Silver Economy Strategies: A Comparative Study of Japanese and South Korean Governmental Measures

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Abstract

This article comparatively analyses the Japanese and South Korean governments' measures directed at embracing the economic opportunities held by a growing elderly population. As highlighted in the literature review, no overarching framework for creating a global ageing strategy has been formulated to date, despite a noteworthy set of activities aimed at capturing the potential of an ageing population. By examining the strategic action plans and policies of these two East Asian countries through a general set of criteria (actors and plans, contributors and factors, actions and content), a possible universal approach is evaluated. The analysis concludes that the respective governmental measures are characterised by great similarity, reflecting the intervention possibilities of similarly structured democracies in related fields. Most notable similarities include the targeting of the small and medium enterprise sector for innovation in newly emerging industries and markets, an improvement of the research and development environment, and the evaluation of social transformations for the development of strategic solutions. The sectorial focus lies on information and communication technology solutions, artificial intelligence and robotics, and additionally focuses on health and medical care devices, as well as on devices facilitating independent living and mobility.

Keywords: Silver Economy, population ageing, R&D, elderly consumer, Japan, South Korea

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Introduction

Population ageing, describing the shift in the distribution of a country's demography towards a greater proportion of elderly people, is a challenging phenomenon dawning in many industrialised and emerging market countries in the twenty-first century (World Health Organisation 2018; United Nations Population Fund 2012: 2; Sander et al. 2015; United Nations Population Fund 2017; Petermans and Piau 2017; Organisation for Economic Co-operation and Development 2016; Peine et al. 2015). The worldwide ageing of societies is caused by trends that have marked the twentieth century including changes in family structures, an increase in longevity, a decline in fertility and mortality rates, and lower birthrates often below the replacement level. As a result, population ageing has a negative impact on economic growth and productivity. In addition, it increasingly burdens the social security, health, and medical care systems, as well as disrupts the labour market of any concerned country.

Recent studies by the World Health Organisation (WHO) and the United Nations Population Fund (UNFPA) estimate that one in five people will be aged sixty years or above by 2050. Regardless of the challenges posed by the demographic transformation, this phenomenon holds a variety of opportunities for societies and their economies. The growing consumer group of elderly people brings forward a new industry or economic sector—the so-called "Silver Economy" (Peek, Wouters, and van Hoof 2014; The World Economic Forum 2015; Organisation for Economic Co-operation and Development 2014a; Kohlbacher, Herstatt, and Levsen 2015).

Until the 1980s, the consumption power of the elderly was overlooked as they were considered a low income consumer group (Interreg Sudoe ICT4SILVER 2018: 2). However, recent studies have proven that the growing number of elderly people as a consumer and customer group hold a previously unseen economic power, because people aged sixty years and above nowadays control a vast portion of global wealth and spending power (Laperche et al. 2018; The World Economic Forum 2015; Interreg Sudoe ICT4SILVER 2018; Nahal and Ma 2014). Indeed, in 2017, it could be observed that seventy per cent of disposable income in the USA was in the hands of those aged over sixty (The World Economic Forum 2015: 4). Furthermore, it is predicted that the spending power of people aged sixty years and above will reach US$ fifteen trillion by 2020. Studies solely analysing the longevity sector expect it to make up more than fifty per cent of US and Japanese gross domestic product (GDP) by the 2030s (Oxford Economics NLIRI, cit. a. Nahal and Ma 2014: 3).

In this context, Figure 1 illustrates the expected growing consumption of people aged sixty years and over.

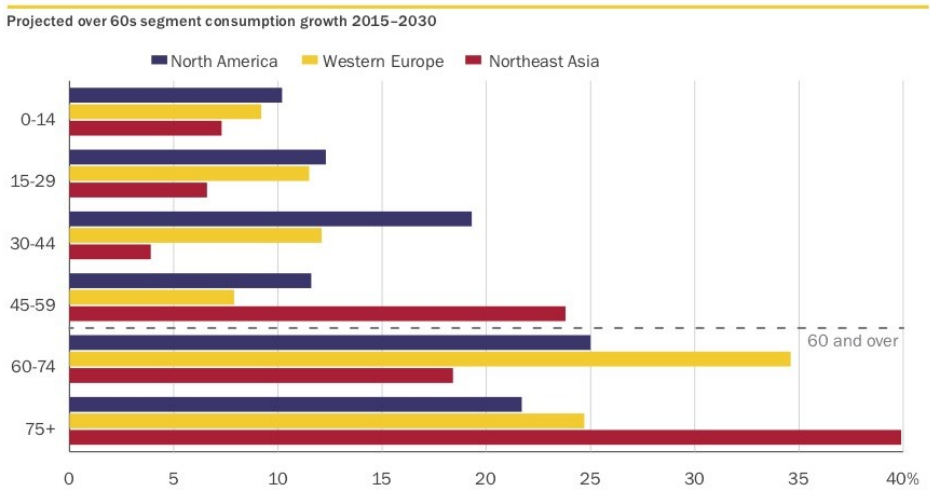

Figure 1: Projected silver age consumption growth 2015–2030. Source: Therlin, Haggard, and Gutiérrez 2018: 2.

Taking a closer look at different sectors that belong to the Silver Economy, numerous calculations give insight into the potential of specific market sectors. The global market for driverless cars, for instance, is estimated to rise from US$ forty-two billion in 2025 to US$ seventy-seven billion by 2035 (Varnai et al. 2018: 31). Similar trends can be observed for markets such as robotics, silver tourism, and smart homes (ibid.).

Analysis shows that although countries have different approaches to fostering economic growth, with the right strategies in place, the ageing of society can be used as an opportunity to direct innovation capacities, investment, and research and development (R&D) towards the growing elderly consumer group. This explains why many regions and countries in the world have shifted their (policy) focus towards the growing elderly population, and as a result, have conducted analyses, proposed measures, and implemented strategic action plans on ageing (Nagano and Mori 2010: 10):

> Despite this profound and inspiring set of activities designed to capture the potential of an ageing population, no overarching framework unites these individual efforts into collective action. No one body has emerged to take the mantle of leadership by articulating a framework for understanding, addressing and executing a global ageing strategy […] (World Economic Forum 2015: 4).

To date, some of the most notable steps towards establishing such strategies have been taken in Northeast Asia, namely in Japan and South Korea. One of the main reasons for their governments' focus on and active engagement with the elderly can be found in the scale of demographic change experienced by these countries.

Japan was the first developed country to encounter rapid demographic change and its consequences. Furthermore, the island nation is defined as one of the world's most aged countries (Steger 2017; World Bank 2017). The transition from an "ageing society" (in which elderly people aged sixty-five years and over make up seven per cent of the population) to an "aged society" (in which elderly people aged sixty-five years and over make up fourteen per cent of the population) took Japan twenty-four years, resulting in a population in which twenty-eight per cent of the population are aged sixty-five years and older (Nikkei Asian Review 2018). The country faces a shrinking population, and is additionally threatened by a labour shortage and difficult fiscal situation (Nagano and Mori 2010).

As a contrast to Japan, which has already crossed the threshold to an aged society, South Korea is still in transition. Considered as one of the fastest ageing countries in the world, South Korea is undergoing the illustrated transformation from an "ageing" to an "aged" society in seventeen years; in comparison, the same process requires forty years in Germany and 115 years in France (Steger 2017; World Bank 2017). A recent economic study has shown that despite high scores in personal security, education, and skills, South Korea ranks below the Organisation for Economic Co-operation and Development (OECD) average on well-being as a result of (gender) inequality, structural problems in the employment sector, and old age discrimination and poverty (Organisation for Economic Co-operation and Development 2018b: 5–6). With a relative poverty rate among those aged sixty-five years and above lying at forty-six per cent, South Korea finds itself far above the thirteen per cent OECD average, thus making poverty in old age one of the nation's major issues (ibid.). Reasons for the high poverty rate are early retirement, low wages, and lower education levels among the sixty plus generation (Organisation for Economic Co-operation and Development 2018b: 40–44; Harris 2018).

As a direct response to the illustrated challenges, Japan and South Korea have been following specific action plans and implemented processes. The intended purpose is to steer against the negative impact of population ageing on aspects of their respective societies and economies by embracing the opportunities held by the elderly consumer group. Thus, this article analyses the differences and similarities of these measures with the aim of introducing a framework for understanding, addressing, and executing a global ageing strategy that can serve as an example for policymakers, scholars, health professionals, economists, engineers, and researchers worldwide. The following research question is guiding this article: What are the main differences and similarities of the Japanese and South Korean governmental measures undertaken as part of a Silver Economy strategy?

Literature Review

Population ageing is a complex phenomenon that impacts upon a wide range of societal and economic aspects. Finding the right approach and selecting useful strategic measures that can help turn an ageing society into an opportunity is thus crucial for states and their governments.

In order to carve out relevant factors, and consequently establish a general set of analytical criteria, a review of the existing literature on this particular research topic will first be presented.

Defining the Silver Economy

A review of the main publications by international bodies such as the United Nations (UN), the OECD, the WHO, the European Union (EU), and the World Bank illustrates that, for many years, population ageing was viewed as a challenge affecting many aspects of society (Nagano and Mori 2010: 10; Klimczuk 2016; Bussolo et al. 2015). Therefore, research in this field mostly focused on issues such as the negative impact of ageing on economic growth and productivity, as well as on the management of health and retirement systems (Acemoglu and Restrepo 2017; Liu and Westelius 2016; World Health Organisation 2017; European Commission 2018). Nonetheless, starting with a report titled "Welfare of the Aged: Old Age Rights" published by the office of the Secretary General of the UN in 1950, elderly people as individuals and their quality of life were increasingly brought into focus (Jarré 2015). Consequently, the "1982 Vienna International Plan of Action on Ageing" and the "2002 Madrid International Plan of Action on Ageing" introduced the subject of wellbeing in old age, often termed healthy, active, or successful ageing (United Nations 2002: Foreword; World Health Organisation 2017; World Health Organisation 2002b). As a result, new understanding of the needs and desires of the elderly combined with knowledge of the economic potential and opportunities held by this new market were moved into the spotlight of academic literature and government publications in this field (Laperche et al. 2018; Organisation for Economic Co-operation and Development 2018a; World Economic Forum 2015; Petermans and Piau 2017).

Understanding the Silver Economy

The term Silver Economy first emerged in the 1970s in Japan, when the government worked to increase the number of facilities available to the elderly (Coulmas 2008, cit. a. Klimczuk 2016: 44). The term as it is used now was created by researchers at Oxford University and initially described all economic activity linked to people aged fifty years and above (European Commission 2015, cit. a. Zsarnoczky 2016: 5). After 2009,

the term became fully established and thus frequently and commonly used by companies, governments, and the media (Paredes-Vanheule 2018). A review of the wording Silver Economy, however, shows that indeed no generally accepted definition exists today (cf. World Economic Forum 2015: 4). One OECD publication (Organisation for Economic Co-operation and Development 2014b) defines the Silver Economy as an industry or economic sector that focuses on producing and providing products and services especially designed for senior citizens. Radvansky and Páleník (n.d.) understand the Silver Economy as the "adaptation of the economy to [the] future needs of [a] growing population of those over fifty years" (Radvansky and Páleník n.d., cit a. European Commission 2015: 7). As voiced by Laperche et al. (2018), Silver Economy is currently defined as "a set of economic and industrial activities that benefit seniors, in terms of increased social participation, improved quality and comfort of life, reduced loss of autonomy, and increased life expectancy (Bernard et al. 2013; Ministère des affaires sociales et de la santé 2013).

Looking further at the concept of the Silver Economy, Varnai et al. (2018) explain that it can be understood as part of the general economy. Hence, they define the Silver Economy as "the sum of all economic activity serving the needs of those aged fifty and over including both the products and services they purchase directly and the further economic activity this spending generates." For this reason, Varnai et al. (2018) commence their study by estimating the (potential) size of the Silver Economy in relation to the general economy, and consequently analyse the resulting economic impact this spending generates. By looking at the elderly's share of total private and public sector consumption, they determine the Silver Economy's share of key consumption groups, as well as the share of economic growth derived from spending by the elderly on adequate services and products.

The Role of Research and Development, Science, Technology, and Innovation, and Companies in the Silver Economy

Technology and innovation are increasingly highlighted as potential solutions to the challenges posed by a growing number of elderly people (Peek, Wouters, and van Hoof 2014; The World Economic Forum 2015; Organisation for Economic Co-operation and Development 2014a). Alongside policy reforms, innovative models of finance, and adjustments to the pension systems and labour market, the OECD (2014a) concluded that technology can act as an empowering solution for the elderly. Given it also creates new market sectors and increases the offer of specific products and services, technology should serve as a key economic focus.

In their most recent analysis, the OECD (2018a) underscores that science, technology and innovation (STI) activities have recently found themselves confronted by disruptions and challenges, among which they name the slowdown in productivity resulting from rapidly ageing populations globally. The OECD further maintains that

these disruptions not only lead to challenges, but also produce opportunities for STI. They influence the way society and policymakers perceive STI, its purposes, and possibilities, thus affecting how STI activities are implemented and exploited (ibid.). In order to manage STIs well, and use them to gain from newly arisen opportunities or to counter previous challenges, the OECD (2018a) report suggests that governments become more responsive and more open to stakeholder participation. In this context, they recommend experimenting with anticipatory and participatory approaches to agenda setting and policymaking, and as such underline the government's prominent role in directing technological advances for the Silver Economy (ibid.: Summary):

> […] governments are seeking to redirect technological change from existing trajectories towards more economically, socially and environmentally beneficial technologies […]. This shift has given impetus to a new era of 'mission-oriented' STI policy, with governments looking to work more closely with the business sector and civil society to steer the direction of science and technology towards ambitious, socially relevant goals (ibid.).

The OECD report (2016: 28) agrees, reporting that lifestyle changes prompted by ageing lead to new consumption patterns, which will in turn have implications for the types of products and services in demand. They expect new markets to emerge as part of a "flourishing 'silver economy'" (ibid.).

Additionally, Nahal, and Ma stress the need for companies to develop effective strategies to address the economic potential of the sixty plus population group. They summarise the two main strategies used so far to explicitly targeting the elderly with products and services especially designed for them, and in maximising opportunities by expanding into the silver market (Nahal and Ma 2014: 125).

In line with the authors above, the World Economic Forum advises on the evolution of emerging markets and elaborates on companies that have recognised the inherent market potential and their approaches to the opportunities. The report authors further discuss how major global corporations have embedded "ageing" as a key driver of their economic strategies. Some examples include technology and insurance companies and banks such as Intel, Cardinal Health, Bradesco, Home Instead Senior Care, Nestlé Skin Health, Aeon, Fujitsu, Pfizer, Bank of America Merrill Lynch, Aegon, and Deloitte (World Economic Forum 2015: 6–10).

Moreover, with regard to firms' roles in the Silver Economy, the OECD report (2014b) names Japanese company Fujitsu as among the most driven companies working on the creation of new technological products assisting the elderly in their daily lives. Adding to this line of thought, the European Commission (EC) (2015: 6) discusses several large US companies' moves into the Silver Economy market. They name Google's Nest and iRobot, as well as Apple's eHealth Kit and their newly emerged Wellness business as examples. European companies like Bosch, Legrand, and Philips are reported to have developed Silver Economy strategies too (ibid.).

Summarising the most recent developments, an OECD (2018a) report states that governments are currently redirecting technology and innovation capacity towards more economically and socially beneficial technologies concerning population ageing, its challenges, and the opportunities it presents. Furthermore, The World Economic Forum (2015) and the OECD (2014a) discuss the adoption of automation and other technologies in this regard, as well as the essential role played by policymakers, and institutional and governmental factors in guiding this economic activity. Lastly, authors such as Nahal and Ma (2014), the World Economic Forum (2015), the OECD (2014b), and the European Commission (2015) have introduced companies as major actors in the Silver Economy, which governments need to take into consideration when developing Silver Economy strategies.

Gerontechnology and Geront'innovations

An increasing interest in the development and use of products and services in the field of gerontechnology is identified as one of the central parts of the Silver Economy (Klimczuk 2016: 31; Laperche et al. 2018). The term "gerontechnology" was first used in 1989 and defined as "the study of technology and aging [sic.] for ensuring an optimal technological environment of all aging [sic.] and old people up to a high age" (Bouma and Graafmans 1992, cit. a. Laperche et al. 2018: 7).

Nowadays, gerontechnology is defined as a multidisciplinary model "that uses technology to innovate in the geriatric field" (Michel and Franco 2014; Sheets, La Buda, and Liebig 1997, cit. a. Petermans and Piau 2017: 281). As such, it is much more closely interlinked with "geront'innovations," a concept that was adapted from the OECD 2005 definition of innovation and proposed by Laperche et al. (2018). They claim that innovations catering for the needs of the elderly cannot be used to only describe technological products and services (ibid.). Therefore, they define geront'innovations "as the implementation of a new or significantly improved product (a good or service or a combination of these) or process, a new marketing method, or a new organisational method to the benefit of fragile and dependent old people" (ibid.).

For the purpose of this article, however, the primary focus lies on Klimczuk's (2016) definition as he provides the most comprehensive summary of the term "gerontechnology:"

> This term refers to the study of technology, products and services dedicated to older people, designed to assist them in almost every aspect of life, in particular, health and self-esteem, housing and daily living, mobility and transport, communication and governance, and work and leisure. (Burdick 2007, cit. a. Klimczuk 2016: 34)

Directing Social Innovation Towards the Elderly Consumer

Petermans and Piau (2017) and Peek, Wouters, and van Hoof (2014) identify cognitive and physical functions, as well as social connectedness as the pivotal challenges in elderly care and healthy ageing, and name technological innovation as a possible solution to help maintain cognitive and physical functions of elderly patients. In this context, Kohlbacher, Herstatt, and Schweisfurth (2011) deduce that addressing the particular physical and psychological needs stemming from ageing—such as constricted eyesight, a loss of hearing, or a worsening memory—acts as a promising foundation for the development of successful products and services (Fisk et al. 2009, cit. a. Kohlbacher, Herstatt, and Schweisfurth 2011). They further elaborate that these physical and psychological shortcomings increase with age, and cause a certain dependence on forms of help and carers. The decline of functional capabilities, which are the negative side effects of ageing considered separately from the pathological effects that originate from diseases, limits the tasks elderly people can perform in their daily lives. The side effects include a decrease in sensory capabilities, creating difficulties performing acts such as the opening of a bottle and the reading of displays, as well as a decrease in cognitive capabilities required for the efficient processing of data. Hence, Kohlbacher, Herstatt, and Schweisfurth (2011) name continued independence as the key desire among elderly people (Rubio et al. 2009, cit. a. Kohlbacher, Herstatt, and Schweisfurth 2011: 5).

The issue of independence and autonomous living thus informs the development of the majority of products and services within the Silver Economy framework and forms the core idea of gerontechnology.

Identifying Target Sectors for the Silver Economy

The silver market cannot be viewed as a homogenous market segment. Its complexity and diversity results from the wide range of customers and consumers included in the fifty plus market and their differing habits, values, desires, and needs. The literature, therefore, concludes that the silver market can actually be understood as a combination of different silver markets (Kohlbacher and Herstatt 2011 (2008): xx). In this context, different sources have identified key sectors that may be targeted by government initiatives as part of a newly developed Silver Economy strategy.

For this reason, Kohlbacher, Herstatt, and Schweisfurth (2011) have developed a means of segmenting the market in order to identify the most attractive business opportunities (ibid.: 3). The key idea behind this is to have a focused approach to specific sub-markets based on preliminary market research. This will lead to a successful and sustainable Silver Economy strategy, in which the focus lies on a smaller number of target sectors or sub-markets relevant to a respective country or region, instead of including all the potential aspects under the broad sphere of the Silver Economy.

According to Kohlbacher, Herstatt, and Schweisfurth, previous research in Japan has brought forward "a variety of strategies for competing in the silver market" (Herstatt and Kohlbacher 2008, cit. a. Kohlbacher, Herstatt, and Schweisfurth 2011: 4):

1) Unique solutions: Innovation strategies that aim to develop brand new products and services especially designed and developed for the elderly;
2) Extended solutions: "Innovation strategies that aim at adapting products and services for the elderly […];" and
3) Universal solutions: This includes innovation strategies which aim at developing ageless or age-neutral products and services that not only serve and attract elderly customers, but are also of relevance and appeal to younger people. The focus of this strategy lies in connecting different generations (ibid.).

Figure 2 provides a graphic summary of the three strategies as identified by Kohlbacher, Herstatt, and Schweisfurth (2011).

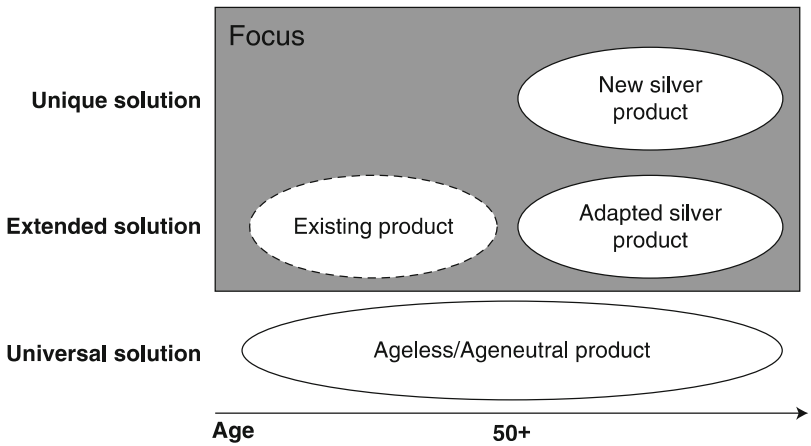

Figure 2: Silver market development strategies. Source: Kohlbacher, Herstatt, and Schweisfurth 2011: 4.

With this initial proposal of different approaches to a silver market strategy in mind, I now consider the overall possible target sectors of the Silver Economy. In this regard, the European Commission (2015) has focused on the creation of a framework for opening new Silver Economy markets with the aim of maximising the benefits and driving economic growth (ibid.: 6). The report, for example, names independent living and smart homes, health and wellbeing, tourism, skilling, autonomous vehicles, robotics, as well as specialised medical devices as existing or emerging market sectors

containing inherent growth potential within the overall silver market (ibid.). Furthermore, the EC underlines that such developed market sectors including goods and services for active and healthy ageing among targeted consumers would not only improve the efficiency and reduce the rising costs of health and social care systems, but also make them more sustainable, and hence a feasible solution to the challenges: "Large scale and systematic introduction of social and technological innovation (such as eHealth, telecare, integrated care, independent living) has shown the potential to substantially increase efficiency of health and long-term care systems […], and lead also to cost savings" (ibid.: 8).

Three years later (2018), the final report of the study on the Silver Economy and opportunities for Europe carried out for the European Commission identified ten sectors offering (potential) solutions for older people while simultaneously creating a new strategic focus for the economy. These ten sectors are 1) connected health, 2) robotics and games, 3) silver tourism, 4) integrated care services and improved connectivity, 5) development of an age-friendly built environment, 6) knowledge for an active and healthy lifestyle, 7) age-friendly universities, 8) driverless cars, 9) "older-preneur," and 10) an interactive platform to fast-track product and service development (Varnai et al. 2018: 27–42).

Furthermore, Zsarnoczky (2016) stresses that the Silver Economy comprises the drive for the development of new strategies related to population ageing "mainly by means of special technology services" (ibid.: 1). "Nowadays, innovation developers focus on solutions for elderly people. Economic sectors involved in innovation and development want immediate strategies and clear visions for the next decades" (ibid.). He names health monitoring, robotic assistance, electrical mobility, tourism, and home care solutions as target sectors of the (silver) economy.

In line with other sources, Nahal and Ma (2014) further identify a number of economic sectors and the companies related to them that are "well placed to benefit from the theme of longevity via older consumers" or from the "silver dollar." The areas emphasised are senior living, care, managed care, healthcare, ageing in place, pharmaceutics, travel and leisure, cosmetics, and general technology. As current and effective strategies used to date, they mention the explicit targeting of the fifty plus market with related services and products "specifically designed for segments in that market," as well as increasing the benefits gained from the market potential by expanding and venturing into the fifty plus market (ibid.: 10).

One of the most prominent publications, a compilation of papers edited by Obi, Auffret, and Iwasaki (2013), generally discusses what governments can do to mobilise innovation and research, as well as the role information and communication technology (ICT) can play in capitalising upon the economic potential of the silver market and its specific sectors. They conclude that the overall aim of the Silver Economy strategy is to highlight the roles of entrepreneurship and innovative financing, showcase the role of new ICT-led technologies for ageing populations, recognise the need

for "user-led" and solutions-oriented innovation approaches, and lastly to develop age-friendly living places, workplace environments, and communities (ibid.: vi).

In line with Obi, Auffret, and Iwasaki (2013), the European Commission (2015: 12) agrees that "ICT is essential as a source of innovation, as it enables integrated person-centred care, with more focus on prevention, early detection and independent living, provided in the own work and home environment. It can empower people to manage their health and support their healthy lifestyle choices."

With regard to the ICT dimension of the Silver Economy, the European Commission (2015: 13) also names telemedicine, telehome, mobile health, smart home systems, and healthcare applications as prominent sectors with high growth potential.

Methodology

The literature review has provided a brief overview of the many factors impacting the Silver Economy and has further introduced numerous aspects that should be considered when exploring and analysing governmental measures. As this research topic is relatively new and very complex, I have not come across similar comparative studies of governmental measures targeted at embracing the Silver Economy. Therefore, an individual methodology working with guiding questions adhering to three different approach levels has been developed to act as the foundation of this analysis.

In developing a framework, I consider arguments on the state's role in approaching and directing economic and technological change (Kohlbacher and Herstatt 2011 [2008]; Laperche et al. 2018; Interreg Sudoe ICT4SILVER 2018; OECD 2018a) with elaborations regarding a demand-led and consumer-driven approach (World Economic Forum 2015; OECD 2016; Yang et al. 2017; Östlund et al. 2014; and Petermans and Piau 2017). It could be concluded that approaching the research question with a developed three-fold framework containing guiding questions may help to identify relevant governmental actors, their strategies regarding certain contributors, and factors on how to approach the Silver Economy. Such an approach consequently enables the identification of governmental measures and actions that have been developed or are being developed and implemented as part of a Silver Economy strategy.

The nature of the research question—aimed at contrasting measures initiated by the two central governments—indicates an analysis of current governmental policies and action plans. Information will thus be gathered from various identified action plans in accordance with the guiding questions of the analytical framework.

Japan

- Fifth Science and Technology Basic Plan (2015–2020) (Basic Plan)
- "Abenomics" Reform and Policy Programme (since 2012)

South Korea

- Fifth Science and Technology Foresight (2018–2022)
- Five-year Plan for the Administration of State Affairs (2017–2021)
- Government Research and Development Innovation Plan
- Aged Care Industry Report

With regard to the literature review, one can summarise that the aim of this article is to analyse actors' determination of the "set of activities" that comprise the productive system of the Silver Economy (Enste et al. 2008, cit. a. Laperche et al. 2008: 6). In this context, I have identified the following three main criteria linked to a general set of guiding questions during the study of secondary literature:

1. Actors and Plans
2. Contributors and Factors
3. Actions and Content

The table below provides an overview of the analytical criteria and their guiding questions, in turn forming the eclectic framework of analysis steering this research.

Analytical Criterion	**Factors / Guiding Questions**
1. *Actors and Plans*	▪ Who is responsible for developing strategic action plans? ▪ Who is responsible for the implementation of the developed strategic measures? ▪ Who/What directs R&D/STI policies?
2. *Contributors and Factors*	▪ What role does R&D/STI play in the strategy? How are they factored into the measures of a Silver Economy strategy? ▪ What role do firms play in the governmental measures as part of a Silver Economy strategy? ▪ What is the relationship like between the central governments and companies formulating and implementing strategies? ▪ What is the sectorial focus on targeted products and services for the silver market?
3. *Actions and Content*	▪ Which overall strategic measures do the governments implement as part of a Silver Economy strategy? ▪ Which measures are implemented to direct R&D and STI? ▪ Which measures are implemented in the context of collaborations with firms?

Table 1: The Analytical Framework. Source: own compilation.

Analysis

Actors and Plans

Who is responsible for developing strategic action plans?

Overall, the process of developing strategic action plans can be considered as a top-down approach in both countries. In Japan, decision making power is concentrated in Prime Minister Abe Shinzō 安倍晋三 (b. 1954) and his Cabinet made up of all relevant ministers (United Nations Centre for Regional Development 2014; Naitou 2017). In South Korea, President Moon Jae-in (Mun Chae-in 문재인; b. 1953) and the State Council dictate the majority of governmental measures and policies. This shows that the heads of government together with senior officials direct measures from the top down, deciding whether to include and set up collaborations with non-governmental actors, agents from civil society, experts, representatives from the field of academia and industry, or similar. The numerous governmental initiatives in Japan and South Korea that promote cross-sectorial collaborations, as well as the measures directed at including experts and research institutes from the R&D and STI fields in the policy-making processes are examples thereof (Government of Japan 2019; Council for Science, Technology and Innovation 2016; Prime Minister of Japan and his Cabinet 2017a; Ministry of Science and ICT Republic of Korea 2015; Government of the Republic of Korea 2017).

The Abe administration assumed office in 2012. Its decision making is heavily characterised by the overarching concept of "Abenomics," an overall objective to revitalise the Japanese economy which has stagnated since the 1990s as a result of the Asian financial crisis (Breene 2016; Akram 2019; Naitou 2017). Low consumer spending, fiscal deficits, and government debt, together with an increase in its elderly population, has rendered economic growth and productivity even more difficult for the island nation (ibid.). Developed by the Abe administration, "Abenomics" is thus the most prominent strategic action plan guiding all governmental measures and policies in the economic and social sphere for the duration of the administration.

While the Japanese government has created an overall action plan shaping policy to manage pressing challenges such as the stagnating economy and ageing population, President Moon has put transparency, open governance, and citizen participation high on the administration's agenda. In doing so, Moon seeks to restore citizens' trust in politics and the government after the impeachment of former President Park Geun-hye (Pak Kŭn-hye 박근혜; b. 1952) (Government of the Republic of Korea 2018).

The current South Korean equivalent of the "Abenomics" policy and reform programme is the so-called "Five-year Plan for the Administration of State Affairs" that includes one hundred policy measures for the administration to implement. While Japan is focusing on creating a "Society 5.0," South Korea's strategic measures seek to

prepare for the Fourth Industrial Revolution—the South Korean guiding concept emphasising strategic efforts to advance and enhance R&D and STI capabilities (Council for Science, Technology and Innovation 2016; Presidential Committee on the Fourth Industrial Revolution 2017; Government of the Republic of Korea 2017).

Special councils or committees made up of experts from the fields of academia, industry and—in Japan's case—civil society representatives, as well as relevant senior government officials and ministers, assist in the evaluation and formulation of measures in specific fields of intervention. In Japan, a relevant example thereof is the Council for Designing One Hundred Year Life Society created in 2017 (Prime Minister of Japan and his Cabinet (2017a). As a comparison, the South Korean governments have established numerous related councils and committees in the past decades. In particular, the Committee on Low Birthrates and Ageing Society, the Presidential Committee on Ageing Society and Population Policy, as well as the State Affairs Advisory Commission responsible for submitting the current five-year plan of the Moon administration, which have consistently served as prime sources in this article, need to be underscored (Ministry for Health, Welfare and Family Affairs, Republic of Korea 2012; Government of the Republic of Korea 2017).

Who is responsible for the implementation of the developed strategic measures?

Upon studying the most recent action and policy plans issued by the Japanese and South Korean governments and related agencies, it becomes clear that the implementation process lies with the relevant ministries (Prime Minister of Japan and his Cabinet 2017b; Government of the Republic of Korea 2018). While South Korea's National Action Plan (NAP) lists detailed policies indicating the main agent and governmental agencies responsible for its implementation, the "Abenomics" policy plan remains rather vague when it comes to the responsible actors (ibid.).

Who/what directs R&D/STI policies?

The themes and concepts laid out in the strategic action plans regarding the field of R&D and STI direct and shape the formation and implementation of the respective policies. However, R&D/STI policies are not directly formulated and implemented by the central government and the relevant ministries in Japan or South Korea, but rather by government related agencies and research institutes responsible for policy evaluation and planning in the STI sector.

In Japan, the National Institute of Science and Technology Policy (NISTEP), operating directly under the Ministry of Education, Culture, Sports, Science and Technology (MEXT) investigates and evaluates policy issues, and further provides the respective government agencies with recommendations guiding strategic policy planning in the R&D/STI field (National Institute of Science and Technology Policy

2019). In addition to NISTEP and MEXT, the most important actor directing R&D/STI policies in Japan is the Council for Science, Technology and Innovation (CSTI) formed by the government (Cabinet Office n.d.; Council for Science, Technology and Innovation 2016). Taking a closer look at the structure of the Council, it can be observed that the assembly reflects the government's promotion of government-academia-industry collaboration. Furthermore, it indicates that not only senior government officials are involved in the formulation of strategic measures regarding R&D and STI policy, but also scholars and representatives from Japan's largest and most influential corporations, such as Mitsubishi and Fujitsu. Every five years, the Council, together with the government, formulates a basic plan that shapes and directs measures in the field of STI for the coming five-year period (Government of Japan 2019).

Parallel to NISTEP, the Korea Institute of Science and Technology Evaluation and Planning (KISTEP) plays the central role in directing South Korea's R&D/STI policies (Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017). It sits next to the Office of Strategic R&D Planning—a part of the Ministry of Trade, Industry and Energy (MOTIE)—and the Office of Science, Technology and Innovation directly under the Minister of Science and ICT. The two ministries and KISTEP, in collaboration with other actors such as the Korea Institute for Industrial Economics and Trade (KIET), the Korea Health Industry Development Institute (KHIDI), and the Korea Institute for Health and Social Affairs (KIHASA), issue a basic plan for science and technology every five years (Korea Institute for Industrial Economics and Trade w.y; Korean Health Industry Development Institute n.d.; Korea Institute for Health and Social Affairs n.d.). Additionally, they publish an annual action plan directing R&D/STI policies. The current Master Plan for Science and Technology covers the five-year period between 2018 and 2022 (Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017).

As a think tank for innovation in science and technology, KISTEP takes part in national science and technology planning. The agency also conducts research and supports the central government with evaluation and consultation services. Most importantly, KISTEP conducts foresight analyses and provides the government with future strategy for STI. They also coordinate government R&D programmes, evaluate the performance of governmental R&D measures, and take part in the budget planning and allocation for R&D (ibid.).

Compared to NISTEP, which was established under the direct jurisdiction of MEXT, KISTEP can be viewed as a more independent think tank given the formulation of the Master Plans for Science and Technology is its main responsibility.

According to KISTEP and the Ministry of Science and ICT, three separate commissions carry out foresight activities: the Foresight Executive Committee, the Future Prediction Committee, and the Future Technology Committee (Ministry of Science

and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017: 3). This demonstrates the aforementioned involvement of many actors and supports the conclusion that especially designed commissions, as well as ministry divisions and agencies are responsible for the formulation and implementation of strategic measures and policy recommendations.

In contrast to these three committees directly connected to the Ministry of Science and ICT and KISTEP, the Japanese government's CSTI performs the same tasks.

Contributors and Factors

What role does R&D/STI play in the strategy? How are they factored into the measures of a Silver Economy strategy?

The Japanese government has set the task of evaluating key national policy issues to direct R&D advancements. Measures described in the Fifth Science and Technology Basic Plan directly translate to the overarching "Abenomics" reform and policy programme shaping Japanese policy-making today (Government of Japan 2019; "Abenomics" policy and reform programme). The Japanese government promotes government-academia-industry collaboration for the purpose of strategic R&D/STI application as part of a problem solving approach (Government of Japan 2016: 15). Further research has shown that the total of five Science and Technology Basic Plans have laid emphasis on the government's R&D investments, the reform of systemic structures, as well as the strategic focus of R&D. Because the government has realised that the right approaches result in the creation of new business opportunities and the opening up of new market sectors, the major aim of the Japanese government has been the creation of a supportive environment for R&D activities, as well as an increase in incentives leading to the acceleration of innovation (ibid.).

When comparing R&D/STI measures outlined in Japan and South Korea's science and technology policy plans, more similarities than differences in approach surface. Both governments aim towards the strategic development of future key industries through the observation of social transformations and consequent structural reforms of the R&D sector. Furthermore, both governments focus on creating a supportive environment that promotes innovation through the relaxation of rules and regulations, as well as administrative processes (Government of Japan 2019; Ministry of Science and ICT, Republic of Korea 2015). Although South Korea also recognises the need to encourage collaboration between government, industry, and academia representatives, the main focus of the plan can be found elsewhere (Restakis 2006; Armstrong and Green 2012).

Contrasting South Korea and Japan, the action plans show a particular focus on R&D spending and investments (Council for Science, Technology and Innovation 2015; Ministry of Science and ICT, Republic of Korea 2015). This is reflected in

South Korea's R&D spending–GDP ratio which made it the leading nation globally in 2018. In an OECD comparison of general R&D spending, however, South Korea comes in fifth place and ranks behind Japan (third place) (Yoon 2018).

Furthermore, South Korea has made it its mission to wipe out past deficiencies concerning the systemic and strategic use of R&D. Analyses have shown that while South Korea makes high R&D investments, the amount of capital invested in R&D compared to successful commercialisation was twenty per cent. Meanwhile, Japan's commercialisation rate lies at about fifty-four per cent (Yoon 2018; Ministry of Science and ICT, Republic of Korea 2015: 2). Therefore, the particular focus in the context of R&D investments in South Korea currently lies with research on commercialisation and the actual production and distribution of newly developed products and services. An additional plan, the Government R&D Innovation Plan 2015, has been managing and evaluating these particular measures (Ministry of Science and ICT, Republic of Korea 2015).

Last but not least, in contrast to Japanese policies which are essentially steered by the strategic pillars developed under the concept of "Abenomics," the Korea Health Industry Development Institute has provided the government with an analysis of the Korean aged care industry valid from 2015–2020. "The Aged Care Industry Report" informed the Korean government about the size and potential of the seniors' market, and additionally underlines the future growth and economic benefits to be gained from directing policies towards identified market trends (Australian Trade and Investment Commission (Austrade) n.d.).

What role do firms play in the governmental measures as part of a Silver Economy strategy?

The Fifth Science and Technology Basic Plan identifies manufacturing as Japan's key industry with the potential to drive economic growth as part of the current strategy. An evaluation of the situation has shown, however, that this potential remains trapped by competition derived from the low production costs of emerging countries, as well as Western countries' strategic exertion of ICT solutions for a more efficient realisation of their national initiatives (Council for Science, Technology and Innovation 2016: 23). As a result, Japan now focuses on advancing R&D in the ICT sector in order to provide the manufacturing sector with ICT solutions, in turn driving economic growth and productivity. Japan's current strategy can be summarised as follows:

> A combination of new, ICT supported production technologies and a strategic focus on emerging markets and new business opportunities carried out by small and medium enterprises of, most prominently, the Japanese manufacturing sector shall boost economic growth and productivity through providing consumer groups with adequate products and services that fulfill their needs

> and desires. CT and AI technologies will help to collect knowledge on consumers' needs. According to the basic plan, these measures are especially directed at SMEs as they make up fifty per cent of all added value in the Japanese manufacturing industry (ibid.: 49).

The South Korean government also targets SMEs and start-ups in the context of STI advancement and the fostering of future growth industries (Government of the Republic of Korea 2017: 9). The Japanese action plan explains that SMEs and start-ups are better suited for innovation and embracing emerging markets than large companies, as they are faster and more agile in their manoeuvring due to more flexible structures and less rules and regulations (Council for Science, Technology and Innovation 2016: 49). This argument is valid for South Korea's focus on SMEs as well. Common strategic measures are directed at monetary incentives and funding for SMEs engaging with certain technologies, the commercialisation of products and services, as well as governmental support through entrepreneurship training and other further learning opportunities (Ministry of Science and ICT, Republic of Korea 2015: 6-8; Government of the Republic of Korea 2017). As a contrast between the two governments' approaches, the Japanese measures are implemented in a unified framework across the spheres of government, academia, and industry as part of the government-academia-industry collaboration project. The Fifth Science and Technology Basic Plan, moreover, acknowledges the R&D potential in universities and national research institutes in addition to the focus on SMEs (Council for Science, Technology and Innovation 2016: 64–69).
The Moon administration has identified additional reasons for the prominent role played by small and medium enterprises and start-ups in their strategy. The five-year plan indicates measures to prevent the abuse of power by Korea's large, family-owned conglomerates, called *chaebŏl* 재벌, and the connected families with the goal of establishing a fair economy and creating equality between companies (Fensom 2017; Government of the Republic of Korea 2017: 21).

What is the relationship like between the central governments and companies formulating and implementing strategies?

This guiding question derived from the literature suggests the prominent role played by companies in the R&D/STI fields and the commercialisation of adequate products and services with regard to the Silver Economy (Bussolo et al 2015; Nahal and Ma 2014; the World Economic Forum 2015: 6–10). It is noteworthy that both governments recognise the important role played by large corporations in the respective economies. Research on the South Korean *chaebŏl* conglomerates with regard to a Silver Economy strategy has shown that companies such as Samsung and LG have indeed embraced the potential held by the elderly consumer group and the emerging

silver market in line with arguments raised in the literature review (Samsung for Business 2019; Cision PR Newswire 2017). As a result, they have been increasingly innovating and developing in this sector. Furthermore, Japan's Science and Technology Basic Plan accentuates companies as the principal drivers of innovation, forming the core of R&D/STI initiatives (Council for Science, Technology and Innovation 2016).

The Council for Science, Technology and Innovation further claim that not only small and medium enterprises, but also large corporations with strong connections to the state hold the biggest share of capital, knowledge, and human resources in this field (ibid.: 46). In spite of this encouraging information, specific governmental measures dealing with the collaboration and relationship between the central governments and large corporations with regard to a Silver Economy strategy could not be identified in any of the respective action plans currently in use by the South Korean and Japanese governments. Data on the corporations' R&D spending, as well as the commercialisation of such products and services suggest, nonetheless, the important role occupied by these conglomerates when it comes to the silver market.

What is the sectorial focus on targeted products and services for the silver market?

When comparing the sectorial focus on specific products and services especially designed for the elderly in the Japanese and South Korean government strategies, it is striking that ICT, AI (Artificial Intelligence) and robotics are the main sectors targeted by R&D and STI measures.

The Japanese government's Fifth Basic Plan, as well as the overarching "Abenomics" policy and reform programme have introduced the concepts of "Super Smart Society" and "Society 5.0" that shape the development and commercialisation processes of STI products and services in Japan today (Council for Science, Technology and Innovation 2016: 8). ICT solutions and robotic devices are mostly listed in this regard (ibid.: 17).

As a comparison to the two Japanese concepts influencing the sectorial focus on products and services in the R&D and STI fields, South Korea's Fifth Science and Technology Foresight has evaluated the overall trends that will impact Korean society over the next twenty years. Deriving from this analysis and classification of trends is the current focus on the development and commercialisation of adequate products and services that support society during these impacts and shifts (Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017: 4–9).

Although there are many identified areas of the Silver Economy that could lead to economic and social benefits if targeted, neither the Japanese nor the South Korean government plans indicate a focus on silver tourism, fashion, media, cosmetics, insurance, and financial services. However, both governments have in one way or another recognised the other identified areas and have set measures accordingly. For example,

education and skills rank highly on the agenda of the "Abenomics" policy plan that focuses on the expansion of human capital and human resources (Council for Science, Technology and Innovation 2016; Government of Japan 2019). Furthermore, the KISTEP analysis has shown that the Korean government must foster human resources in order to realise the targeted products and services (Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017). In contrast to Japan, South Korea has explicitly mentioned consumer goods, and with it leisure items for the elderly as a strategic area for business possibly resulting from the recommendations and evaluations published by KHIDI in the "Aged Care Industry Report" (Australian Trade and Investment Commission (Austrade) n.d.).

In general, both countries most prominently target innovation in the medical service field with a focus on new technologies, as well as medical devices in the context of gerontechnology. Moreover, adaptations and innovative solutions regarding living and mobility for the elderly are the focus of governmental measures in Japan, while South Korea additionally highlights daily care and rehabilitation assistance robots.

Actions and Content

Which overall strategic measures do the governments implement as part of a Silver Economy strategy?

A recent government report examining the current status of the "Abenomics" reform and policy programme recognises ageing as the greatest structural issue challenging the Japanese economy and society today (Government of Japan 2019: 3). Complementing "Abenomics," the concept of "Society 5.0" steers policies targeted at the sustainable development of a new social model that draws its success from the smart management of longevity. A shrinking and ageing population forms the starting point of governmental measures formulated to manage and transform the current challenges (ibid.). Overall strategic measures by the Japanese government in this regard involve the creation of new demand, increased production, higher income, and a subsequent consumption boost (ibid.).

As previously mentioned, the Japanese government aims to expand human capital. According to the current Japanese way of thinking, a smart and skilled workforce increases the research, development, and production of innovative solutions, and also knows how to make strategic use of these technological advances to balance out the ageing and shrinking of society (ibid.: 5–8). Additional measures support the creation of new business and new demand through the relaxation of administrative and regulatory barriers, promote the cross-sectorial collaboration of relevant stakeholders, and focus on SMEs' full potential (ibid.: 13–14).

South Korean governmental measures are more explicitly aimed at elderly citizens and their consumption power compared to Japan's more general measures. Particular

focus is laid on improving health and medical care, living environments, as well as encouraging leisure activities and lifelong learning (Ministry for Health, Welfare and Family Affairs, Republic of Korea 2012). Similar to Japan, South Korea directs measures towards education and life long learning with the aim of enhancing human capital in order to boost economic productivity and balance the decrease in the working age population. Furthermore, the Moon administration's action plan focuses on healthy and active ageing, as well as the promotion of the so-called social economy (Government of the Republic of Korea 2017: 21–26). Reflecting current economic and social developments, social economy describes the government's intention to put individual and societal needs at the centre of their policymaking with the aim of providing solutions through an increase in stakeholder cooperation.

Which measures are implemented to direct R&D and STI?

As both governments work at relaxing administrative and regulatory processes in order to create a more supportive and productive innovation environment, a sizeable portion of strategic measures is dedicated to the reform of such systemic structures. Moreover, both governments share measures directed at the promotion of cross-sectorial collaboration. While Japan repeatedly emphasises the government-academia-industry collaboration as an essential driver of R&D, South Korea explicitly identifies cooperation between stakeholders such as public and private research institutes and the international community (Government of Japan 2016; Restakis 2006; Armstrong and Green 2012). Additionally, a particular focus lies on the working relationship between the South Korean government and the government funded national and public research institutes, such as KISTEP (Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017).

The biggest differences in approach are connected to the analyses conducted for the Fifth Science and Technology Basic Plan. The document conveys that the Japanese government's R&D targets have not been met in several years due to stagnation in governmental R&D investment (Council for Science, Technology and Innovation 2016: 6). Against the backdrop of comparatively low proportional contributions, the Japanese government aims to increase its investment in STI (ibid.: 69). Bearing in mind that SMEs in collaboration with universities and national R&D institutes have been placed at the centre of R&D/STI policies in Japan, the current plan entails incentive measures and strategic financing of these core institutions and their projects (ibid.). Contrasting Japan's focus on increased government investment with South Korea's most prominent aims, it can be noted that South Korea, first and foremost, seeks to build a more strategic approach guiding R&D initiatives. In this context, the government's main tasks include the formulation of a long-term R&D strategy directing all related measures (Ministry of Science and ICT, Republic of Korea 2015: 8–9). Consequently, the steps involve the analysis and evaluation of projects leading to a

priority ranking in line with predefined strategic purposes in order to address the most pressing R&D needs, and, lastly, the assessment of general R&D tasks (ibid.).

In contrast to Japan, South Korea's Fifth Science and Technology Foresight has provided a list of specific technologies along with a time frame, as well as the relevant actors responsible for the development and subsequent commercialisation of the product or service (Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017). This list once again underlines South Korea's dedication to strengthening the software and ICT sectors, as well as the government's support for future oriented, newly emerging industries (Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017: 15–20; Government of the Republic of Korea 2017: 22).

Which measures are implemented in the context of collaborations with firms?

It is striking that the relevant action plans guiding Japanese and South Korean strategic measures more or less solely mention SMEs, as well as start-ups in the context of realising future technologies. Expected measures dealing with cooperation between the central governments and large conglomerates were not discovered for either country.

On the contrary, the current five-year plan followed by the Moon administration details measures to control the power and influence of South Korea's large, family-owned corporations (*chaebŏl*). To provide the Korean people with more transparent governance and an open democracy, as reflected in a large variety of recent policy initiatives, the Moon administration has started working on severing ties with large corporations (Fensom 2017; Government of the Republic of Korea 2017; Cho 2015). However, given that *chaebŏls* have played a key role in the Korean economy, particularly in the R&D/STI field, the importance of these actors cannot be neglected in the analytical part of this article. Almost eighty per cent of South Korea's total R&D expenditure comes from corporations (Lee n.d.: 54). According to numbers published in the Fifth Science and Technology Foresight, corporations have a thirty-five per cent share of the total distribution of R&D activity (Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning 2017: 17).

As previously indicated, conglomerates such as Samsung and LG have recognised the potential offered by the growing elderly consumer group and have been developing products and services targeting the silver market (Samsung for Business 2019; Cision PR Newswire 2017).

Conclusion

In recent years, it was discovered that in spite of the challenges posed by ageing demography, this phenomenon holds great economic potential. Among governments, it has become clear that with the right approaches, population ageing can be turned into an opportunity to develop new markets and products, as well as direct innovation capacities and R&D towards the Silver Economy.

The objective of this comparative analysis was to study the Japanese and South Korean governments' strategic differences and similarities in approach in order to determine generally useful actions towards this issue for policymakers, researchers, economists, medical professionals, and other actors concerned with this specific issue worldwide.

To sum up, the main similarities in measures undertaken as part of a Silver Economy strategy count a clear, strategic focus on SMEs and start-ups as the drivers of innovation in new and emerging markets, the promotion of ICT solutions to enhance productivity, as well as the promotion of robotics and AI. Additionally, both countries have observed and assessed social transformations which aim towards the strategic development of future industries that may boost economic growth. Overall, a focus on improved health and medical care through innovation and the development of medical devices as described by the terms gerontechnology and geront'innovations, as well as improved and adapted mobility and housing for the elderly could be observed.

Regarding R&D/STI related policies, both countries seek to reform systemic structures by relaxing administrative processes, rules and regulations in order to form a supportive innovation environment. Along this line, both countries also seek to increase government funding of strategic R&D and provide monetary incentives for firms that engage with particular future technologies. Furthermore, the Japanese and South Korean governmental measures emphasise the cooperation and collaboration of various stakeholders from the spheres of industry, government, academia and, in rare cases, civil society representatives. Finally, it was discovered that both governments rely on education and life long learning measures to enhance human capital in order to balance out the decline in working age populations resulting from ageing.

The slight differences observed in governmental measures as part of a Silver Economy strategy can be accounted for by the difference in general political approaches by the two countries and current objectives as outlined in their respective government programmes. While Japan focuses first and foremost on the realisation of a healthy, growing economy and the success of the "Abenomics" reform and policy programme, South Korea concentrates on transparency, open governance, and regaining the citizens' trust through improving their living situation. The growing proportion of elderly people plays a crucial role in both administrations' strategic plans, as they are directly linked to achieving economic growth and prosperity.

Last but not least, the results convey that technology and innovation indeed offer potential solutions to the challenges created by the demographic transformation towards older populations. This proves that governments can influence and steer R&D/STI activity with adequate measures to help turn the challenges into an economic and social opportunity.

With regard to these results, the analysis concludes that the similarities in measures clearly outweigh the differences, and hence provide an exemplary guideline for strategic government intervention. The great similarity in measures can be explained by intervention possibilities for action of any similarly structured democracy. In addition, the similar societal structures, as well as Japan's and South Korea's relationship and close regional proximity must be considered in the evaluation of these results. Therefore, a final evaluation of possible universal measures is recommended after a comparison of a significantly larger number of country cases from different world regions.

ABBREVIATIONS

AI	Artificial Intelligence
CSTI	Council for Science, Technology and Innovation
EC	European Commission
EU	European Union
GDP	Gross Domestic Product
ICT	Information and Communication Technology
KHIDI	Korea Health Industry Development Institute
KIET	Korea Institute for Industrial Economics and Trade
KIHASA	Korea Institute for Health and Social Affairs
KISTEP	Korea Institute of Science and Technology Evaluation and Planning
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MOTIE	Ministry of Trade, Industry and Energy – Republic of Korea
NAP	National Action Plan
NISTEP	National Institute of Science and Technology Policy
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
STI	Science, Technology and Innovation

REFERENCES

Acemoglu, Daron and Pascual Restrepo. 2017. "Secular Stagnation? The Effect of Aging on Economic Growth in the Age of Automation." NNBER Working Paper 23077; online: https://economics.mit.edu/files/13126 (accessed: July 17, 2020).

Akram, Tanweer. 2019. "The Japanese Economy: Stagnation, Recovery and Challenges." *Journal of Economic Issues*, 53 (2), pp. 403–410.

Armstrong, J. Scott and Kesten C. Green. 2012. "Effects of Corporate Social Responsibility and Irresponsibility Policies." *Journal of Business Research*, 66 (10), pp.1–15.

Australian Trade and Investment Commission (Austrade). n.d. "Aged Care to Korea – Trends and Opportunities." Online: https://www.austrade.gov.au/australian/export/export-markets/countries/republic-of-korea/industries/aged-care (accessed: June 11, 2019).

Bernard, Claire, Sanaa Hallal, and Jean-Paul Nicolai. 2013. "La Silver Économie, une Opportunité de Croissance pour la France." Commissariat général à la stratégie et à la prospective, Rapports et documents. Online: www.strategie.gouv.fr (accessed: December 20, 2018).

Breene, Keith. 2016. "Why is Japan's Economy Shrinking?" World Economic Forum, Regional Agenda, Future Economic Progress, Japan. Online: https://www.weforum.org/agenda/2016/02/why-is-japans-economy-shrinking/ (accessed: June 28, 2019).

Bussolo, Maurizio, Johannes Koettl, and Emily Sinnott. 2015. "Aging and Poverty and Inequality." In Maurizio Bussolo, Johannes Koettl, and Emily Sinnott, eds., *Golden Aging: Prospects for Healthy, Active, and Prosperous Aging in Europe and Central Asia.* Washington D.C.: International Bank for Reconstruction and Development/The World Bank, pp. 213–256.

Cabinet Office. n.d. "Science and Technology Basic Plan." Online: https://www8.cao.go.jp/cstp/english/basic/index.html (accessed: May 19, 2019).

Cho, Mu-hyun. 2015. "The Chaebols: The Rise of South Korea's Mighty Conglomerates." Cnet, April 6, 2015; online: https://www.cnet.com/news/the-chaebols-the-rise-of-south-koreas-mighty-conglomerates/ (accessed: June 14, 2019).

Cision PR Newswire. 2017. "LG Driving Technology Solutions for Long-Term Care, Senior Housing Markets." Las Vegas, October 16, 2017; online: https://www.prnewswire.com/news-releases/lg-driving-technology-solutions-for-long-term-care-senior-housing-markets-300537020.html (accessed: June 14, 2019).

Council for Science, Technology and Innovation. 2015. "Council for Science, Technology and Innovation Brochure." Cabinet Office, Government of Japan, 2015; online: https://www8.cao.go.jp/cstp/english/panhu/3_p6-7.pdf (accessed: June 7, 2019).

Council for Science, Technology and Innovation. 2016. "The 5th Science and Technology Basic Plan." Cabinet Office, Government of Japan, January 22, 2016; online: https://www8.cao.go.jp/cstp/english/basic/5thbasicplan.pdf (accessed: May 31, 2019).

Enste, Peter, Gerhard Naegele, and Verena Leve. 2008. "The Discovery and the Development of the Silver Market in Germany." In Florian Kohlbacher and Cornelius Herstatt, eds., *The Silver Market Phenomenon. Business Opportunities in an Era of Demographic Change*. Heidelberg: Springer Verlag, pp. 325–339.

European Commission. 2015. "Growing the European Silver Economy." Online: http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/silvereco.pdf (accessed: July 17, 2020).

European Commission. 2018. "The 2018 Ageing Report." Institutional Paper 079, May 2018; online: https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en (accessed: July 17, 2020).

Fensom, Anthony. 2017. "South Korea's Chaebol Needn't Fear Moon." The Diplomat, Pacific Money, June 19, 2017; online: https://thediplomat.com/2017/06/south-koreas-chaebol-neednt-fear-moon/ (accessed: June 14, 2019).

GlobalAgingtimes. 2019. "The Silver Economy: Definition." Online: http://www.globalagingtimes.com/aging/what-is-silver-economy (accessed: January 12, 2019).

Government of Japan. 2019. "ABENOMICS – For Future Growth, for Future Generations, and for a Future Japan." Online: https://www.japan.go.jp/abenomics/_userdata/abenomics/pdf/1903_abenomics.pdf (accessed: May 30, 2019).

Government of the Republic of Korea. 2017. "100 Policy Tasks: Five-year Plan of the Moon Jae-in Administration." Online: https://www.english1.president.go.kr. (accessed: June 12, 2019).
Government of the Republic of Korea. 2018. "Open Government Partnership (OGP) – Korea's 4th National Action Plan 2018–2020." Online: https://www.opengovpartnership.org/sites/default/files/South-Korea_Action-Plan_2018-2020.pdf (accessed: May 20, 2019).
Harris, Bryan. 2018. "South Korea's Elderly Overtake Young in the Workforce." The Financial Times, March 11, 2018. Online: https://www.ft.com/content/edad1432-2591-11e8-b27e-cc62a39d57a0 (accessed: March 17, 2019).
Interreg Sudoe; ICT4SILVER. 2018. "The Silver Economy in Southwest Europe." Online: https://4.interreg-sudoe.eu/contenido-dinamico/libreria-ficheros/310619FB-AFB6-AA98-B00D-5D03559BB329.pdf (accessed: December 21, 2018).
Jarré, Dirk. 2015. "How 'Ageing' Has Found its Place on European Policy Agendas." Online: http://www.eurag-europe.net/how-ageing-has-found-its-place-on-european-policy-agendas/ (accessed: March 18, 2019).
Klimczuk, Andrzej. 2016. "Comparative Analysis of National and Regional Models of the Silver Economy in the European Union." *International Journal of Ageing and Later Life*, 10 (2), pp. 31–59.
Kohlbacher, Florian and Cornelius Herstatt, eds. 2011 (2008). *The Silver Market Phenomenon. Marketing and Innovation in the Aging Society.* Second Edition. Berlin and Heidelberg: Springer-Verlag.
Kohlbacher, Florian, Cornelius Herstatt, and Nils Levsen. 2015. "Golden Opportunities for Silver Innovation: How Demographic Changes Give Rise to Entrepreneurial Opportunities to Meet the Needs of Older People." *Technovation*, 39–40, pp. 73–82.
Kohlbacher, Florian, Cornelius Herstatt and Tim Schweisfurth. 2011. "Product Development for the Silver Market." In Florian Kohlbacher and Cornelius Herstatt, eds., *The Silver Market Phenomenon: Marketing and Innovation in the Aging Society*. Berlin and Heidelberg: Springer Verlag, pp. 3–13.
Korea Health Industry Development Institute. n.d. "Services." Online: https://www.khidi.or.kr/board?menuId=MENU00776&siteId=null (accessed: June 11, 2019).
Korea Institute for Health and Social Affairs. n.d. "Publications – Policy Report." Online: https://www.kihasa.re.kr/english/publications/eng_research/list.do?menuId=71&tid=34&bid=87 (accessed: June 11, 2019).
Korea Institute for Industrial Economics and Trade. n.d. "About KIET – President's Message." Online: http://eng.kiet.re.kr/kiet_eng/?sub_num=218 (accessed: June 10, 2019).
Korea Institute of Science and Technology Evaluation and Planning. (n.d.). "Main Functions." Online: http://www.kistep.re.kr/en/c2/sub1_2.jsp (accessed: May 23, 2019).
Laperche, Blandine, Faridah Djellal, Marc Ingham, Zeting Liu, Fabienne Picard, Sophie Reboud, Corinne Tanguy, and Dimitri Uzunidis. 2018. "Innovating for Elderly People: the Development of Geront'innovations in the French Silver Economy." *Technology Analysis and Strategic Management*, 31 (4), pp. 462–476.
Lee, Jeong Hyop. n.d. "Evolution of Republic of Korea's R&D System in a Global Economy." Asian and Pacific Centre for Transfer of Technology, Asia-Pacific National Innovation Systems Online Resource Centre. CSN Workshop Report; online: http://apctt.org/nis/sites/all/themes/nis/pdf/CSNWorkshop_Report_P2S2_Lee.pdf (accessed: May 27, 2019).
Liu, Yihan and Niklas Westelius. 2016. "The Impact of Demographics on Productivity and Inflation in Japan." IMF Working Paper, 16 (237); online: https://www.imf.org/external/pubs/ft/wp/2016/wp16237.pdf (accessed: July 17, 2020).

Ministère des affaires sociales et de la santé. 2013. *Contrat de Filière Silver Économie*. Online: https://solidarites-sante.gouv.fr/IMG/pdf/Contrat_Silver_economie-MEP-9-12-2013-v6.pdf (accessed: July 17, 2020).

Ministry of Education, Culture, Sports, Science and Technology – Japan. n.d. "Science and Technology Basic Plan." Online: http://www.mext.go.jp/en/policy/science_technology/lawandplan/title01/detail01/1375311.htm (accessed: May 19, 2019).

Ministry for Health, Welfare and Family Affairs, Republic of Korea. 2012. "Framework Act on Low Birth Rate in an Ageing Society." Statutes of the Republic of Korea; online: https://elaw.klri.re.kr/eng_service/lawView.do?hseq=25680&lang=ENG (accessed: May 22, 2019).

Ministry of Science and ICT, Republic of Korea. n.d. "Main Page." Online: https://english.msit.go.kr/english/main/main.do (accessed: May 23, 2019).

Ministry of Science and ICT, Republic of Korea. 2015. "Government R&D Innovation Plan." Online: https://www.msit.go.kr/SYNAP/skin/doc.html?fn=c6dceba446aad03dc2e8e599fd413097&rs=/SYNAP/sn3hcv/result/201905/ (accessed: May 28, 2019).

Ministry of Science and ICT and Korea Institute of Science and Technology Evaluation and Planning. 2017. "The 5th Science and Technology Foresight (2016–2040) – Discovering Future Technologies to Solve Major Issues of Future Society." Republic of Korea, April 2017; online: https://www.msit.go.kr/SYNAP/skin/doc.html?fn=77108b814b7aca9aeaea00d09d9f9a8c&rs=/SYNAP/sn3hcv/result/201905/ (accessed: May 29, 2019).

Nagano, Amie and Takato Mori. 2010. "From Silver to Gold: the Implications of Japan's Ageing Population." Economist Intelligence Unit Report, GE Healthcare; online: https://www.yumpu.com/en/document/read/409361/from-silver-to-gold (accessed: July 17, 2020).

Nahal, Sarbjit and Beijia Ma. 2014. "The Silver Dollar – Longevity Revolution Primer." Online https://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/merrill.pdf (accessed: 17 July, 2020).

Naitou, Keisuke. 2017. "Human Resources Development Revolution' as a Priority Issue." Mizuho Research Institute; online: https://www.mizuho-ri.co.jp/publication/research/pdf/mb/MB171130.pdf (accessed: May 18, 2019).

National Institute of Science and Technology Policy. 2019. "About NISTEP." Online: http://www.nistep.go.jp/en/?page_id=1730 (accessed: May 18, 2019).

Nikkei Asian Review. 2018. "Japan Crosses New Aging Milestone, With 20% Now 70 or Older." Online: https://asia.nikkei.com/Economy/Japan-crosses-new-aging-milestone-with-20-now-70-or-older (accessed: March 16, 2019).

Obi, Toshio, Jean-Pierre Auffret, and Naoko Iwasaki, eds. 2013. *Aging Society and ICT: Global Silver Innovation*. Amsterdam: IOS Press.

Organisation for Economic Co-operation and Development. 2014a. "The Silver Economy as a Pathway for Growth: Insights from the OECD-GCOA Expert Consultation." Report of a meeting held at University of Oxford, 26 June, 2014; online: https://www.oecd.org/sti/the-silver-economy-as-a-pathway-to-growth.pdf (accessed: December 21, 2018).

Organisation for Economic Co-operation and Development. 2014b. "Fostering Resilient Economies: Demographic Transition in Local Labour Markets." Online: http://www.oecd.org/cfe/leed/Fostering-Resilient-Economies_final_opt.pdf (accessed: January 11, 2019).

Organisation for Economic Co-operation and Development. 2016. "OECD Science, Technology and Innovation Outlook 2016." Online: http://dx.doi.org/10.1787/sti_in_outlook-2016-en (accessed: December 29, 2018).

Organisation for Economic Co-operation and Development. 2018a. "OECD Science, Technology and Innovation Outlook 2018." Online: https://read.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-innovation-outlook-2018/summary/english_a665d1f2-en#page1 (accessed: December 29, 2018).

Organisation for Economic Co-operation and Development. 2018b. "OECD Economic Surveys: Korea." Online: http://www.oecd.org/eco/surveys/Korea-2018-OECD-economic-survey-overview.pdf (accessed: March 17, 2019).

Östlund, Britt, Elin Olander, Oskar Jonsson, and Susanne Frennert. 2014. "STS-inspired Design to Meet the Challenges of Modern Aging: Welfare Technology as a Tool to Promote User-driven Innovations or Another Way to Keep Older Users Hostage?" *Technological Forecasting and Social Change*, 93, pp. 82–90.

Paredes-Vanheule, Adrien. 2018. "The Silver Economy: from a Multisectoral Approach to a Growing Phenomenon." Online: https://www.investmenteurope.net/investmenteurope/opinion/3709159/silver-economy-multisectoral-approach-growing-phenomenon (accessed: March 20, 2019).

Peek, Sebastiaan, Eveline J. M. Wouters, and Joost van Hoof. 2014. "Factors Influencing Acceptance of Technology for Aging in Place: a Systematic Review." *International Journal of Medical Informatics*, 83, pp. 235–248.

Peine, Alexander, Alex Faulkner, Birgit Jaeger, and Ellen Moors. 2015. "Science, Technology and the 'Grand Challenge' of Ageing: Understanding the Socio-Material Constitution of Later Life." *Technological Forecasting and Social Change*, 93, pp. 1–9.

Petermans, Jean and Antoine Piau. 2017. "Gerontechnology: Don't Miss the Train, But Which is the Right Carriage?" *European Geriatric Medecine*, 8, pp. 281–283.

Presidential Committee on the Fourth Industrial Revolution. 2017. "Main Page." Online: https://www.4th-ir.go.kr/home/en (accessed: June 12, 2019).

Prime Minister of Japan and his Cabinet. 2017a. "Aims and Main Themes of 'Council for Designing 100-Year Life Society.'" Online: http://japan.kantei.go.jp/ongoingtopics/pdf/2017/09/11/AimsAndThemes.pdf (accessed: May 18, 2019).

Prime Minister of Japan and his Cabinet. 2017b. "Basic Policy (Cabinet Decision on November 1, 2017)." Cabinet Decisions and Other Announcements; online: http://japan.kantei.go.jp/98_abe/decisions/2017/basic_policy.html (accessed: May 18, 2019).

Prime Minister of Japan and his Cabinet. 2017c. "Member List." Online: http://japan.kantei.go.jp/ongoingtopics/pdf/2017/09/11/MemberList.pdf (accessed: May 18, 2019).

Prime Minister of Japan and his Cabinet. 2018. "Council on Investments for the Future." Online: https://japan.kantei.go.jp/98_abe/actions/201806/_00013.html (accessed: May 18, 2019).

Restakis, John. 2006. "Defining the Social Economy – The BC Context." Social Economy Roundtable, British Columbia Co-operative Association; online: http://www.msvu.ca/socialeconomyatlantic/pdfs/DefiningSocialEconomy_FnlJan1906.pdf (accessed: June 13, 2019).

Samsung for Business. 2019. "Technology for Seniors." Online: https://www.samsung.com/us/business/solutions/industries/healthcare/technology-for-seniors/ (accessed: June 14, 2019).

Sander, Miriam, Bjarke Oxlund, Astrid Jespersen, Allan Krasnik, Erik Lykke Mortensen, Rudi Gerardus Johannes Westendorp, and Lene Juel Rasmussen. 2015. "The Challenges of Human Population Ageing." *Age and Ageing*, 44 (2), pp. 185–187.

Steger, Isabella. 2017. "South Korea is Aging Faster Than any Other Developed Country." Online: https://qz.com/1066613/south-korea-demographic-time-bomb-its-aging-faster-than-any-other-developed-country-with-lowest-birth-rate-of-oecd-countries/ (accessed: March 16, 2019).

Therlin, William, William Haggard, and Amaya Gutiérrez. 2018. "The Silver Economy." Online: https://www.rothschildandco.com/siteassets/publications/rothschild/private_wealth/2019/switzerland/wm---investment-views---the-silver-economy-2019.pdf (accessed: July 21, 2020).

United Nations. 2002. "Political Declaration and Madrid International Plan of Action on Ageing." Online: https://www.un.org/esa/socdev/documents/ageing/MIPAA/political-declaration-en.pdf (accessed: March 15, 2019).

United Nations Centre for Regional Development. 2014. "Japanese Administrative System." Online: http://www.uncrd.or.jp/content/documents/1739Bangla%20Tra%202013_P1_Japanese%20Administrative%20System.pdf (accessed: May 19, 2019).

United Nations Population Fund. 2012. "Ageing in the Twenty-First Century: A Celebration and A Challenge." Online: https://www.unfpa.org/sites/default/files/pub-pdf/Ageing%20report.pdf (accessed: March 10, 2019).

United Nations Population Fund. 2017. "Perspectives on Population Ageing in the Asia-Pacific Region." Online: https://asiapacific.unfpa.org/sites/default/files/pub-pdf/Perspectives%20on%20%20Population%20Ageing%20Report_for%20Website.pdf (accessed: March 11, 2019).

Varnai, Peter, Paul Simmonds, Kristine Farla, and Henry Worthington. 2018. "The Silver Economy." European Union/European Commission; online: http://www.smartsilvereconomy.eu/ (accessed: December 21, 2018).

World Bank. 2017. "Population Ages 65 and Above (% of Total)." Online: https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS?end=2017&locations=JP-KR&start=1980&view=chart (accessed: March 16, 2019).

World Economic Forum. 2015. "How 21st-century Longevity can Create Markets and Drive Economic Growth." Online: https://www.weforum.org/reports/how-21st-century-longevity-can-create-markets-and-drive-economic-growth (accessed: December 21, 2018).

World Health Organisation. 2002a. "Proposed Working Definition of an Older Person in Africa for the MDS Project." Online: https://www.who.int/healthinfo/survey/ageingdefnolder/en/ (accessed: March 15, 2019).

World Health Organisation. 2002b. "Active Ageing: A Policy Framework." Online: https://apps.who.int/iris/bitstream/handle/10665/67215/WHO_NMH_NPH_02.8.pdf?sequence=1 (accessed: March 18, 2019).

World Health Organisation. 2015. "World Report on Ageing and Health." Geneva: World Health Organisation.

World Health Organisation. 2017. "Global Strategy and Action Plan on Ageing and Health." Online: https://www.who.int/ageing/WHO-GSAP-2017.pdf?ua=1 (accessed: March 16, 2019).

World Health Organisation. 2018. "Ageing and Health." Online: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health (accessed: March 10, 2019).

Yang, Fang, Anson Kai Chun Chau, Anna L. Y. Wong, and Helene H. Fung. 2017. "Information and Communicative Technology Use Enhances Psychological Well-being of Older Adults: The Roles of Age, Social Connectedness, and Frailty Status." *Aging and Mental Health,* 22 (537), pp. 1–9.

Yoon, Young-sil. 2018. "S. Korea's R&D Spending to GDP Ratio Highest in the World." BusinessKorea, November 28, 2018; online: http://www.businesskorea.co.kr/news/articleView.html?idxno=26955 (accessed: May 28, 2019).

Zsarnoczky, Martin. 2016. "The New Hope for the EU – Silver Economy." Conference Paper, RSA Conference-Building Bridges: Cities and Regions in a Transnational World, April 2016, Graz, Austria; online: https://www.researchgate.net/publication/312370332_The_New_Hope_for_the_EU_-_Silver_Economy (accessed: March 27, 2019).