technical integration during the use of technology is the type of skills possessed by employees. What is recommended in our framework is to base technology usage on multiple broad skills instead of on simple narrow skills (Trist, 1981; Pasmore *et al.*, 2019). The literature on digital health initiatives shows how in contexts where health workers have limited digital literacy, insufficient training and inadequate technical support, the use of digital tools is often suboptimal or scarce (Yew *et al.*, 2025; Long *et al.*, 2018). Reviews also indicate that insufficient

training contributes to anxiety, reduced confidence and diminished efficiency among frontline providers (Nazeha *et al.*, 2020). Thus, providing structured training programmes and change management strategies facilitates technology adoption, and guarantees long-term adoption success in long-term nurse care (Chiu and Hsieh, 2025).

Alongside multiple broad skills, the development of staff buy-in (Trist, 1981) is then recommended in our framework, as service employees would feel more engaged. By so doing, it is possible to prevent high stress levels that usually occur when technologies are perceived as imposed and poorly designed (Chen *et al.*, 2021; Ko *et al.*, 2018).

Furthermore, if technology takes repetitive or low-value tasks from employees (as a consequence of multi-task breakdown), focusing on high-value tasks allows employees to contribute in a more meaningful way to guests' wellbeing (Wilson *et al.*, 2020).

To guarantee effective use of technology by employees in nursing homes, internal controls are then needed to ensure self-regulating subsystems (Trist and Bamforth, 1951; Pasmore *et al.*, 2019; Parker *et al.*, 2025). Limited access to responsive technical support indeed often results in system failures, and when device malfunctions persist unresolved, continued use is discouraged and this will negatively affect service delivery (Tumuhimbise *et al.*, 2024; Livieri *et al.*, 2025). On the contrary, in self-regulating subsystems, employees tend to feel more committed, and consequently, more confident and more open to taking risks by adopting new technologies and suggesting adaptations (Pasmore *et al.*, 2019). As a result, the system is nurtured by continuous iterative feedback leading

technology developers to adapt the technology to the specific needs of nursing homes, by introducing incremental continuous innovations (Trist, 1981; Pasmore *et al.*, 2019).

Overall, from our framework it is possible to suggest some specific organisational roles that could be introduced and that should facilitate the effective adoption of new technologies by employees, thus fostering decent work in a transformative perspective.

In technology introduction, one of the main challenges is represented by the need to integrate multiple stakeholders whose interactions are expected to impact on value co-creation processes and wellbeing (Mele and Russo-Spena, 2019; Rahman, 2021; Letaifa *et al.*, 2016). Hence, the specific role of expert facilitators (Davis *et al.*, 2025) may be introduced. They should be responsible for promoting collaboration among the multiple stakeholders of the service ecosystem, and for capturing insights on their various needs; in this way, a more participative style could be enabled. Expert facilitators could also guide the technology adoption process and thus provide a clear leadership (Dahlkvist *et al.*, 2023); moreover, they could also be in charge of employees' training so that they are equipped with the necessary skills for integrating technologies into care (Li *et al.*, 2022; Chiu and Hsieh, 2025). This enables the development of an organisational system where employees can benefit from multiple broad skills, guaranteeing a self-regulating subsystem.

With specific regard to technology use, since a higher level of buy-in is essential, we suggest the creation of structured social groups (Davis *et al.*, 2025) made up of staff members. These groups, combining expertise in geriatric care and in basic digital technologies (Cui *et al.*, 2023) should actively interact with technology providers, favour effective technology usage and further stimulate innovation by suggesting potential adaptations based on their needs and on those of their guest. This organisational solution could promote employees' buy-in and, at the same time, allow them to act as transformative service mediators (Johns and Davey, 2019). Together with structured social groups, informal peer networks may emerge and they could play a key role in socio-digital learning processes (Davis *et al.*, 2025) by removing barriers that hinder technology introduction and use and, as a result, favour decent work and improve employee wellbeing (Phillips *et al.*, 2025).

## Managerial implications

From our results, a number of managerial implications for the deployment of voice assistants in nursing homes have been identified.

Firstly, a participatory approach should be implemented, through which staff and other key actors (e.g. volunteers, guests' families, guests, service providers and employees) of the service ecosystem are involved in the decision-making processes. This approach should entail assessing each stakeholder's needs and objectives, since it is possible to align the different perspectives through this practice. Crucially, this participatory approach should be developed from the very beginning (i.e. during the technology design phase) (Kelly *et al.*, 2023). In so doing, there would be a benefit not only for the nursing home guests but also for the employees. With regard to the former, previous research demonstrated that technology advancements aimed

at older customers often adhere to certain assumptions (Franco, 2023), which do not consistently align with the genuine demands of this demographic (Joe *et al.*, 2018). Thus, by involving nursing home guests in the design and development of technology, it will be possible to take into account their specific needs and customise the technology accordingly, for instance through user-friendly interfaces and features (Sheerman *et al.*, 2023). With regard to the latter, also in this case, the involvement of employees in the participatory approach will allow the development of features that are adapted to the specific needs of employees and, in so doing, making it possible to avoid employees' scepticism and resistance.

Secondly, it is fundamental to identify those people who could become expert facilitators (Davis *et al.*, 2025) who will promote effective communication among the various actors involved in the service ecosystem (Dahlkvist *et al.*, 2023). In particular, expert facilitators should promote two-way communication between internal stakeholders (e.g. employees, guests' families, guests, etc.) and external actors (e.g. technology providers) so that any issues developing after installation are promptly identified and addressed. This means creating regular feedback loops that, ultimately, will improve the overall user experience (Creaney *et al.*, 2023).

Thirdly, training and ongoing support appear crucial for enhancing staff confidence and competence in utilising voice assistants (Wilson *et al.*, 2020). For instance, nursing home managers should ensure that comprehensive training programmes developed in collaboration between technology providers and the nursing home are delivered to staff so that it is possible to accommodate the different levels of technological literacy among employees. In addition to this, informal peer networks should be promoted along with more formal types of training, since they could favour digital learning through socialisation processes (Davis *et al.*, 2025).

## Limitations and further research

Despite its contribution, our study presents a number of obvious limitations that may provide several avenues for new theoretical and empirical lines of research.

Firstly, our framework has been developed based on the results of a single case. Even though this enabled us to capture the main challenges that hindered the integration of socio-technical sub-systems, thus undermining effective technology adoption in elderly care services, a comparative analysis with other cases could further support our framework. Specifically, by comparing our case with successful cases of technology adoption it would be possible to complement our framework, if necessary.

Furthermore, our data collection was mainly based on interview data, thus future research should adopt a different approach to further refine our framework. For instance, participatory action research (Reason and Bradbury, 2001) viewed as a "systematic approach that seeks knowledge for social action" and involving participants "throughout the research process across problem identification, design, data collection, analysis and application of the research findings" (Ozanne and Saatcioglu, 2008, p. 424) is considered

particularly relevant by scholars studying decent work in services (Subramony and Rosenbaum, 2024).

Moreover, in our research we collected data from the managers of the nursing home, those of the external organisations and the nursing home employees. However, to fully adopt a service ecosystem approach, other stakeholders should also be taken into account, such as guests, their families and volunteers. Hence, future research should also collect data from these people.

Finally, future research should also consider the impact of policymakers in the context of elderly care. Thus, it would be interesting to analyse cases of nursing homes established in contexts characterised by different policymaking so that it will be possible to study how differences in regulations, funds, institutional leadership and political commitment promote or hinder decent work in nursing homes.

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