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SOCIAL STRUCTURES RELEVANT TO LONGEVITY SERVICE SYSTEMS

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1 Introduction

Services play a crucial role in modern economies, constituting a significant portion of economic output and employment (Wizinsky, 2022; Downe, 2021). The service sector's growth reflects changes in society (Meroni & Selloni, 2022; Meroni & Sangiorgi, 2011) and the economy, moving away from manufacturing-based economies to those where information, knowledge, and creativity are primary drivers of economic activity. With emerging technologies (Lee, Yang, et al., 2023; Hamid & Suoheimo, 2023; Etkin, 2021), supportive education, accessible healthcare systems, and other critical social infrastructures and governmental policies, people's life spans and health spans have been extended (Norman, 2024; Justice, 2019; Schwab, 2016). The World Health Organization (2022) estimated that the world's population over 60 years old will approximately double from 12% to 22% between 2015 and 2050. This transformation will greatly impact our lives and perceptions of work (Welch & Krystopowicz, 2023; Lim & Gandini, 2022).

1.1 Context: longevity, service systems, and financial planning

Longevity economics (A. Scott, 2024; Gratton & Scott, 2017) studies the economic implications of increasing life expectancy and an aging population. This field encompasses topics including the labor market, healthcare costs, economic growth and productivity, and policy development. Overall, longevity economics seeks to provide insights and strategies to manage the economic challenges and opportunities of a longer-living population, ensuring sustainable economic development and quality of life for all ages.

The rise of longevity economics is mirrored in our social infrastructures, encompassing transportation, housing, education, communities, investment, finance, policies, and other areas spanning industry and academia. The increase in life expectancy and health span enables individuals to weigh quality of life in terms of time, resources, and investments. To address the complex design challenges inherent in the social structure, the field of service design has transformed, including re-evaluating the materials, theories (Lee, de Weck, et al., 2023; Crawley et al., 2016), and methods (Jones & Ael, 2022; De Weck et al., 2016) that constitute service design.

According to Google Trends data for the US population from 2019 to 2024, there is a rising interest in the key phrases: longevity (gray, avg. = 46), service system (black, avg. = 70), and financial planning (light gray, avg. = 33). Figure 9.1 shows search interest relative to the highest point on the chart for the specified region and period. A value of 100 represents the term's peak popularity and 0 signifies insufficient data for the term. This outcome implies a potential opportunity to investigate the intersection among longevity planning, service systems, and financial planning.

1.2   *Research questions*

The study examined the convergence of longevity planning, service system, and financial planning through a preliminary systematic literature review, utilizing the modified PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist (Page et al., 2021). The research question is: *What are the key design considerations for physical components (symbols, artifacts, activities, relationships) and institutional elements (regulative, normative, cultural-cognitive pillars) within the social structure to develop comprehensive, meaningful, and respectful longevity service systems?*

The research question explores the integration of critical social structures into longevity services and complete systems for such services, by examining physical components and institutional elements. This study treats social structure (e.g., social norms, beliefs, values, culture, politics) as an integral component of service
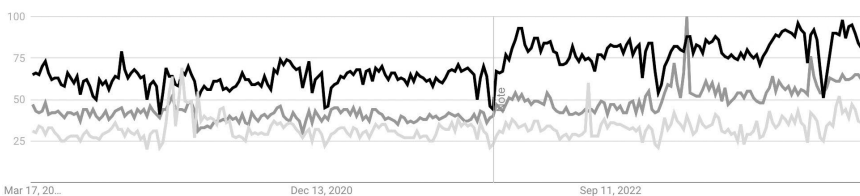

FIGURE 9.1   Trends in interest for the keywords: longevity (gray), service systems (black), and financial planning (light gray) from 2019 to 2024.
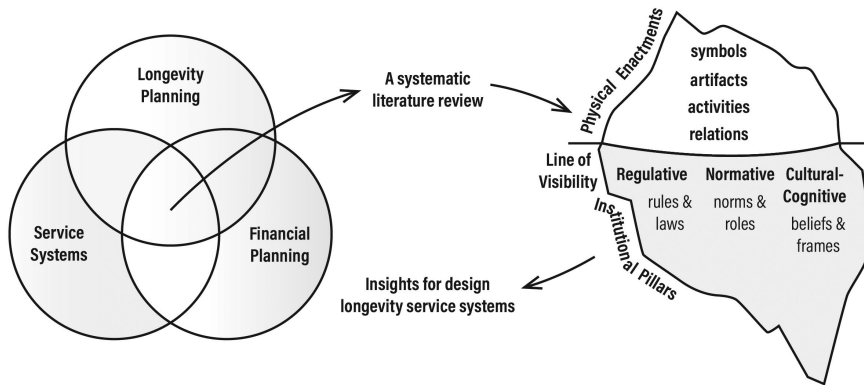
Source: Google Trends.

FIGURE 9.2   This study employs a systematic literature review within Vink and
Koskela-Huotari's conceptual iceberg framework (2021), which views
social structures as materials for service design.

design in developing systems for longevity services. This research focuses on the
USA because its special healthcare system impacts longevity planning and finan-
cial planning significantly differently from those in Europe, Asia, and other coun-
tries. The findings prompt a discussion on developing longevity service systems
by applying the conceptual iceberg framework (Vink & Koskela-Huotari, 2021),
emphasizing comprehensive and interdisciplinary perspectives (Figure 9.2).

2   Background studies

2.1   *The shift in service design materials: from tangible artifacts*
to social structures

Shostack (1982) highlighted the significance of tangible evidence in the service
management field, introducing the concept of tangible artifacts within service
design. This idea resonates with Bitner's (1992) proposal of the servicescape,
which examines service interactions, behaviors, and emotions within a physical
setting. Clatworthy (2011) expanded on this by introducing the concept of physical
service touchpoints (toolkits) as the materials of service design, while Secomandi
and Snelders (2011) focused on service interfaces considered objects of service
design and in relation to service infrastructures. However, it's clear that the tangi-
ble aspects, such as service touchpoints, interfaces, and servicescapes, only repre-
sent a fraction of the service system's social structure.

The invisible aspects of social structure should also be explored to understand
complex service systems fully. Kimbell (2011) explored the concept of socio-mate-
rial configurations, emphasizing the characteristics of duality (social and material)
and the integration of people, processes, and technologies. Blomberg & Darrah

(2015) viewed services as assemblies of both immaterial and material components, including institutions, lifestyles, technologies, and networks. The concept of assembled service fragments was influenced by individuals and communities beyond the designers. Blomkvist et al. (2016) regarded different phases as design materials that help navigate the design process in a service system of value co-creation, suggesting that service design materials evolve over time, surpassing the tangible to encompass more abstract materials and concepts.

Most recently, Vink and Koskela-Huotari (2022) stressed the importance of incorporating and reflecting on the social structure in service design, highlighting institutional social structures and the interplay of widespread arrangements of entrenched social structures like rules, roles, norms, and beliefs. This underscores a shift toward a broader understanding of materials in service design, integrating both tangible and intangible elements to capture the full essence of service systems (Table 9.1).

Current research in service design seeks to explore and influence aspects of social structures, such as shaping cognitive frameworks (Vink et al., 2019), transforming organizational development and community culture (Sangiorgi, 2011), and understanding the networks of co-creative value (Čaić et al., 2019). The authors focused on identifying longevity economics as an emerging social structure and culture and adopting Vink and Koskela-Huotari's (2021) conceptual iceberg framework to identify a complex social structure, investigate physical enactments and institutional pillars, and examine the development and considerations of building longevity service systems.

2.2   *The conceptual iceberg framework*

The design of services and systems is an iterative process of value co-creation, influenced and restricted by institutionalized social structures (Vink et al., 2021). This underscores the importance of focusing on these complex systemic social structures within the field of service design. The emergence of longevity economics represents an extension and reflection of our social structure, influenced by shifting demographics, technological advancements, and other social infrastructure factors shaping longevity services. Given the complexity, privacy concerns, ambiguity, and systematic challenges associated with longevity service systems, the authors employed Vink and Koskela-Huotari's conceptual iceberg framework, complemented by insights from a systematic literature review, to investigate new design considerations for service systems.

Greenwood et al. (2017) and Scott's institutional theory (2014) underscore three key characteristics that identify social structures as crucial materials for service design, forming a foundational basis for Vink and Koskela-Huotari's (2021) iceberg framework. Vink and Koskela-Huotari's study highlights two pivotal contributions to the service design field. Firstly, the iceberg framework underscores the significance of social structures as design materials by highlighting three distinct

TABLE 9.1 The progressive expansion of design materials in service design literature

Source	Service design material and its interpretation
Shostack (1982)	**Tangible evidence** is crucial in service design for confirming a service's existence or completion, contrasting with product design, which doesn't require such evidence. Service design often involves physical objects that aren't considered actual products.
Bitner (1992)	**Servicescape** involves examining service interactions within a physical environment. This encompasses ambient conditions, spatial layout and functionality, signs, symbols, artifacts, and service types. It includes the study of behavior, social interactions, and cognition related to the service environment.
Clatworthy (2011)	**Physical service touchpoints** applied as a toolkit can enhance new service development processes, linking service designers, organizations, project teams, and researchers as valuable resources for innovation. They offer insights into service design materials and the essence of service design itself.
Secomandi and Snelders (2011)	**Service interfaces** are often considered secondary, a byproduct of service infrastructure, which overlooks the importance of design discussions and limits design discussions to service management, marginalizing disciplines like product and interaction design, which are critical for enhancing service interfaces.
Kimbell (2011)	**Socio-material configurations** refer to the integration of diverse elements such as people, processes, and technologies. This concept highlights that designing for service is a dynamic, iterative process, where traditional boundaries between products and services become less significant.
Blomberg and Darrah (2015)	**Assembled service fragments** are the idea that services are often composed of practices, institutions, lifestyles, technologies, and networks rather than intentionally designed. This limits designers' ability to translate intentions into cohesive products.
Blomkvist et al. (2016)	**Service design materials** are considered guidance for conceptualizing the service design process. Unlike other fields where materials are transformed into a final product, service design materials navigate between the concrete and the abstract at various stages of the design process.
Vink et al. (2021)	**Institutional social structures** embody service design's evolution and its influence on individuals. The concept of reflexivity—recognizing and understanding existing social structures—aims to prevent the unconscious replication of social structures.

Modified from Vink and Koskela-Huotari's diagram (2021).

characteristics: invisibility, duality, and the composition of multiple institutional pillars. These traits shed light on the materiality essential for informing the design of services and systems. Secondly, the framework offers a rigorously tested, practical process that guides academics and practitioners on how to engage with social structures as service design materials. It outlines six steps: (1) gather diverse perspectives, (2) sensitize through experiences, (3) identify physical enactments, (4) unpack intangible social structures, (5) critically reflect on social structures, and (6) explore possible alternatives. Additionally, each step contains two core activities and provides detailed advice on the considerations when identifying and utilizing social structures as design materials.

Figure 9.3 illustrates the physical manifestations of social structures' tangible components, comprising four types of carriers: symbols (e.g., language for written or visual communication), artifacts (e.g., tangible objects), activities (e.g., routines, habits, and preferences), and relations (e.g., interactions). These carriers are also shaped by the intangible aspects of social structures encompassing rules, norms, and beliefs (W. R. Scott, 2014). The invisible and complex institutional social structures are divided into three categories: the regulative, normative, and cultural-cognitive pillars. The regulative pillar relates to structures that establish order and promote promptness through coercion, often expressed explicitly, for example, through rules and laws. The normative pillar encompasses structures that use social obligations to set expectations for appropriate behavior in specific situations, such as norms and rules. The cultural-cognitive pillar pertains to the implicit social structures, like beliefs and frames, that foster a common understanding, thereby facilitating certainty and the creation of meaning.
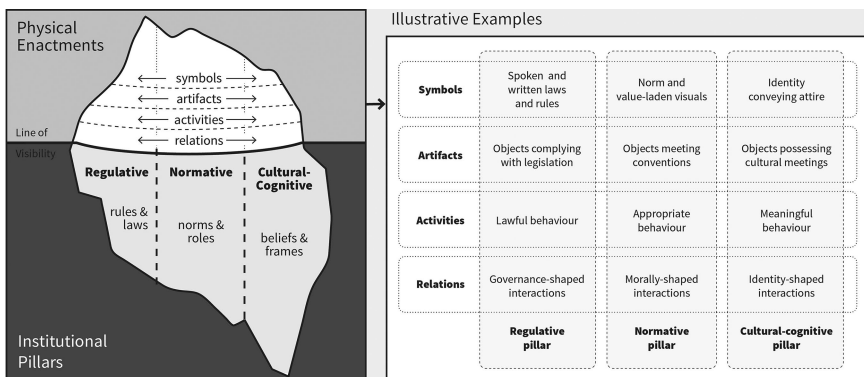

FIGURE 9.3   Vink and Koskela-Huotari's (2021) conceptual framework for considering social structures as materials in service design, with an example on the right showing four tangible aspects (symbols, artifacts, activities, and relations) as carriers of physical enactments, alongside the three intangible institutional pillars (regulative, normative, and cultural-cognitive).

2.3   *Longevity economics, planning, and services*

The era of longevity and service-based economics has come (Pine & Gilmore, 2020; Coughlin, 2017). People not only want to live longer. They want to live better. Therefore, the concept of longevity planning products and services has become increasingly popular (Heye, 2023; Stanford Center on Longevity, 2022; Barone, 2021; Albrecht et al., 2014). A successful longevity service should lead to a better quality of life, with physical and mental health, independence, mobility, financial freedom, purpose and meaning, with family and community support. The mindset and behavioral shift from age to stage has raised interest in developing longevity services and AgeTech to fulfill people's needs across different life stages (Etkin, 2021).

The traditional three stages of "born, learn, and retire" are being replaced by the values of living in a multigenerational society. For example, Bank of America Merrill Lynch, an American investment management and wealth management firm, provides a life plan product with 18 defined life stages incorporating people's needs beyond finance. They hired a financial gerontologist to help design products to ensure better preparation for solving longevity challenges while simultaneously creating an estimated $7–8 trillion in potential business. Warby Parker Inc., an American eyeglasses brand, launched a lifelong service providing eyecare and product services across various age ranges catering to the $10–15 billion longevity consumer market in the USA (Golden, 2022). Experience-driven services have transformed industries and how people perceive user experiences.

3   Research method: a preliminary systematic review

We developed a systematic literature review protocol, employing the modified PRISMA checklist to guarantee a rigorous and standardized process in Appendix (Table A.1).

3.1   *Develop the review protocol*

The authors referred to a PRISMA checklist as an essential guide for conducting literature reviews with thoroughness and transparency, ensuring the inclusion of all relevant information. We considered key criteria for article selection, including search engine (article database), date (limiting the search to a specific publication period), language (English and others), publication type (certain types of publications), population (specific populations with a specific condition), geographic focus (specific regions or countries), and study quality (peer-reviewed articles), detailed in Table 9.2.

3.2   *Conduct a comprehensive search*

The study employed a defined review protocol to conduct a thorough search for relevant articles, considering three systematic approaches: line-by-line, block-by-block, and single-line. The authors chose the single-line method, combining all search

TABLE 9.2 The key reviewed criteria for article selection

Search focus	Explore and discuss the concept of longevity service systems
Search engine and scope	The top 100 cited peer-reviewed articles on Google Scholar from 2019 to 2024.
Geography and language	USA and English-based material.
Publication type	Peer-reviewed articles (e.g., theoretical frameworks, case studies, review papers, and book chapters) along with gray literature, non-peer-reviewed articles (e.g., theses and reports).
Population	Typical individuals, excluding those who are disabled (e.g., people with intellectual and developmental disabilities), disadvantaged (e.g., people with lower socioeconomic income or refugees), or need special caregiving services.

TABLE 9.3 The search keywords and their synonyms for Google Scholar

Keywords	*Synonym*
Longevity planning	Longevity Planning OR "longevity service" OR "longevity planning service" OR "design for longevity" OR "D4L"
Service	Service OR "service design" OR "service system" OR "service ecosystem" OR "systemic service"
Finance	"Financial planning" OR "financial service"

terms and concepts into one line. This approach utilized Boolean operators (AND, OR) to link key terms between concepts and parentheses to group concepts together, streamlining the search process. The authors list keywords and their synonyms used in Google Scholar to retrieve the top 100 cited articles from 2019 to 2024. The search was conducted using search software (Anne-Wil, 2007), with keywords entered in a single-line format for full-text searches (Table 9.3).

The authors included gray literature such as government documents, theses, toolkits, and technical reports sourced from organizations like the Teachers Insurance and Annuity Association of America, the American Association of Retired Persons, and the Royal College of Art's Helen Hamlyn Centre for Design. This diverse range of sources is vital for a thorough systematic review. However, many reports from the insurance, financial, and fintech industries may not be indexed by academic search engines. Quality assessment of gray literature is critical due to its variable evidence quality, which can introduce bias and affect the validity of the review's findings.

3.3   Screen results for eligibility

The systematic review's screening process entailed a detailed evaluation of all identified articles to assess their relevance and eligibility for inclusion. To minimize bias, the authors conducted the screening collaboratively, with cross-checks to ensure accuracy. This study's screening was divided into two phases: screening of titles and abstracts, followed by full-text screening. The 72 out of 100 articles were excluded based on geographical restrictions (outside the USA), relevance of the publication topic (unrelated to longevity planning and service systems within the context of financial planning), and population constraints (Table 9.4).

TABLE 9.4 Materials excluded during the first round of screening of titles and abstracts

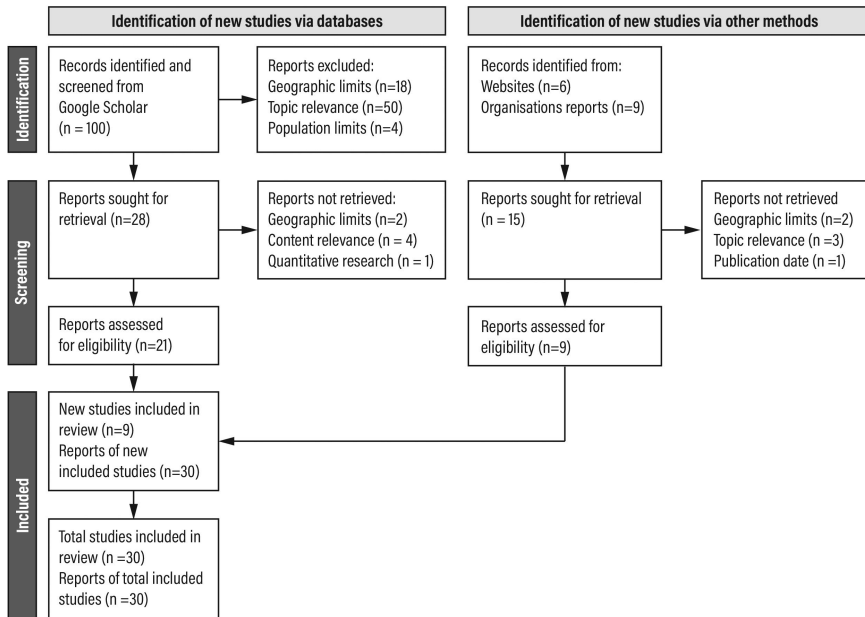| *Criteria*	*The explanation for excluded articles*
Geographic limits: outside USA (n = 18)	In this study, we excluded regions such as Canada (including Ontario), Delhi, Islamic nations, Latin America, Italy, Europe, Australia, Africa (including Ghana and Ethiopia), and parts of Asia, including India, Malaysia, and Indonesia.
Relevance of the publication topic: not relevant study (n = 50)	• **Energy system**: electric power system, electric generation planning, electrified transport, energy planning, energy storage system, power plant, EV, electric bus planning, charging facility planning, hydrogen storage, IoT, fuel treatments • **Supply chain system**: product information management, production planning, project management, logistic network, renewable hydrogen supply chain, workforce planning, Industry 4.0 • **Urban planning**: city planning, estate planning, offshore wind farms, green building, housing, public facility planning, urban light pollution, waste management, water management, railway track maintenance planning, climate change • **Business**: enterprise resource planning, tactical sales and operations planning, leadership, customer retention, public capital budgeting and management, pension • **Health** (n = 8): health monitoring, ethical wills, family planning, long-term care insurance, modeling of mortality and survival curves, environmental health services, disease, surgical system
Population limits: not target user (n = 4)	In this study, we aim to encompass a diverse range of demographics, including ethnicity, age, physical abilities, financial conditions, cultural backgrounds, and social-economic status, to ensure broad applicability and inclusivity. However, certain specific populations remain underrepresented in our research, such as senior surgeons, residents of slums, physicians, and individuals with intellectual and developmental disabilities (IDD).

Identification of new studies via databases		Identification of new studies via other methods	
Identification			

Identification

Records identified and screened from Google Scholar (n = 100) → Reports excluded: Geographic limits (n=18), Topic relevance (n=50), Population limits (n=4)

Records identified from: Websites (n=6), Organisations reports (n=9)

Screening

Reports sought for retrieval (n=28) → Reports not retrieved: Geographic limits (n=2), Content relevance (n = 4), Quantitative research (n = 1)

Reports sought for retrieval (n = 15) → Reports not retrieved Geographic limits (n=2), Topic relevance (n =3), Publication date (n =1)

Reports assessed for eligibility (n=21)

Reports assessed for eligibility (n=9)

Included

New studies included in review (n=9) Reports of new included studies (n=30)

Total studies included in review (n =30) Reports of total included studies (n =30)

FIGURE 9.4   The PRISMA flow diagram to investigate the concept of longevity service systems.

Following the initial screening of titles and abstracts, which excluded the 72 articles, the authors conducted a full-text review of the remaining 28 articles, alongside an analysis of 9 non-peer-reviewed reports to evaluate the studies' quality. After screening the full texts, the authors excluded 7 articles because of geographic limits (n = 2), content relevance (n = 4), and qualitative research (n = 1). The PRISMA flow diagram (Figure 9.4) was employed to document the results, serving as proof of the search process's thoroughness.

3.4   Evaluate the quality of the studies to extract data for synthesis

The objective is to evaluate the strengths, weaknesses, and potential biases in the research findings. Assessing the validity and relevance aids in avoiding inaccurate conclusions. The synthesis phase entails meticulously examining the included studies to uncover patterns, themes, and connections among them. The author analyzed how the selected articles applied concepts of service design, service systems, or system methods to examine longevity planning.

4 Results and discussion

4.1 Insights into longevity service systems from a systematic literature review

In the field of longevity services, individuals face a broad array of challenges influenced by social and technological advancements. This scenario is markedly different from the era before the Industrial Revolution when labor-intensive tasks dominated most people's lives until they died. In contrast, the 21st century has seen a shift toward a greater demand for services that enhance and celebrate quality of life through the enjoyment of products and experiences. This transition heralds the emergence of the experience economy within the domain of longevity services. The convergence of longevity trends and economic developments highlights the critical need to focus on service systems. The evaluation of 30 selected articles (21 papers and 9 reports) aimed to gain a deeper understanding of longevity planning and its implications and to gather content relevant to the design of service systems (Figure 9.5). The findings from this analysis are documented in Table A.2. The
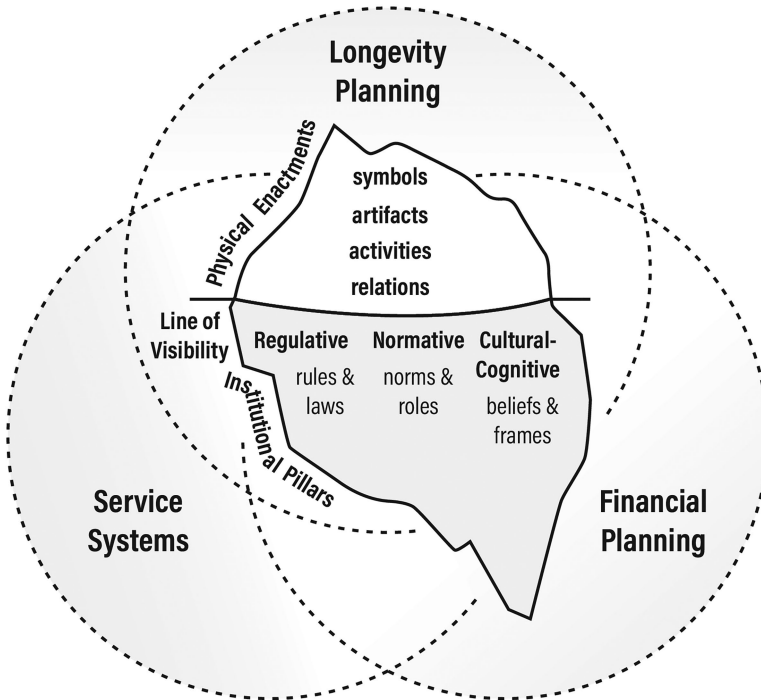

FIGURE 9.5 The study utilized the conceptual framework proposed by Vink and Koskela-Huotari (2021), which views social structures as materials within the service design field.

table presents (1) the sources of the selected articles, (2) definitions, concepts, and examples related to longevity or financial planning, and (3)implications and challenges associated with the service system.

4.2 Social structure as material for designing services and systems for longevity

In the preliminary systematic literature review, we extracted data from the reviewed articles (n = 30) by examining not only the paper titles and abstracts but also the content and conclusions to ensure unbiased and comprehensive insights. Table 9.5 presents the synthesized learnings and insights derived from the review, examining the materiality of social structures for longevity service systems. It includes physical enactments, which cover four tangible materials as carriers (e.g., symbols, artifacts, activities, and relations), alongside the complex and invisible pillars of social structures, the regulative pillar (e.g., rules and laws), the normative pillar (e.g., norms and roles), and the cultural-cognitive pillar (e.g., beliefs and frames).

TABLE 9.5 Social structure as input and material for designing longevity service systems

	Regulative pillar	Normative pillar	Cultural-cognitive pillar
Symbols	Improve education and knowledge focused on longevity, such as enhancing longevity literacy (Tinofirei et al., 2023; Bandopadhyay, 2023; Dickson, 2023)	Develop longevity strategies (Hodin, 2023) and rituals for transformation, such as elevating longevity well-being (Carstensen, 2022).	Foster lifestyle changes and impact people's perceptions, for example, promoting longevity fitness (Kolluri, 2024; Transamerica & MIT AgeLab, 2022)
Artifacts	Crafted to meet standards based on qualitative assessments. They exist in either physical or digital formats (Brown & Lin, 2021) and are primarily distributed through in-person engagement.	Crafted for self-reflection (The School of Life, 2023) and self-identification, such as personal values and worldviews (Enete & McDowell, 2024; Cherry & Asebedo, 2022), and are made available through an omnichannel product service experience (Jantan, 2020).	Created for self-expression, incorporating cultural, socioeconomic, and technological elements (Briscoe, 2022). They serve as touchpoints within an immersive journey, offering a mixed reality (XR) and AI-empowered user experience (Cao, 2023; Manser Payne et al., 2021).

(*Continued*)

TABLE 9.5 (Continued)

	Regulative pillar	*Normative pillar*	*Cultural-cognitive pillar*
Activities	Indicate that individuals are path followers with instructional behavior: People often look to traditional stereotypes as role models for societal success (Leshner, 2023; Dew et al., 2020).	Indicate that individuals are path seekers with transformative behavior: People seek paths to success that extend beyond financial achievement (Lee, Hodara et al., 2023; Solhi et al., 2022; Goyal et al., 2021).	Indicate that individuals are path builders with adaptive behavior: People forge paths by adapting their needs according to various lifestyles, genders (Yen & Chong, 2022), and ages (Rappaport, 2019).
Relations	Focus on transactional financial planning goals, tasks (Fallaw et al., 2020), and discussions to hit the standard evaluation (Xiao & Tao, 2020).	Focus on conversational interaction and have evolved from retirement planning to longevity planning (Scott, 2021; Coughlin, 2019).	Focus on integrating longevity services, personal objectives, and systems (Rappaport, 2021).

Table 9.5 was initially structured using the iceberg framework to summarize the findings from the comprehensive literature review. In subsequent analysis, the author expanded the scope to incorporate emerging themes such as the impact of social technology, artificial intelligence, climate change, and other significant social challenges that could affect the design and development of longevity planning service systems.

In this study, the authors applied a systematic approach that considers the intersection of longevity planning, service systems, and financial planning. It emphasizes key principles such as integration, a holistic view, user-centricity, adaptability, sustainability, and collaboration. These principles are crucial in navigating the complexities of service environments like healthcare, finance, longevity planning, urban planning, organization cultures, and digital platforms, where the interplay of multiple actors and elements influences system dynamics. This notion impacts industry and resonates within academia. Suoheimo et al. (2023) highlight the essential role of leveraging emerging technologies to redefine service design research methodologies. Grimes (2018) proposed applying the modified service ecosystem as an adaptable, transformative approach to studying complex systems in relation to users' behavior. Vink et al. (2021) expanded on this by investigating the service ecosystem design through a multi-level process model encompassing micro, meso, and macro phases. Adopting a systemic viewpoint allows industry

and academia to forge services that are more efficient, resilient, and user-centric, thereby enhancing the overall health of systems in the context of longevity.

5   Conclusion

Utilizing insights from a systematic literature review (n = 100) of the intersection between longevity planning, service systems, and financial planning 2019–2024 and conducting US-based research on Google Scholar with the modified PRISMA checklist, we identified and analyzed 21 reviewed articles and 9 non-peer-reviewed reports. This analysis adopted Vink and Koskela-Huotari's iceberg framework (2021), focusing on social structures as materials, to analyze longevity service systems. This framework was applied for analyzing complex systemic challenges, and enabled researchers and designers to transform intangible topics like social norms, values, cultural differences, and policies into tangible elements. This was achieved through the framework's terms, including the regulative, normative, and cultural-cognitive pillars, and examples.

Analyzing 30 selected articles, the authors discussed four tangible elements—symbols, artifacts, activities, and relations—in longevity service systems. These elements integrate aspects of longevity literacy, strategy, well-being, and fitness into the design of the longevity service systems. Specifically, longevity service systems address a wide array of individual concerns, including physical health, overall well-being, retirement preparedness, safety, financial security, and wealth and risk management. This approach underscores a more nuanced, layered perspective compared to financial planning services, advocating for a paradigm shift from financial value (e.g., monetary assets) to people's value (e.g., life quality).

The iceberg framework highlights three intricate and invisible aspects of social structure—regulative, normative, and cultural-cognitive dimensions—adding a layer of sophistication and complexity. Thus, it forms a comprehensive understanding that encompasses social-technological factors such as gender, identity, artificial intelligence (AI), immersive media, policy impacts, worldviews, and socio-economic status. Crafting a successful longevity service system, as differentiated from standard financial planning services, demands a tailored approach that respects individual preferences and has the flexibility to adapt over time to changing life stages, financial circumstances, health status, and familial or community relationships. The adaptive nature of the service system assists individuals in setting and pursuing long-term longevity objectives. Further studies can explore insights that systems-oriented design (SOD) might provide (Sevaldson, 2022; Jones, 2021; Jones, 2013) in developing longevity service systems. Additionally, it will be important to consider the situations and social structures of countries beyond the USA, such as those in Asia, Europe, and Africa, as well as diverse demographics, including refugees and people with disabilities. This is particularly pertinent as longevity service systems have evolved and become interconnected worldwide.

Appendix

TABLE A.1 Systematic literature review protocol

Aim	Explore the design and development of longevity service systems by examining four key physical components—symbols, artifacts, activities, and relationships—and three institutional elements (regulative, normative, and cultural-cognitive pillars) derived from social structure (Scott, 2014), using the conceptual iceberg model (Vink & Koskela-Huotari, 2021).
Question	What are the key design considerations for physical components (symbols, artifacts, activities, relationships) and institutional elements (regulative, normative, cultural-cognitive pillars) within the social structure to develop comprehensive, meaningful, and respectful longevity service systems?
Objective	Review peer-reviewed articles from 2019 to 2024 related to longevity planning, service systems, and financial planning. Using the conceptual iceberg model (Vink & Koskela-Huotari, 2021). Findings will be analyzed and integrated to enhance the design and development of longevity service systems, considering social structure.
Protocol	Concentrate on peer-reviewed articles and gray literature, like reports, to identify relevant materials in longevity planning, service systems, and financial planning. The detailed flow can refer to Figure 9.4.
Search strategy	Utilize the following single-line search string: "longevity planning" OR "longevity service" OR "longevity planning service" OR "design for longevity" OR "D4L" AND "service" OR "service design" OR "service system" OR "service ecosystem" OR "systemic service" AND "finance" OR "financial planning" OR "financial service."
Process of selecting articles	Used Anne-Wil's journal search software (2007), with a single-line search string in Google Scholar targeting full text. After ensuring no duplicates, the list of peer-reviewed articles was finalized. Articles from 2019 to 2024 were sorted by citation frequency to select the first 100 results.
Inclusion and exclusion criteria	The search string was designed to yield peer-reviewed articles relevant to longevity planning, service systems, and financial planning, although few articles integrated all three topics. Most focused on one or two fields, often indicated only in keywords. Each article was initially screened by title and abstract, with those not meeting the study's criteria excluded. Articles advancing in the literature review were examined in detail. The main objective was to understand and incorporate social structure as a design material, enhancing the design and development of comprehensive longevity service systems.

TABLE A.1 (Continued)

Process of extraction of relevant information	The data extraction involved two phases: initial screening of titles and abstracts, followed by full-text reviews. An Excel table captured key publication details, including author, year, institution, faculty, country, article title, journal, keywords, and citation count. To minimize bias, authors collaboratively conducted screenings with cross-checks for accuracy.
	• Round 1: 72 articles were excluded due to geographical restrictions (18 outside the USA), topic relevance (50 unrelated to longevity planning and service systems in financial planning), and population constraints (4 not targeting the intended users). See Table A.1. • Round 2: The full-text review was applied to the remaining 28 articles, alongside 9 selected non-peer-reviewed reports, to assess study quality. Seven articles were excluded due to geographical limits (2), content relevance (4), and qualitative research methodology (1). Refer to Figure 9.4.
Result	The review results and synthesized insights are displayed in Table A.2.
Discussion	The discussion is presented in the form of an article.
Reference	The modified extensive literature review protocol was made according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist (Page et al., 2021).

TABLE A.2 Summary of the reviewed papers (n = 24)

Source	The definitions, concepts, and examples regarding longevity or financial planning	The implications and challenges connecting to the service system
Enete and McDowell (2024)	**Integrating personal values with worldviews and financial strategies**. This paper investigates the influence of worldviews on individuals' financial perspectives and actions, and creates tools for identifying personal values and worldviews to help them accomplish their life objectives. The diagram depicting the circumplex model of values, a value-measuring tool adapted from Grouzet et al. (2005), signifies the application of service design thinking.	Cultural-cognitive pillar (personal values with worldviews and financial strategies)

(*Continued*)

TABLE A.2 (Continued)

Source	The definitions, concepts, and examples regarding longevity or financial planning	The implications and challenges connecting to the service system
Leshner (2023)	**The diverse longevity planning portfolios**. This paper presents five case studies covering provisions, including children, students with loans, part-time and active employees, pre-retirees, retirees, and employers, to demonstrate the intricacies of longevity planning services, highlighting how they cater to different individuals' varied backgrounds and requirements.	Normative pillar (different demographics influence social norms and diverse cultures)
Tinofirei et al. (2023)	**Exploring the role of education in enhancing financial planning and literacy**. This paper indicates that higher education levels correlate with increased salaries, which, in turn, enhances overall literacy in healthcare and financial planning decisions.	Regulative pillar (education)
Ingale and Paluri, (2023)	**Financial decision-making process and systems**. This paper offers insights into the financial decision-making process for retirement savings and identifies constructs to operationalize and measure financial behaviors in retirement planning. The study employs the Theory, Context, Characteristics, and Method (TCCM) framework for literature analysis.	Regulative pillar (measurement) Normative pillar (behavior)
Zehra and Singh (2023)	**Household finance and national economics**. This paper examines the current research landscape in household finance (HF), summarizing key findings to underscore its significance in national economies. It explores HF's conceptual and practical aspects.	Regulative pillar (considerations to connecting to national economies)
Hodin (2023)	**Longevity science and wealth management.** This paper introduces tools and strategies that adapt and evolve to accommodate extended work lives, caregiving management, and improved longevity planning, incorporating insights and actions for employers, policymakers, financial institutions, and individuals.	Normative pillar (perception centered around financial security) Cultural-cognitive pillar (embracing the principles of healthy aging and adjusting financial planning and policy frameworks)

(*Continued*)

TABLE A.2 (Continued)

Source	The definitions, concepts, and examples regarding longevity or financial planning	The implications and challenges connecting to the service system
Bandopadhyay (2023)	**Improved financial literacy and behavior.** This paper recognizes the escalating life expectancy and consequent elongation of retirement spans, and delves into demographic, sociological, and, notably, behavioral dimensions influencing retirement investment decisions. It recommends a retirement planning strategy, highlighting the importance of improved financial literacy and behavioral understanding in developing pension policies and retirement schemes.	Normative pillar (retirement planning behaviors, risk tolerance, and future time perspective)
Yeo et al. (2023)	**New theory of financial planning behavior.** This paper develops a theory on financial planning behavior by reviewing literature through the theory of planned behavior (TPB) and proposes a theory where financial satisfaction, socialization, and literacy influence the intention and adoption of financial planning in various forms.	Regulative pillar (financial literacy) Normative pillar (behavior) Cultural-cognitive pillar (financial satisfaction, socialization)
Cao (2023)	**Artificial intelligence and data science in finance.** This paper provides an overview of the use of artificial intelligence (AI) and data science (AIDS) in finance, covering its evolution over decades from classic to modern techniques. It begins by highlighting the challenges in financial businesses and data and then offers a detailed classification and summary of AIDS research in finance.	Physical enactments (AI products) Regulative pillar (AI-empowered financial business) Normative pillar (behavioral change)
Solhi et al. (2022)	**Systematic considerations and strategies for aging preparedness**. This paper suggests preparations for aging across six dimensions: health, psychological well-being, financial security, housing, social connections, and active leisure.	Cultural-cognitive pillar (financial preparation for aging as a multi-dimensional, ongoing service)

TABLE A.2 (Continued)

Source	The definitions, concepts, and examples regarding longevity or financial planning	The implications and challenges connecting to the service system
Briscoe (2022)	**Technology roadmap for longevity economics.** This paper examines how service systems for longevity technology progress through five phases: innovation trigger, the peak of inflated expectations, trough of disillusionment, slope of enlightenment, and plateau of productivity. It explores the technology roadmap for the longevity economy over the next two years, between two and five years, five to ten years, and beyond ten years.	Physical enactments (through the lens of a technology roadmap to reconsider symbols, artifacts, activities, and relations)
Yen and Chong (2022)	**Adapting financial planning and strategies to reflect gender, cultural, and social norms**. This paper examines gender as a moderating factor in financial planning for retirement. Cultural and social norms have significantly influenced women in terms of decision-making, environment, and social support.	Normative pillar (social norms) Cultural-cognitive pillar (gender)
Cherry and Asebedo (2022)	**Personality traits and finance decision-making.** This paper suggests personality traits as a new factor influencing life insurance ownership. It offers insights for financial planners and insurance professionals to tailor their advice based on clients' personality traits, potentially enhancing decision-making and encouraging life insurance purchases.	Physical enactments (life insurance products and services) Cultural-cognitive pillar (personality traits influencing financial decisions)
Brown and Lin (2021)	**New opportunities for FinTech**. This paper conducts a comprehensive review of recent developments in the FinTech sector to pinpoint opportunities for practitioners, researchers, and policymakers. It considers technological innovation (FinTech) as a catalyst for service innovation and recommends fostering synergistic collaborations among researchers, practitioners, and regulators to enhance social welfare.	Regulative pillar (policies reflecting the needs and applications of applying FinTech) Normative pillar (new lifestyle and work behavior impact by FinTech)

TABLE A.2 (Continued)

Source	The definitions, concepts, and examples regarding longevity or financial planning	The implications and challenges connecting to the service system
Scott (2021)	**Longevity society through the lens of policy**. This paper investigates the transformative shift from an aging society to a longevity society through the lens of policy, taking into account significant changes in life course and social norms. The study underscores the necessity of a new stage for humanity aimed at enhancing the quality of life.	Regulative pillar (policy) Normative pillar (social norms)
Rappaport (2021)	**The changing environment for longevity planning.** This paper investigates retirement planning's changing landscape, focusing on economic risks (e.g., inflation and interest rates), personal planning challenges (e.g., longevity and post-retirement work), and unforeseeable events (e.g., policy shifts and health care needs).	Regulative pillar (emergence rules, laws, and policy shifts due to economic risks) Normative pillar (behavioral change)
Manser Payne et al. (2021)	**Financial service ecosystem with AI integration**. This paper introduces a digital servitization framework to examine AI services' effects on value perceptions, consumer engagement, and firm performance, focusing on the financial service ecosystem.	Normative pillar (value perceptions, consumer engagement, and firm performance impacted by AI integration)
Goyal et al. (2021)	**Personal financial management behavior**. This paper explores the current research on Personal Financial Management Behavior (PFMB), emphasizing its antecedents and consequences. Introduces a framework to depict PFMB's antecedents and consequences, including mediation and moderation linkages.	Normative pillar (behavior)
Jantan (2020)	**Retirement-pension systems and challenges**. This paper analyzes challenges within the retirement-pension system. It aims to address issues encountered by households in retirement savings, including the longevity risk associated with retirement plans and the adequacy of retirement savings.	Regulative pillar (pension system)

(Continued)

TABLE A.2 (Continued)

Source	The definitions, concepts, and examples regarding longevity or financial planning	The implications and challenges connecting to the service system
Fallaw et al. (2020)	**Household finance and financial tasks**. This paper analyzes performance criteria in household financial management to evaluate the effectiveness of the household chief financial officer (HCFO), highlighting the frequency and importance of financial tasks for success.	Physical enactments (artifacts, activities, and relations impacted by household chief financial officer)
Xiao and Tao (2020)	**Consumer finance and future research**. This paper defines consumer finance, outlines its scope, explores future research directions, compares it with related terms like household, personal, and family finance, and reviews key studies on consumer financial behavior across money management, insurance, loans, and saving/investment.	Cultural-cognitive pillar (consumer finance is defined as an interdisciplinary research field with various personal values and beliefs)
Dew et al. (2020)	**Financial-helping fields and education.** This paper investigates financial-helping fields—family resource management, financial education, personal financial planning, and financial counseling—to identify evidence-based practices for addressing money-related issues.	Physical enactments (symbols, artifacts, activities, and relations to reflect financial education) Regulative pillar (financial-helping platform with accordance policies and social structure)
Guido et al. (2020)	**Consumer financial behavior and services supporting an aging population.** This paper examines the financial service choices and behaviors of elderly consumers, focusing on their decisions related to asset management and legacy. It summarizes key research findings and offers practical insights for marketers.	Physical enactments (symbols, artifacts, activities, and relations reflect the heterogeneous nature of elderly consumers' values and lifestyles) Cultural-cognitive pillar (culture of demographic differences)
Rappaport (2019)	**Financial perspectives regarding aging and retirement across diverse generational cohorts.** This paper, in collaboration with the Society of Actuaries, explores financial perspectives on aging and retirement across generations, offering insights for employers, policymakers, and financial planners to develop inclusive and effective financial wellness and retirement strategies.	Regulative pillar (policy) Normative pillar (multi-generation norms) Cultural-cognitive pillar (inclusive financial wellness and retirement strategy)

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