



Growing Old, but Paying Back: Understanding How Age Influences Corporate Social Innovation Depth and Breadth of Multinationals in Weak Institutional Contexts

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Received: 2 January 2023 / Revised: 25 February 2024 / Accepted: 25 March 2024 /
Published online: 12 June 2024
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Abstract

Corporate Social Innovation (CSI) has emerged as a research priority for multinational enterprises (MNEs) due to the increasing popularity of sustainable development solutions addressing wicked problems in the 21st century. Although most studies on CSI have focused on data from developed economies, emphasising the younger generation's forward-looking, sustainable, and environmentally friendly attitudes, there exists a gap in our understanding of the attitude of the older generation towards CSI practices of MNEs operating in emerging economies. The UN's SDG 3 advocates for the well-being of all at all ages. Despite this, healthcare outcomes in global-south countries fall below standard. Therefore, we conducted an in-depth critical analysis of textual data concerning CSI practices of 115 healthcare MNEs operating in 13 emerging economies. We quantified the number of CSI practices in their annual reports and operationalised the dependent variable using an entropy index to calculate the density and percentage score of CSI. Drawing on Upper Echelons, our analysis revealed that older CEOs are likelier to promote, initiate, and implement CSI in greater depth and breadth. These findings present a compelling case supporting the argument that CEOs and board members tend to contribute more to society as they age. We offer empirical evidence supporting the strengthening roles of senior board members and female board chairs. Our findings complement existing CSI studies from developed countries and illustrate how CEO and board characteristics influence the depth and breadth of CSI in emerging economies.

Keywords Corporate social innovation · Multinational enterprises · Weak institutional contexts · CEO age

1 Introduction

The concept of Sustainable Development Goals (SDGs) has emerged as a research priority for international business (IB) scholars due to the increasing urgency for sustainable solutions to grand challenges (Dentoni et al., 2018) in the twenty-first century. In response to local problems within communities worldwide, organisations have devised strategies for social innovation. Corporate social innovation (CSI) comprises initiatives that create shareholder and social value by (a) altering innovation systems' structure, (b) enhancing employee motivation, and (c) changing corporate identity through strategies aimed at gaining and sustaining a competitive advantage while addressing societal needs (Canestrino et al., 2015; Herrera, 2015; Mirvis et al., 2016). According to the UN's SDG 3, ensuring healthy living and promoting well-being for all ages is a collective responsibility (UN, 2017). This study aims to understand how the age of top management teams (TMTs) influences the CSI practices of healthcare MNEs operating in global south countries, where healthcare outcomes are below standard, and the population is considered to be living at the bottom of the pyramid (Hahn, 2009; Ullah et al., 2021).

Broadly, three strands of CSI literature have gained prominence in recent years amid ongoing debates on climate targets for reducing global emissions. The first strand tends to focus on defining CSI and exploring ways to enhance and institutionalise it (e.g., Herrera, 2015; Mirvis et al., 2016; Mulgan et al., 2007). The second strand investigates social challenges that CSI can address (e.g., Witkamp et al., 2011; Osburg & Schmidpeter, 2013; Dionisio et al., 2020). The third examines how firms can better generate social innovation ideas for competitiveness (Mumford et al., 2002; Howaldt & Schwarz, 2010; Adro and Fernandez 2022; Hagedoorn et al., 2023). Other studies explored how firms could improve financial performance and social acceptance by creating social value in an emerging market context (Sinkovics et al., 2014). Studies have emphasised that social value created in light of community expectations should not be overlooked as an optional extra in a firm's corporate strategy toolkit (Adro & Fernandes, 2022; Pret & Carter, 2017). Older and more recent studies have explored how firms can widen and expand the impact of CSI (Bhattarai et al., 2019; Foroudi et al., 2021; Hazel & Onaga, 2003; Moolaert et al., 2005; Swyngedouw, 2005). Nevertheless, gaps persist in the IB literature in understanding the factors influencing the intensity and diversity (i.e., depth and breadth) of CSI. Additionally, there are a plethora of CSI studies specifically focusing on emerging economies (e.g., Rao-Nicholson et al., 2017; Shirodkar & Shete, 2021; Ying et al., 2022). While these studies have improved our understanding of the role of CSI, they fail to explain how age in particular influences CSI in the IB domain.

Previous studies concur that within the context of MNEs operating in underdeveloped markets, Top Management Teams (TMTs) face constraints stemming from weaker institutions, making CSI even more challenging to initiate (Attah-Boakye et al., 2020; Boone et al., 2019; Shirodkar & Shete, 2021). However, the narrative surrounding CSI literature appears to have popularised the notion that

the younger generation is more environmentally responsible and socially innovative than the older generation (e.g., Dwivedi et al., 2022; Mcbeath & Rosenberg, 2006; Nordensvard & Ketola, 2022; Zhanda et al., 2021). Thus, it remains unclear whether older top managers craft CSI in emerging economies.

Our study addresses a significant gap by demonstrating how TMT attributes can help navigate (a) local contextual realities and (b) influence the promotion and integration of CSI ideas in an MNE's corporate strategy. On the one hand, promoting and integrating CSI in emerging economies is crucial. Compared with developed countries, emerging nations typically grapple with significant social challenges, such as lower education quality, income inequality, social justice issues, and underdeveloped social infrastructure. Nevertheless, emerging economies usually have weaker local institutions, limiting the state's capacity to solve social problems by generating scalable and sustainable social value (Rao-Nicholson et al., 2017). Based on our literature review, we find that social innovation literature is limited in two ways: (1) how MNEs from emerging markets engage with CSI (i.e., do they engage in CSI identically?) and (2) factors influencing their engagement (i.e., do they start by increasing the breadth or the depth of CSI, or vice versa)?

Consequently, our analysis of CSI activities of 115 multinationals from 13 emerging economies (EMNEs) from 2010 to 2021 indicates that in underdeveloped contexts, the age of the CEO is positively related to social innovation depth and breadth. These positive relationships are even more strengthened when there is a senior female board chair. Our findings contribute theoretically in three ways. First, our research is among the first to innovatively conceptualise and construct measures for CSI depth and breadth, showing that firms can engage in CSI differently. This contribution lays the foundation for future research to develop a nuanced understanding of how and why firms engage in CSI differently. Second, our research integrates the Upper Echelon and life span psychology theories to highlight that older CEOs are more motivated and capable of scaling impactful CSI in both greater depth and breadth (Desa & Koch, 2014; Shaw & de Bruin, 2013). This finding broadens the scope of CSI literature and brings a new theoretical perspective to the Upper Echelons theory. Finally, we provide empirical evidence for the strengthening roles of senior board members and female chairs. Our finding complements existing literature and further shows how CEO and board characteristics interact and influence social innovation depth and breadth.

2 Literature Review

2.1 Institutional Context

It has been acknowledged that social innovation requires a favourable institutional environment to ease resistance (Renko, 2013). Formal institutions are relevant to drive interactive and evolving CSI systems (Rao-Nicholson et al., 2017). However, in developing countries, a weak institutional and economic environment makes it less favourable for CSI initiatives (Adams et al., 2019; Urbano et al., 2010). CSI tends to be more acceptable in developed markets (Dacin et al., 2010). For example,

lower income and weak education infrastructure may not provide a solid grounding for increasing the perceived importance, preference and acceptance of socially innovative products in developing countries (Govindarajan & Ramamurti, 2011), such as eco-friendly products with higher prices. EMNEs generating social values often need to collaborate with institutions and providers of social benefits to better understand what urgent social problems are and how to better solve them. In the context of emerging markets where institutional voids are prevalent, bureaucracy can have conflicting interests with novel CSI initiatives that can bring significant social changes (Venugopal & Viswanathan, 2019). Institutional inefficiency in emerging economies can also delay the enactment of novel ideas and create barriers to CSI (Baines et al., 2010; Murphy & Coombes, 2009). Both institutional bureaucracy and inefficiency which exist in emerging economies can reduce the likelihood of EMNEs CSI decisions, no matter who is at the helm of affairs. On this basis, we argue that EMNEs may not even enjoy favourable external conditions for initiating and developing CSI projects.

An EU-funded social innovation project unfolded seven key policy fields where social innovation can generate value for low-income societies including (1) education and lifelong learning, (2) employment, (3) environment and climate change, (4) energy supply, (5) transport and mobility, (6) health and social care, (7) poverty reduction and sustainable development (Ecker et al., 2017; Oeij et al., 2019). In line with previous studies, our study provides explanations and examples of CSI in each policy field, along with the main social problems it attempts to solve in Table 1 (Adams & Hess, 2010; Witkamp et al., 2011). It also shows how the values from CSI can be better designed, generated and maintained (Howaldt & Schwarz, 2010; Mumford et al., 2002). Based on this rationale, we turn our focus on exploring theories that explain EMNE's social innovation engagement at the firm level.

2.2 Theoretical Background and Hypotheses

Corporate social innovation studies that have focused on the characteristics of TMTs in emerging market contexts argue that country-level culture, corporate culture, institutional settings, and social capital are distinctive variables that affect social innovation (Kerlin, 2013; Kolk & Lenfant, 2015; Onsongo, 2019; Rao-Nicholson et al., 2017). A firm's innovation decisions, activities, and performance are closely related to the behavioural characteristics of the TMT and board members, as explained by the Upper Echelons theory (Hambrick, 2007; Attah-Boakye et al., 2020; Adams et al., 2023). While executives can drive the decision of how firms innovate, those ideas are also subject to their experiences, values, personalities, personalised construals, and interpretation of the situations they face (Rost & Osterloh, 2010; Seijts et al., 2019). The Upper Echelons theory further emphasises the importance of understanding the demographic characteristics of executives, such as age, education, nationality, and lifestyle, in understanding strategic choices they make when faced with complex situations (Brieger & De Clercq, 2019; Brieger et al., 2019; Hambrick, 2007; Terjesen, 2017). Demographic characteristics shape beliefs, mindsets, attitudes, and worldviews, which consequently become important determinants of

Table 1 Summary of social innovation types according to policy field

Types of social innovation	Main social problems/objectives	Social innovation examples
Social innovation in education and life-long learning	Enhancing education quality in societies: Increasing early childhood education Reducing drop-outs from education and training Increasing youth's learning abilities Increasing the participation in tertiary education Promoting wider participation in lifelong learning	Online learning platforms Interactive learning software New learning clubs Student lodging with families
Social innovation in employment	Addressing social problems in the labour market: Reducing youth unemployment Narrowing the labour gap in an aging society Reducing power imbalance in the labour market Developing a social inclusive labour market Addressing risks associated with flexible approaches to working	Job search support & matching Further training Managing a business with all employees together
Social innovation in environment and climate change	Responding to outstanding environmental issues Repairing, reusing and recycling resources Developing sustainable food products and distribution	ICT equipment reuse and refurbishment Electronic devices repair system Sustainable food system
Social innovation in energy	Developing a sustainable energy production system Enhancing engagement in energy production in general Rising levels of greenhouse gas emissions Too low energy conservation	Energy co-operations Collective purchasing Domestic energy production Energy solution offering
Social innovation in mobility and transport	Developing sustainable and local energy production Improving the accessibility and quality of transport Promoting accessibility of mobility services Enhancing the quality of public mobility services Ensuring mobility of vulnerable groups	Shared car usage Real-time matching Driver training for vulnerable people
Social innovation in health and social care	Developing accessible and qualified healthcare services Improving the water sanitation system Providing accessibility to healthcare Enhancing the quality of healthcare	E-health Self-health management Integrated care

Table 1 (continued)

Types of social innovation	Main social problems/objectives	Social innovation examples
Social innovation in poverty reduction and sustainable development	Addressing poverty Developing income support Building community capacity Addressing displacement and refugees	Alternative financial services to get access to credit for poor people Poverty alleviation funds Trade associations or community

Source: Ecker et al. (2017) and Oeij et al. (2019)

how managers run firms including how a firm can better innovate (Galaskiewicz, 1991; Post & Byron, 2015). However, the existing literature remains unclear as to whether and how different top managers who are nearing retirement would approach CSI decisions. Therefore, we deploy the lifespan theory to draw comparisons between the young and older top management teams to understand how they engage new paradigms of innovation with the consideration for social value creation (van der Have & Rubalcaba, 2016).

2.2.1 Social Innovation and Lifespan Theory

Bringing the perspective from lifespan development psychology (Baltes, 1987; Baltes et al., 2006), we argue that the age of managers in the upper echelons is an important theoretical gap that needs to be considered in social innovation research in emerging markets contexts. Given that individuals emotionally prioritise different meaningful goals for personal satisfaction as they grow older, understanding how old age influences the CSI practices of top managers in EMNEs is timely. Previous studies (Baltes et al., 2006; Kanfer & Ackerman, 2004; Kooij et al., 2011; Lang & Carstensen, 2002), psychological functioning, the personalised construal of value, what is perceived to be important, and time perception of human beings change as they grow older. This comes as a result of the experiences that they have developed throughout their lives, their present circumstances, or the expectations they hold about the future. The combination of these factors has a significant influence on legacy decisions and their attitude towards CSI (Erikson, 1994). As suggested by the stage model of lifespan by Erikson (1994), it is also because the challenges an individual faces are different over their life stages. Such challenges impinge on the individual's social life which systematically shifts goals over their life span (Carstensen et al., 1999).

The lifespan development theory suggests that individuals in their young, middle, and late adulthood have specific developmental tasks and hence have different motivations, goals, and attendant behaviours (Carstensen, 2006; Kanfer & Ackerman, 2004; Super, 1980). Young adulthood is a period of exploration and establishment characterised by a search for identity (Erikson, 1994). Hence, young adults focus on developing their social relations and their own identities. It has also been identified that young adults usually live in a financially secure environment with fewer living concerns like housing, which makes them tend to focus more on personal values and preferences and less on economic objectives.

Age itself is an influencer on individual decision-making preferences and objectives via an individual's perception of time and value (Carstensen, 1995). For example, on the one hand, young adults tend to perceive time as open-ended. Hence, prioritising goals towards improving the community and society, finding their roles in society, and receiving social acceptance is construed as valuable (Carstensen, 1995; Lang & Carstensen, 2002). Moreover, younger individuals are more likely to attach importance to social value, recognition, social embeddedness, and social identity formation (Lang & Carstensen, 2002). Individuals in their middle adulthood, on the other hand, experience a period of growth and maintenance and undertake multiple responsibilities, such as supporting family, raising, and guiding offspring and

generating wealth (Schaie, 2016). Due to the multiple and demanding responsibilities, middle-aged adults are likely to be self-centred, economically value-oriented, and forced to foster less complex goals (Levinson, 1986; Warr, 2008).

Finally, individuals in late adulthood experience a period of increasing conscientiousness (Roberts et al., 2006). In other words, older people tend to critically evaluate their achievements in their lives (Erikson, 1994). More importantly, older people often realise their limited time and prioritise their goals to greater contributions to social well-being in their career, such as cultivating and inspiring the younger generation and ‘paying back’ to society after a rewarding professional career (Clegg & Fifer, 2014; Funken & Gielnik, 2016; Kooij et al., 2011; Lang & Carstensen, 2002; Zacher et al., 2012). Older individuals pay less attention to economic goals and growth motives (Kooij et al., 2011).

2.2.2 CEO Age and Corporate Social Innovation

Combining Upper Echelon theory and the lifespan perspective, we argue that social innovation depth and breadth are contingent on the age of the CEO, as argued by Estrin et al. (2013). In addition, studies from various fields like finance, innovation, strategy, and organisational behaviours seem to agree that CEOs have influential roles in corporate innovation activities as they are seen as key decision-makers and implementors in firms. It has also been argued by the micro-foundation studies of organisational goals that corporate goals are a reflection of the interests and knowledge of its senior managers and the most powerful actors within the firm (Hambrick, 2007; Linder & Foss, 2018). More importantly, a growing number of the empirical literature (Cummings & Knott, 2018; Galasso & Simcoe, 2011; Hirschleifer et al., 2012; Kiss et al., 2022; Lee et al., 2020; Makri et al., 2006) support the argument that a firm’s innovation adoption and performance are contingent on CEO characteristics such as CEO confidence, founder CEO, CEO proactiveness, outside CEO, and CEO incentives.

Instructively, our argument in this study is premised on the fact that age does make a difference in decision-makers’ attitudes, goals, motivations, and values and further influences how their firms pursue multiple value-creation goals through innovation (Andreou et al., 2017; Serfling, 2014; Yim, 2013). According to the lifespan theory, a CEO’s priorities and willingness to create economic or non-economic social values through innovation activities can shift at different life stages. In this research, therefore, we focus on comparing and discussing the differences between middle-aged and older CEOs.

To be more precise on CEOs middle-aged CEOs tend to focus more on preventing financial insecurity, maximising profits, generating wealth, and emphasising economic goals in their decision-making (Minola et al., 2016). Moreover, middle-aged CEOs are less likely to engage in CSI which is less manageable and more complex because they undertake multiple roles and responsibilities in their family (Ebner et al., 2006; Warr, 2008). Such engagement can be classified into two categories: corporate social innovation depth (i.e., the number of CSI activities) and corporate social innovation breadth (i.e., the diversity of CSI activities).

Therefore, we theorise that EMNEs with middle-aged CEOs are less likely to show high levels of CSI depth and breadth.

In contrast, older CEOs are more willing and able to pursue innovative activities to obtain commercial gains and bring welfare to society at the same time for three main reasons. First, given that older CEOs have already achieved key career goals and satisfactory incomes, they often tend to view the value of innovative activities from a wider perspective (Gielnik et al., 2012). Older CEOs tend to assume that innovation activities bring more value than being just an economic value generator (Heimonen, 2013). They also tend to increasingly attach importance to societal well-being and contributions to wider communities, including alleviating social problems, protecting the environment, and enhancing societies' well-being (Heimonen, 2013; Lang & Carstensen, 2002). Second, older CEOs can be more conscientious towards social embeddedness and social cohesion (Singh & DeNoble, 2003; Warr, 2008). Individuals' value orientation tends to change from instrumental (such as growth, wealth, and financial security) to terminal values (such as world peace desire) (Kanfer & Ackerman, 2004; Ryff & Baltes, 1976). Third, older CEOs have more time and are more capable of managing the complexity derived from more diverse CSI activities, even under intense pressure from stakeholders and within weak institutional contexts.

Thus, compared with middle-aged CEOs, older CEOs have less demanding family obligations (Kautonen et al., 2017). They also have more social capital to understand and connect social stakeholders and skills to coordinate resources for managing CSI activities (Putnam, 2000). Therefore, we hypothesise a positive relationship between CEO age and CSI depth.

H1a: *There is a positive association between CEO age and CSI depth.*

Older CEOs have a strong motivation to pay back to their communities and societies (McCuddy & Cavin, 2009; Ng & Sears, 2012). This motivation emerges from the desire to engage in social innovation more intensively at the corporate level (i.e., corporate social innovation depth) but also more diversely (i.e., corporate social innovation breadth). Older CEOs are more sensitive to potential social problems and more conscious of developing a variety of CSI initiatives. Several empirical works support our argument. Older CEOs have shorter career horizons and feel less pressure from the market in terms of career concerns, making them more willing to address the concerns of a wide array of stakeholders and a variety of social problems independent of immediate firm profits (Fabrizi et al., 2014). The same relationship has also been identified in firms from emerging markets. Drawing on 1,957 firm-year observations from Chinese firms between 2009 and 2012, previous research found that older CEOs are more extensively involved in addressing concerns from a wider range of stakeholders (Zhang et al., 2018). Other studies argued that CEOs with shorter career horizons are more likely to acknowledge a wider set of opportunities and threats associated with environmental issues (Ortiz-de-Mandojana et al., 2019). Therefore, we hypothesise a positive relationship between CEO age and CSI breadth.

***H1b:** There is a positive association between CEO age and social innovation breadth.*

2.2.3 The Moderating Role of Senior Board Members

We further hypothesise that the relationship between CEO age and CSI depth and breadth is likely strengthened by senior board members since corporate innovation decisions and activities are affected by the interaction between the CEO and board members. Although directors on the board are not involved in adopting and implementing innovation activities, their roles in firm strategic advising, supporting, and monitoring matter (Miletkov et al., 2017). The board of directors also functions as strategic decision-makers and information channels within firms (Connelly et al., 2011; Davis & Greve, 1997). Their strengthening role is reflected in three ways.

First, older boards of directors share similarities with older CEOs in terms of values and goals for CSI. For example, previous studies (Post et al., 2011) used a sample of 49 electronics firms listed on Fortune 1000 companies and found that older directors exhibit higher moral reasoning and are more environmentally conscious. Similarly, another study analysed 611 Chinese listed firms from 2010 to 2013 and found that senior board members are more likely to monitor CEOs and control the likelihood of corporate financial fraud (Xu et al., 2018). Due to shared values and goals for bringing social values, older boards of directors are more motivated and able to utilise their power and function to advise and support older CEOs' pursuit of CSI activities. Second, older directors on the board are sufficiently motivated to diligently monitor CEOs' active engagement in social innovation due to the consideration of their reputation in their social circles (Hambrick et al., 2015; Hillman et al., 2008). In their late career stage, older directors are more willing to increase their reputation and reluctant to put their reputation at risk (Carlsson & Karlsson, 1970; Hambrick & Mason, 1984; Yim, 2013). Given this logic, older directors are strongly motivated to monitor and promote corporate innovation activities for social gains. Third, older directors have more general and directorial experience (Hambrick et al., 2015). These experiences can be drawn upon to advise and support the management of an increasing number of CSI activities as well as diversity (depth and breadth) (Xu et al., 2018).

***H2a:** A senior board strengthens the relationship between CEO age and social innovation depth.*

Furthermore, we argue for a strengthening role of a senior board on CSI breadth. The interaction between the older CEO and the senior board, as we discussed above, tends to increase the older CEO's willingness to address concerns from more diverse social stakeholders. Older CEOs can face less pressure in the presence of a senior board which shares a similar motivation of paying back to society. In addition, the interaction and discussion between older CEOs and senior board members are more likely to stimulate sensitivity and responsiveness to the opportunities and threats associated with grand social challenges.

***H2b:** A senior board strengthens the relationship between CEO age and corporate social innovation breadth.*

2.2.4 The Moderating Role of Female Board Chair

Another key characteristic influencing CSI is the female board chair. We hypothesise that the relationship between CEO age and CSI depth and breadth is strengthened by female presence on the board. Gender differs and influences how individuals think and behave. CEOs think differently according to their identities, attitudes, beliefs, and values (Boulouta, 2013; Eagly, 1987). First, female directors are more likely to advise, support, and monitor corporate innovation. Existing literature has established that female leaders can stimulate and enable effective management of corporate innovation activities by challenging the status quo (Eagly, 2009). Female leaders are also found to have different cognitive frames, experiences, knowledge bases, and diverse perspectives compared with male directors who support social innovation activities (Adams et al., 2023; Carpenter & Westphal, 2001; Hillman & Dalziel, 2003; Peterson & Philpot, 2007). Thus, stimulating deep discussion, knowledge integration, and corporate innovation.

For example, prior studies (Díaz-García et al. (2013) indicated that more gender diversity in R&D teams directly leads to more radical product innovations. Women directors often encourage deep discussion and integration of existing firm information and knowledge on sustainable practices (Lloyd et al., 2013). Other studies (Torchia et al., 2011) used the Norwegian samples and argued that women directors on board promote more organisational innovation. Using the panel data from 472 MNEs, existing research found that female leaders on board positively affect corporate innovation investment (Attah-Boakye et al., 2020). More importantly, female directors are often more experienced and skilled leaders shaped by the tough process of career progression (Glass & Cook, 2016). Such accumulated experiences and skills enable women directors to effectively manage complexities associated with CSI activities (Post, 2015; Zenger & Folkman, 2019). Promoting women to the upper echelons improves the effectiveness of firm knowledge integration and innovation performance (Dai et al., 2018).

A female board chair is more likely to advise, support, and monitor older CEO's initiation and wide engagement in innovation for social value. Female leaders tend to be empathetic, caring (Eagly, 2009; Eagly & Wood, 2012; Slote, 2007), cohesive, and value-interdependent (Adams & Funk, 2012; Rosener, 1995) and often consider net gains of decisions on multiple stakeholders in their decision making (Gaard & Gruen, 1993; Groysberg & Bell, 2013; Post et al., 2021). Previous work (Sachs et al., 1997) found that women care more about stakeholders from a wider community and are at the heart of driving green revolutions and social innovations such as biotechnological innovation and crop diversity promotion in emerging economies like Africa and Asia. In this vein, a female chair on board is more likely to support CSI initiatives and advise key decision-makers within the firms to consider creating social value via innovation activities. Furthermore, given that CSI involves multiple stakeholders (i.e., customers, suppliers, competitors, government, and non-profit organizations), the sophisticated communication, negotiation and coordination skills

possessed by female directors can give effective advice to older CEOs to deal with the challenges associated with social innovation implementation and reduce risks (Eagly & Johnson, 1990; Rudman & Glick, 2001).

***H3a:** Female board chair strengthens the relationship between CEO age and corporate social innovation depth.*

Finally, the common interest and motivation of CSI between older CEOs and female board chairs can increase the CEO's willingness to address concerns from diverse social stakeholders. Support from a female board chair can also stimulate relevant SCI ideas. Thus, we argue that there is a strengthening role of a senior board on social innovation breadth. The interaction between the older CEO and senior board, as we discussed above, tends to increase the older CEO's willingness to address concerns from more diverse social stakeholders. Older CEOs can face less pressure in the presence of a senior board which shares a similar motivation of paying back to society. In addition, the interaction and discussion between older CEOs and senior board members are more likely to stimulate older CEO's sensitivity and responsiveness to CSI for addressing grand social challenges.

***H3b:** Female board chair strengthens the relationship between CEO age and social innovation breadth.*

3 Methodology

3.1 Sample Selection and Data Collection

Among the key challenges confronting our world today are climate change and associated healthcare challenges, which particularly affect the most deprived communities in the global south (Van der Have & Rubalcaba, 2016; Asayama et al., 2021). Studies argued that climate change has resulted in increasing healthcare challenges, including infectious diseases, high mortality rates, and respiratory and cardiovascular diseases in developing countries (Rocque et al., 2021; Goshua et al., 2021). Government budget allocation in emerging economies and aid donations towards the healthcare sector are substantial, yet Corporate Social Innovation (CSI) is crucial in improving healthcare outcomes and the quality of life (Alonzo-Martinez et al., 2019). Concentrating on the CSI initiatives of EMNEs in healthcare has enhanced our understanding that firms need to go beyond cost minimisation and profit maximisation. Moreover, examining whether the age of top leaders influences the CSI of firms in the healthcare sector is interesting, given that they might be at an age when their health demands attention.

Consequently, we collected firm-level data from the Thomson Eikon database. To lessen potential multicollinearity and endogeneity problems, we operationalised the data collection process in four stages. First, we addressed the issue of data limitations by sourcing data from multiple sources. Conversely, given the unique nature of the dependent variable (social innovation), we followed previous studies (Bellstam

et al., 2020; Hoberg & Lewis, 2017; Jizi et al., 2014) and used content analysis of annual reports in operationalising the data collection on social innovation. Second, given the nature of the research questions and the hypothesis to be tested, we included a corpus of firm-level variables such as the CEO age (CEOAGE) and the average age of the board of directors (BRDAGE). To examine whether having a female board chair can influence a firm's social innovation, we used dichotomous variables (dummy variable) of 1 if the board chair is female, otherwise 0.

Third, due to the lack of data availability, we initially selected 145 healthcare MNEs from 13 emerging economies covering periods from 2010 to 2021 inclusive. We cleaned the data by (a) excluding firms that had missing data, (b) removing duplicate firms from the datasets, and (c) removing outliers by winsorising the entire dataset at the 1st and 99th percentiles (Schiller et al., 2020). The final sample size panel dataset after cleaning the data comprised 115 MNEs with 13,560 firm-year observations. Tables 2 and 3 below show the sample characteristics of the sample data and the variable description."

3.2 Dependent Variable: Social Innovation (SOCINV)

We operationalised the dependent variable (i.e., social innovation) by conducting a rigorous content analysis on the annual reports of sampled firms. Social innovation which addresses societal needs and problems contributes social value to human and social life. Although burgeoning social innovation studies largely focus on the performance of the social innovation phenomenon (Adomako & Tran, 2021; Howaldt & Schwarz, 2010; Moulaert et al., 2005) performance-based social innovation studies based on data from emerging markets are limited. To overcome this limitation, we drew on a growing body of literature from finance, accounting and content analysis to extract and quantify social innovation depth and breadth (Bellstam et al., 2020; Gray et al., 1995; Hoberg & Lewis, 2017; Jizi et al., 2014).

We conducted a content analysis to systematically operationalise social innovation based on available textual data on social innovation practices or activities (McTavish & Pirro, 1990; Stemler, 2015). The content analysis objectively and systematically identified specific characteristics of the text data (Hoberg & Lewis, 2017) in three steps. In the first step, the technique relies on a comprehensive framework that guides the themes of social innovation practices and the potential keywords associated with each theme for the selection and combination of social innovation practices in a meaningful way (Lowry et al., 2016). Using the theoretical framework developed by the social innovation-driven project we divided social innovation into seven policy fields: education and lifelong learning, employment, environment and climate change, energy supply, transport and mobility, health and social care, and poverty reduction and sustainable development (Oeij et al., 2019). Details and exemplary social innovation practices are detailed below:

Table 2 Variables definition

Variable name	Definition	Source
Dependent variables		
Social innovation (<i>SOCINV</i>) <i>Depth</i>	This measures the total number of social innovation activities carried out during the year	Content analysis of hand-picked data from the firm's annual report
Social innovation (<i>SOCINV</i>) <i>Breadth</i>	This measures the diversity of social innovation activities carried out during the year	Content analysis of hand-picked data from the firm's annual report
CEO age	This measures the average Age of the CEO in the period (Annual figures)	Thomson Eikon
Board age	Measures the average age of the board members at the time (annual figures)	Thomson Eikon
Female board chair	This is a dummy variable that provides a value of 1 if the board chair is female otherwise 0	Thomson Eikon
Control variables		
Board size (<i>BSIZE</i>)	The total number of board members during the year	Thomson Eikon
Single largest owner (<i>SLO</i>)	The percentage of share ownership of a single largest shareholder	Thomson Eikon
CEO duality	This measure if the CEO is also the board chairman	Thomson Eikon
Total assets (<i>Log</i>)	The natural log of the value of total assets during the financial year. This is a dummy variable that represents the size of the firm	Thomson Eikon
CEO remuneration	This is the total remuneration received by the CEO during the financial year	Thomson Eikon
Market to book ratio (<i>MBR</i>)	The market value of common equity divided by the balance sheet value of the common equity	Bloomberg
Moderating variables		
<i>BRDA</i> age × <i>CEO</i> Age	This is a moderating variable that combines the average age of board members with the CEO's Age	Thomson Eikon
<i>FEMCHR</i> × <i>CEO</i> Age	This is a moderating variable that combines the CEO's Age with the female chair	Thomson Eikon

Table 3 Sample characteristics

Country	Number of MNEs
Bangladesh	3
Brazil	2
China	40
India	27
Indonesia	2
Nigeria	3
Pakistan	2
South Africa	3
Sri Lanka	2
Taiwan	2
Thailand	2
Uganda	2
Vietnam	25
Total	115

3.2.1 Education and Lifelong Learning

Firms can provide social innovation related to education and lifelong learning. We grouped the sample firms' social innovation activities as (1) reduction of educational disadvantages, (2) new learning arrangements and interactive education, (3) digital inclusion with new and virtual learning environments, (4) quality improvement of the formal education system, and (5) strategic partnership education and economy (transition management, labour market needs).

3.2.2 Employment

Apart from education and lifelong learning, firms can also engage in social innovation activities related to employment. We grouped the sample firms' social innovation activities as (1) youth unemployment and other vulnerable groups, (2) social entrepreneurship and self-creating opportunities, and (3) workplace innovation and working conditions.

3.2.3 Environment and Climate Change

Most of our sample firms also engage in social innovation activities related to environmental and climate change. We captured evidence and categorised them into two groups: (1) repairing, reusing, and recycling and (2) alternative and sustainable food production and distribution.

3.2.4 Energy Supply

Our sample firms' social innovation activities related to energy supply are categorised as follows: (1) energy collectives, (2) local production of energy, (3) working with smart meters, (4) energy services, (5) providing examples and inspiration, (6) district and neighbourhood energy systems, and (7) energy-efficient mobility.

3.2.5 Transport and Mobility

Our sample firms' social innovation activities related to transport and mobility encapsulate activities such as (1) shared car usage and (2) mobility of vulnerable groups.

3.2.6 Health and Social Care

We further checked the social innovation activities related to health, including (1) electronic or mobile health, (2) integrated care, and (3) new models of care. Activities which improve healthcare quality are all considered and captured, such as efficiency, coverage, access, equality, and affordability.

3.2.7 Poverty Reduction and Sustainable Development

In our observation, most sample firms engage in a wide range of poverty reduction and sustainable development social innovation activities, such as (1) financial support, (2) community capacity and welfare, (3) good quality of work, (4) education and skill development, (5) lifestyles, (6) disadvantage, vulnerability, discrimination, and other unfair treatment, (7) migration, (8) corruption, and other unethical behaviours, (9) impoverishment/disruption/displacement caused by human agency and natural disaster.

In the second step, we summarised possible social innovation practices in each policy field and identified the textual data points to be interpreted and coded by following Nardo et al. (2008). A protocol of coding was then developed and agreed upon by all research team members. In the third step, we searched and collected self-reported information provided by each sample firm on their annual reports, investor reports and presentations, sustainability reports, and official websites during the period from 1st January 2010 to 31st December 2021. We then coded each firm's social innovation practices following our coding protocol by manually scrutinising the textual content of the collected documents. Compared with other alternatives, such as topic modelling, our manual approach reduced the risks of missing relevant, meaningful data (Blei et al., 2003).

We hired a native language speaker as a research assistant to code reports written in foreign languages. All the authors and the research assistant coded the documents of the first five sample firms independently, discussed any disagreement and further updated the coding protocol, which helped to ensure the quality and consistency of final scores of social innovation practices. We also developed a keyword bank in

each category of social innovation activities and used the keywords to rule out data omissions.

In the fourth step, we assigned the collected textual evidence to the seven pre-determined policy fields. We counted the number of social innovation practices mentioned in the reports and used the number as the score for each policy field identified above. Consequently, we measure social innovation depth by summing up all scores in each policy field, in each firm each year. Social innovation breadth is constructed as an entropy index, which is often used to capture diversity, such as product diversification and international diversification (Gomez-Mejia et al., 2010; Hitt et al., 2006; Jacquemin & Berry, 1979; Majocchi & Strange, 2012; Sanchez-Bueno & Usero, 2014). To develop the entropy index, we calculated the percentage of the score in each policy field and calculated the index as:"

$$\text{Social innovation breadth} = \sum_{k=1}^7 x_k \ln \left(\frac{1}{x_k} \right) \quad (1)$$

Here, the subscript k defines one of the seven policy fields, and x_k is calculated as the social innovation score in a category k divided by the total social innovation score. This measure ranges from zero for a firm engaging social innovation in only one policy field to 1.946 for a firm engaging social innovation in all policy fields equally.

To enable us to generate a deeper understanding regarding how CEO age and other board characteristics influence social innovation, in our fourth step, we decided to split the dependent variable (social innovation) into two to include: *depth and breadth*. Doing so provided a broader and much deeper perspective on how CEO age and other board characteristics influence social innovation. We assigned the collected textual social innovation evidence to the seven pre-determined policy fields (identified above). We counted the number of all social innovation practices mentioned in the reports and used the number as the score of social innovation in each policy field. We measure *social innovation depth* by summing up all scores in each social innovation policy field in each firm per year.

3.3 Independent Variables

To be able to test the hypothesis, we included CEO Age (*CEOAGE*), the average age of the board of directors (*BRDAGE*) and the female chair (*FEMCHR*) as the main variables of interest. We included CEO age, Board AGE and female chair as our main variables of interest for two main reasons. First, previous studies such as Molloy et al. (2020) argue that the CEO and the board are responsible for providing strategic oversight, directions, and enabling conditions for social innovation. Nonetheless, studies that examine the association between corporate governance attributes (such as CEO age, and Board Age, among others) and social innovation have surprisingly received little attention. However, other studies argue that the board and the CEO are responsible for navigating the balance between the firms'

social responsibilities and profit maximisation agenda (Boone et al., 2022; Fox et al., 2020). Given that little research has concurrently examined the association between CEO age, Board Age, and Female board chair on social innovation from the perspective of MNEs operating in emerging economies, our study, therefore, contributes to the literature by providing novel insights about how CEO and Board age affect social innovation among MNE's operating in underdeveloped settings. Combining CEO age, Board Age and female board chair enabled us to test all three hypotheses.

3.4 Control Variables

To be able to control for differences in firm sizes, ownership, and other managerial characteristics, we included five control variables comprising of board size (*BODSIZE*), total assets (*TASSETS*), single largest owners (*SLO*), CEO duality (*CEODUAL*) and CEO remunerations (*CEOREMU*) as control variables. Consistent with studies such as Cheng (2004) that argue for a positive association between CEO remuneration and R&D spending we included CEO remuneration to confirm if it has any linkages with social innovation depth and breadth.

3.5 Moderating Variables

We utilised two moderating variables including the presence of a female chair on the board and the average age of board members (senior board). First, we interacted with the average age of the board with the age of the CEO (*BRDAGECEOAGE*) to enable us to investigate if board age has any moderating effect on the relationship between CEO age and CSI breadth/depth. Second, we interacted female board chair with CEO age (*FEMCHRCEOAGE*) to enable us to examine if it has any moderating effect on the association between CEO age and CSI breadth/depth. The purpose is to confirm how useful the average age of the board is to older CEOs and their CSI initiatives.

3.6 Empirical Estimation and Baseline Regression Model

The Hausman test results favour the fixed effects model. Consequently, we used the fixed effects estimation model in Eq. 3 as a baseline regression model in testing all three hypotheses.

$$\begin{aligned}
 SOCINVdepth_{i,t} = & \alpha + \beta_1 CEOAGE_{i,t} + \beta_2 BRDAGE_{i,t} + \beta_3 FEMCHR_{i,t} \\
 & + \beta_4 BRDAGECEOAGE_{i,t} + \beta_5 FEMCHRCEOAGE_{i,t} + \sum_{i=1}^{n=5} \beta_i Contrvar_{i,t} + \delta + \epsilon_{i,t} \quad (2)
 \end{aligned}$$

where *SOCINVdepth*_{*i,t*} represents the social innovation depth as a dependent variable at a particular period. α is the intercept, *CEOAGE* is the average age of the CEO, *BRDAGE* is the average age of the board members, *FEMCHR* represents the female chair and the *BRDAGECEOAGE* and *FEMCHRCEOAGE* represent the moderating

variables. The $\sum_{i=1}^{n=5} \beta_4 \text{Contrvar}_{i,t}$ represents the five control variables comprising CEO duality, Board size, single biggest owners, total assets, and CEO remuneration. To be able to test if CEO age, Board Age, and female chair affect social innovation breadth, we substituted the dependent variable of SOCINV depth in Eq. 3 with SOCINV Breadth in Eq. 4 below.

$$\begin{aligned} \text{SOCINVBreadth}_{i,t} = & \alpha + \beta_1 \text{CEOAGE}_{i,t} + \beta_2 \text{BRDAGE}_{i,t} + \beta_3 \text{FEMCHR}_{i,t} \\ & + \beta_4 \text{BRDAGECEOAGE}_{i,t} + \beta_5 \text{FEMCHRCEOAGE}_{i,t} + \sum_{i=1}^{n=5} \beta_4 \text{Contrvar}_{i,t} + \delta + \varepsilon_{i,t} \end{aligned} \tag{3}$$

4 Findings

4.1 Descriptive Statistics and Pairwise Correlation

Tables 4 and 5 represent the descriptive statistics and Pearson correlations matrix respectively. We recorded a mean value of CSI depth of 91.173 with a minimum and a maximum value of 2 and 476.0 respectively. The vast difference between the minimum and the maximum value of the CSI depth result represents the lackadaisical orientations towards social innovation by some MNEs operating in emerging countries. A similar scenario is captured in our results for the CSI breadth in which we recorded a mean value of 65.568 and a minimum and maximum value of 2 and 473.429 respectively. Although different estimations were used in computing CSI depth and breadth in this study (please refer to the variable definitions Table), our results revealed a higher mean value of CSI depth (91.173) in comparison to breadth (65.568). This result implies that a substantial

Table 4 Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
SOCINV depth	91.173	71.606	2.000	476.000
SOCINV breadth	65.568	52.89	2.000	473.429
BRDAge × CEOAge (log)	3.481	2.796	3.309	3.766
FEMCHR × CEOAge	2.251	10.905	0.000	60.000
CEO age	55.962	6.457	42.000	85.000
Board age	53.893	4.977	40.556	69.067
Female chair	0.026	0.160	0.000	1.000
CEO duality	0.303	0.460	0.000	1.000
Board size	9.472	1.930	4.000	16.000
Single largest owners	25.314	25.221	0.000	148.494
Total assets (log)	3.206	3.580	0.056	4.722
CEO remuneration	6.155	5.915	4.514	6.813

Table 5 Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) SOCINV depth	1.000											
(2) SOCINV breadth	0.967*	1.000										
(3) BRDAge × CEOAge	0.527*	0.017	1.000									
(4) FEMCHR × CEOAge	0.215*	0.259*	0.055	1.000								
(5) CEO age	0.172*	0.156*	0.878*	-0.026	1.000							
(6) Board age	0.194*	0.127*	0.747*	-0.073	0.348*	1.000						
(7) Female chair	0.171*	0.212*	-0.058	0.998*	-0.032	-0.055	1.000					
(8) CEO duality	-0.080*	-0.054	0.187*	0.034	0.340*	0.041	0.016	1.000				
(9) Board size	-0.007	-0.047	0.436*	-0.155*	0.279*	0.388*	-0.111*	-0.095*	1.000			
(10) Single largest owners	0.326*	0.310*	-0.104	-0.036	-0.065	-0.048	-0.037	-0.098*	0.149*	1.000		
(11) Total assets	0.206*	0.182*	0.124*	-0.087	0.096*	0.052	-0.063	0.003	0.300*	0.265*	1.000	
(12) CEO remuneration	0.037	0.045	-0.142*	0.149*	-0.286*	0.028	0.151*	-0.187*	-0.046	-0.032	-0.046	1.000

Please note that; (a) SOCINV Depth and SOCINV Breadth are dependent variables representing social innovation depth and breadth respectively (b) the BRDAge × CEOAge and the FEMCHR × CEOAge are the two moderating variables (Please refer to Table 1 the variable definitions table for the description of each of the variables (c) the [*] shows significance at the 0.05 level

number of EMNEs in our sample data are relatively more concerned about CSI depth in comparison to breadth.

Further, the descriptive statistics in Table 4 revealed an average CEO age of approximately 56 years with a minimum and maximum age of 42 years and 85 years respectively. These results imply that most of the CEOs in our sample dataset are relatively middle-aged. Similar statistics were recorded regarding the average age of the board of directors in the sample data. In addition, we noted an average board age of approximately 54 years with minimum and maximum years of 40 years and 69 years respectively. Also, we recorded an average board size of approximately 9 board members with a minimum and maximum board membership of 4 and 16 respectively. We recorded interesting findings in our Pearson correlation matrix.

First, we noted a significant positive association between CEO age and CSI depth/breadth. Similar results are recorded between the board age and CSI depth/breadth. Conversely, we noted a significant negative association between CEO duality and CSI depth/breadth and a negative association between board size and social innovation depth/breadth. These findings provide a compelling case that supports our argument that CEOs and the board give more back to society as they grow older.

In testing our research hypothesis, we draw insights from the CSI literature and the upper-echelon theoretical lens to operationalise the baseline regression in Table 5. First, following the Hausmann test results we used the fixed effects baseline regression model in testing all three hypotheses. We then proceed to use the two-step system GMM model in Table 6 to test the robustness of our findings.

4.2 The Association between CEO Age and CSI Depth and Breath

In hypothesis 1 we argued that there is a positive association between CEO age and CSI depth and breadth. To do that, we used models 1 and 2 in Table 6. By our expectations, results from models 1 and 2 in Table 6 revealed a significant positive association between CEO age and CSI depth (*Model: $\beta = 1.7062, p < 0.043$*) and CSI breadth (*Model: $\beta = 1.1203, p < 0.064$*) respectively. Consistent with the upper echelon social life span theoretical arguments, we found that, based on their life-long experience and know-how, older CEOs provide a wider and deeper perspective on matters regarding CSI primacy, community growth and social regeneration (Heimonen, 2013; Lang & Carstensen, 2002). In other words, older CEOs are usually more conscientious towards social embeddedness and social cohesion (Singh & DeNoble, 2003; Warr, 2008).

This finding extends the CSI literature in two ways. First, in the context of emerging economies where social deprivation is endemic and weak institutions are prevalent, burgeoning studies on CSI have failed to elucidate the linkages between CEO age and board age on CSI depth and breadth. To the best of our knowledge, our study contributes to the literature by examining the linkages between CEO age and CSI depth and breadth from the emerging economies perspective. Second, our findings lend weight to the UN's SDG arguments by drawing the attention of policymakers to

Table 6 Baseline regression model

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed effects depth	Fixed effects breadth	Fixed effects depth	Fixed effects breadth	Fixed effects depth	Fixed effects breadth
CEO age	1.7062** (0.8341)	1.1203* (0.6488)				
Board age	2.7019** (1.1000)	1.2263 (0.8556)			2.6732** (1.1093)	1.2058 (0.8605)
Female board chair	26.2633* (13.7153)	17.9162* (10.6683)	25.7514* (13.6633)	17.9511*		
CEO duality	25.4839** (10.5547)	16.6240** (8.2099)	24.1507** (10.4685)	16.3468** (8.1366)	28.9227*** (10.5180)	18.9144** (8.1592)
Board size	- 5.1512 (4.3905)	- 5.7050* (3.4152)	- 5.4835 (4.3542)	- 5.7239* (3.3843)	- 4.9235 (4.4258)	- 5.5615 (3.4333)
Single biggest owner	0.2371 (0.1448)	0.1889* (0.1126)	0.2339 (0.1446)	0.1875* (0.1124)	0.2382 (0.1459)	0.1890* (0.1132)
Total assets	0.2043*** (0.0208)	0.2030*** (0.0206)	0.2043*** (0.0208)	0.2030*** (0.0206)	0.2043*** (0.0208)	0.2031*** (0.0206)
CEO remuneration	0.1020*** (0.0201)	0.1030*** (0.0201)	0.1010*** (0.0201)	0.1010*** (0.0200)	0.1021*** (0.0201)	0.1020*** (0.0201)
Board age CEO age (log)			0.2385*** (0.0124)	0.2213*** (0.0096)		
Female chair × CEO age					0.4487*** (0.2477)	0.4219*** (0.2921)
Constant	- 165.9341* (88.5715)	- 48.3650 (68.8945)	- 37.6911 (57.2707)	16.5086 (44.5134)	- 75.1935 (77.3053)	11.3793 (59.9686)
Observations	265	265	265	265	265	265
R-square	0.3024	0.2219	0.3010	0.2215	0.2880	0.2101

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

the role of age as the catalyst for driving change through social innovation in emerging countries.

4.3 The Association between the Age of the Board of Directors and CSI Depth and Breadth

We test hypothesis 2 by including board age in models 1 and 2 in our baseline regression in Table 6. We noted a significant positive association between Average board age and CSI depth (*Model 1*: $\beta=2.7019$, $p<0.045$) and CSI breadth (*Model 2*: $\beta=1.2263$, $p<0.068$) respectively. Hypothesis 2 argued that there is a positive association between older board members and CSI depth/breadth. Whilst our result confirms this, our findings further complement the upper echelon theoretical stance and other empirical studies arguing that social innovation is conditioned by factors including human capital, age, and experience of the board (Amran et al., 2021; Schulman et al., 2018; Edwards-Schachter et al., 2012). Indeed, we noted that, in comparison to the CEO age, the β coefficient of the predicted value of board age is higher (*Model 1*: $\beta=2.7019$, *Model 2*: $\beta=2.7019$) compared to CEO age predicted β coefficient (*Model 1*: $\beta=1.7062$, *Model 2*: $\beta=1.1203$). This result implies that older board members exert significant influence on a firm's decision to invest in social innovation.

Our result corroborates with previous empirical studies contending that older board members invest more in CSI because it is their way of reinforcing their social value and reputation in society (Carlsson & Karlsson, 1970; Yim, 2013). Previous research shows that board members increasingly recognise the associated positive effects of social innovation imperativeness (Carlsson & Karlsson, 1970; Eberhardt-Toth, 2017; Yim, 2013). Nevertheless, our study argues that older board members due to their unique industry and firm-specific experiences have moved from profit maximisation objectives to social innovation responsibilities. Thus, we argue that older board members are motivated in comparison to younger board members when it comes to prioritising investment that benefits society and future generations. Also, older CEOs and board members are usually more independent from pressure and more likely to prioritise CSI initiatives that ultimately enhance the firm reputation. Therefore, our study contributes to the extant corporate governance and social innovation literature by providing empirical evidence that sheds light on the linkages between CSI and board age from the perspective of depth and breadth contemporaneously.

4.4 Moderating Effects of Female Board Chair and CEO Age on Social Innovation Depth/Breadth

We test our third hypothesis by including a female board chair in our corpus of variables in Table 6. The purpose is to ascertain if it can moderate the positive association between CEO age and CSI depth and breadth. First, we moderate female board chair with CEO age in Models 3 and 4 of the baseline regression Model in Table 6.

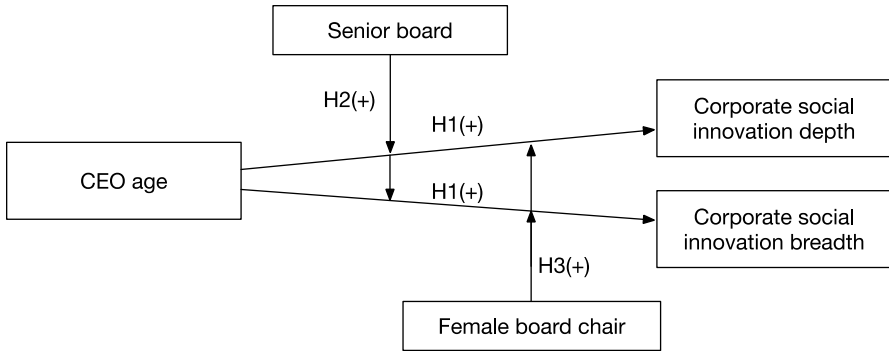


Fig. 1 Conceptual framework

Adjusted Predictions with 95% CIs on CEO Age Relationship with social Innovation

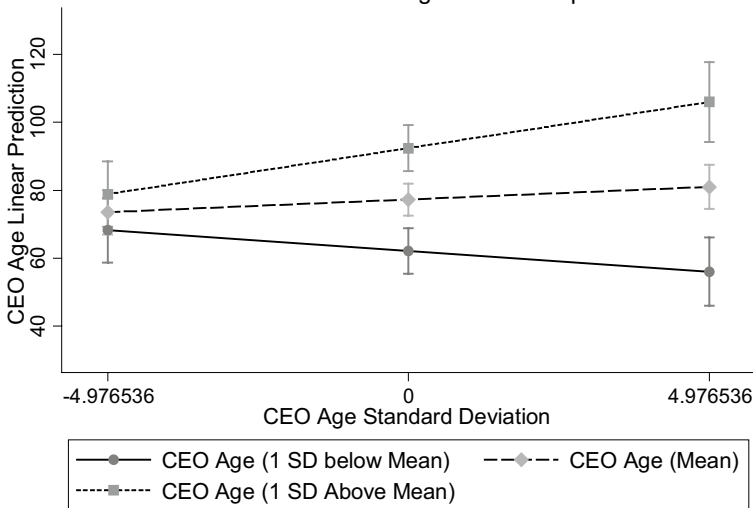


Fig. 2 Moderation effects of Board Age on the relationship between CEO Age and social innovation. Please note. The two figures above show that while CEO age has a positive association with social innovation, the positive association is more pronounced by the moderation effects of female board chair

We ascertain if the female board chair moderates the effects of CEO age on CSI. We operationalised this moderation effect by multiplying the predictor variable (*CEO Age*) by the moderating variable (*female board chair*). We noted from our result that, the positive association between CEO age and CSI is more pronounced by the moderating effects of female board chair. Our result on Table 5 Models 5 and 6 β predictor coefficients show that female board chairs significantly moderate the positive association between CEO age and CSI (Model 5: $\beta=0.4487, p<0.006$; Model 1: $\beta=0.4219, p<0.008$) depth/breadth respectively.

We also noted that board age positively moderates the association between CEO age and CSI. Our β predictor coefficients for the moderating effects of board age on the CEO age relationship with CSI revealed β predictor coefficients in Table 6 as follows; *Model 5*: $\beta = 0.2385$, $p < 0.008$; *Model 1*: $\beta = 0.2213$, $p < 0.009$) depth/breadth respectively. To test the robustness of our result, we proceed to use linear prediction graphs in Figs. 1 and 2 to ascertain if there is any relationship between the moderation effects of CEO age and female board chair on CSI depth/breadth. Our results in Figs. 1 and 2 also confirm that the moderation effects between CEO Age and female board chair can provide a significant positive linear prediction of CSI at a 95% confidence level. Our results confirm hypothesis 3 and previous empirical studies arguing that the characteristics of board members such as gender, age, ethnicity, education, and experience can influence the level of CSI. Also, studies (e.g., Adams & Funk, 2011) argue that female board members usually support decisions that will benefit more stakeholders and society in general. Our studies extend corporate governance and social innovation literature by being one of the first studies to shed empirical evidence on how the female board chair moderates the positive association between CEO age and CSI depth/breadth.

4.5 Single Largest Owners, CEO Duality/Remuneration, Board Size and CSI

Our result also revealed other interesting findings. For example, we noted that the single largest owners have a positive association with social innovation although this positive association is not significant. This result implies that larger shareholders such as institutional investors can play a key role in influencing CSI investment positively. Also, our result revealed a significant positive association between CEO remuneration and CSI. This result corroborates other empirical studies that argue that well-remunerated CEOs are keen on giving back the society (Saiia et al., 2003; Wang et al., 2021). Also, we noted a significant positive association between firm size and CSI. This implies that larger firms are more likely to engage in CSI in comparison to medium-sized MNEs. Conversely, we noted a consistent negative association between board size and social innovation. This result implies that firms with bigger board sizes are less likely to engage in social innovation activities.

4.6 Test for Robustness

Our results are robust and consistent across both our fixed effects baseline regression results in Table 6 and the two-step system GMM robust estimations in Table 7. We operationalised the robustness test of our studies in three stages. First, we performed a series of initial pre- and post-regression estimations and results validation including cleaning the panel data by eliminating inconsistent datasets and removing outliers. Also, we used the variance inflation factor in testing if any of our models suffer from any multicollinearity problems. All our models passed the VIF test threshold, implying that none of our models suffers from multicollinearity issues.

Table 7 Two-step system GMM robust estimations

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	GMM-2 step depth	GMM-2 step breadth	GMM-2 step depth	GMM-2 step breadth	GMM-2 step depth	GMM-2 step breadth
CEO age	0.5081* (1.5829)	0.4159* (1.6929)				
Board age	1.1508* (2.7307)	1.3669* (2.6982)			0.5713* (2.3162)	0.6584* (2.0316)
Female board chair	170.3894*** (78.0900)	122.1356* (64.3577)	149.2230* (77.6207)	124.2266** (56.3990)		
CEO duality	-49.5448 (31.6670)	52.7568* (31.3930)	-43.4085 (29.0270)	43.2699** (18.8686)	-46.6519 (36.3238)	48.2506* (26.8677)
Board size	-1.6957 (8.1436)	-4.6278 (7.5597)	-6.4725 (7.9266)	-0.5996 (6.7452)	-6.5125 (8.2190)	-2.7500 (7.0007)
Single biggest owner	0.3168 (0.5863)	0.6691 (0.5198)	0.3058 (0.6757)	0.5583 (0.4067)	0.3541 (0.7154)	0.6041 (0.4482)
Total assets	0.0061** (0.0031)	0.0035 (0.0027)	0.0044** (0.0021)	0.0040** (0.0020)	0.0044* (0.0027)	0.0043** (0.0019)
CEO remuneration	0.0820** (0.0201)	0.0830*** (0.0201)	0.0798** (0.0201)	0.0788** (0.0201)	0.0819** (0.0201)	0.0821** (0.0201)
Board age CEO age (log)			0.1023*** (0.0274)	0.1049*** (0.0198)		
Female chair × CEO age					2.9950*** (0.5646)	2.5085*** (0.1649)
Constant	154.4843 (181.6801)	86.7129 (209.0982)	166.6940 (118.6427)	36.1037 (105.5307)	196.8481 (126.3046)	108.0313 (132.0540)
Observations	238	238	238	238	238	238
AR (1)	0.2624	0.2532	0.2345	0.2346	0.2532	0.2546
AR (2)	0.2121	0.2330	0.2442	0.2143	0.2330	0.2441

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Second, our Hausmann test results revealed that the fixed effects estimation model is appropriate for the baseline regression. Hence, the reason for using the fixed effects estimation model is correct. Most importantly, we dealt with possible endogeneity issues that may result from autocorrelation, reverse causality, and simultaneity in our results by using the two-step system GMM robustness estimations presented in Table 7. Interestingly, our results were not any different although the level of significant associations between our variables of interest and social innovation depth/breadth were relatively not as strong as the results from our fixed effects estimation models. This scenario is particularly plausible due to differences between the fixed effects and the two-step system GMM estimation model as also reported in previous studies (Roodman, 2009). The fixed effects model assumes that some variables have constant effects on the outcome variable in which case possible endogeneity problems may not be detected by the module. Conversely, a two-step system GMM robust estimation can identify possible endogeneity issues in the model.

Third, to confirm both our fixed effects and two-step system GMM robust results, we proceeded to use linear prediction graphs (please refer to Figs. 1 and 2 in the appendix) to estimate if indeed there are positive linkages between the variables of interest and CSI depth/breadth. All our three hypotheses were confirmed by the regression results along with the linear prediction graph at 95% confidence intervals.

5 Discussion and Implications

Our study contributes to the IB and social innovation literature by employing the entropy index to calculate the density and percentage score of CSI to explain the factors influencing CSI in MNEs from emerging and underdeveloped markets. By utilising handpicked firm-level social innovation data, our study extends the CSI literature by providing empirical evidence confirming that CEO age is a crucial determinant of CSI activities in underdeveloped markets characterised by weak institutions. Capturing CSI depth and breadth through the entropy index based on seven CSI measurement indicators further extends the literature, emphasizing that CEO age is vital not only for CSI but also for the density of such activities. It was fascinating to discover that the positive effect of CEO age on CSI activities of EMNEs is strengthened by having a female chair and senior members on the board. Thus, our empirical findings are reinforced by using the seven unique characteristics of CSI.

5.1 Theoretical Implications

Our research provides three key contributions to the IB and social innovation literature. First, while the importance and varieties of CSI are well-known in the literature, how firms engage in it remains unknown. While the existing literature examines CSI performance using environmental expenditures, our study goes beyond the measurements to show how MNEs engage in CSI in emerging markets.

First, while the existing social innovation literature has shed light on internal and external factors affecting a firm's CSI engagement, research on the engagement of

firms from other economic contexts has been limited (Rao-Nicholson et al., 2017). While previous research embraced the typical resource-constrained innovation literature to argue that firms often have limited resources constrained by their local context, we argue that EMNEs' motivation and behaviours regarding CSI tend to be different (Agarwal et al., 2017; Ying et al., 2022). This is because these firms face more challenges in convincing stakeholders and gaining resource support (Herrera, 2015). Their CSI engagement may also create conflicts with local institutions as the creation of social value often brings changes to society (Bellandi et al., 2021). In the IB field, while it is widely reported that EMNEs may not operate in favourable external environments, this study shows that older board members have sufficient motivation to initiate and develop CSI projects. Thus, our inquiry into why some EMNEs commit to CSI and others do not even engage is a result of board age. Subsidiaries of EMNEs should maintain older CEOs to ensure greater depth and breadth of CSI.

Second, to specifically address gaps in the IB literature, our study shows that having an older CEO, a female chair along with senior members on the board can provide significant positive CSI outcomes for EMNEs navigating the complex dynamics of institutional voids in underdeveloped markets. The IB literature seems to agree that organisational culture in emerging economies is uniquely different and influenced by weak institutions (Adomako et al., 2020, 2021; Dang et al., 2020). Moreover, there are country-specific and regional-specific cultural differences which create collectivist dynamism and complex structures in emerging economies (Ferraris et al., 2022; Busch and Barkerma 2022). Therefore, based on the characteristics of our sample, we argue that older TMTs in emerging economies require unique experience to circumvent CSI activities in socially liable environments. Older TMTs have the cross-cultural skills needed to circumvent and bridge contextual gaps by (a) aligning organisational CSI policies with stakeholder interests, and (b) institutionalising new CSI practices in a locally sensitive way while establishing credibility and legitimacy.

Third, we found that older CEOs are likelier to promote, initiate, and implement CSI in greater depth and breadth in EMNEs. Thus, CEOs' goals, priorities, motivations, and willingness are influenced by their age, which also influences how they lead EMNEs to pursue value creation via social innovation (Andreou et al., 2017; Serfling, 2014). Furthermore, since CSI is often complex and requires time and resource commitment from CEOs, we theorise that middle-aged CEOs are less likely motivated and able to engage in it due to the multiple social roles and responsibilities required to undertake successful CSI activities. Despite these findings, we also found that older CEOs (aged 50+) are more willing and capable of pursuing economic and social values through CSI activities. While studies agree that 50+ TMTs are conscientious toward social embeddedness and cohesion, we provide a deeper understanding (Heimonen, 2013; Singh & DeNoble, 2003; Warr, 2008). We do so by showing that older CEOs are likely to pay back to society because (a) they have fewer family obligations, (b) have more time, and (c) they have access to social networks and resources needed to manage complexities surrounding CSI initiatives in underdeveloped contexts. Overall, these findings broaden the scope of CSI literature

and advance the current discourse on social innovation by providing novel insights into the national and economic development perspective of the UET.

Fourth, we provide empirical evidence that both a female chair and senior members on the board strengthen the positive relationship between older CEOs and CSI depth and breadth. Female chairs and older board members are more likely to have aligned motivation and capabilities to advise, support, and monitor older CEOs' initiation and wider engagement in social innovation. Whilst, our results complement existing IB studies (Dionisio & de Vargas, 2020a, 2020b; Hitt et al., 2006; Majocchi & Strange, 2012; Miletkov et al., 2017), we go further by showing the interactive effects of board characteristics and CEO age on social innovation depth and breadth of MNEs operating in emerging markets.

Finally, CSR studies used KLD CSR ratings, ESG and the Dow Jones sustainability index, self-developed measures to examine CSR and sustainability performances (Arouri & Pijourlet, 2017; Bazel-Shoham et al., 2023; Cahan et al., 2017; Keeble et al., 2003; Lourenco et al., 2012; Mishra, 2017; Radu & Smaili, 2022; Thorne et al., 2017). While these measures include relevant aspects of social innovation, we argue that they do not accurately represent the CSI performance of MNEs for three reasons. Firstly, whether these measures represent innovation activities is unclear. Most of these measures focus on the inputs or outputs of CSR or sustainability without directly looking at whether the firms are innovating at a greater depth or breadth. Philanthropy investment and cash donation may not necessarily represent an innovation activity (Thorne et al., 2017). Secondly, while most of the CSR studies include a broader range of indicators such as executive compensation, risk management, and supply chain management, governance issues surrounding CSI are not brought to the fore in most cases. Thirdly, while CSR studies provide the overall social responsibilities of firms, they fail to provide a nuanced understanding of the depth or breadth of social activities.

To mitigate the limitations of previous studies, our research utilised content analysis to extract and more accurately quantify CSI into innovation depth and breadth, treating them as two separate dimensions (Bellstam et al., 2020; Hoberg & Lewis, 2017). Based on previous research, we constructed a unique and more accurate measure of CSI by compiling a novel hand-collected dataset and directly coding CSI activities according to seven previously established CSI categories: education and lifelong learning, employment, environment and climate change, energy supply, transport and mobility, health and social care, poverty reduction, and sustainable development (Oeij et al., 2019). The approach we used to capture CSI depth represents the total social innovation initiatives developed by a firm or the intensity of social innovation engagement. CSI breadth represents the weighted percentages of social innovation engagement or the diversity of CSI engagement. Our results also show that firms can engage in CSI differently in terms of depth and breadth, overcoming the limitations reported in existing studies. More importantly, using the seven policy fields shows the different strategies EMNEs could embrace to increase CSI depth and breadth. To further advance theory, future research can follow the same approach and develop nuanced understandings of how and why EMNEs engage in CSI differently, what possible strategies firms use in the process of developing CSI, and the decision-making process between CSI depth and breadth.

5.2 Practical Implications

Given the growing urgency for sustainable development solutions to sustainability problems in the 21st century, social innovation intrapreneurship should be brought to the forefront of the corporate strategy of MNEs operating in emerging economies. Experienced and older CEOs should institutionalise and support the adoption and diffusion of socio-eco innovation systems and practices at the organisational level. Given that the initial stages of implementing CSI initiatives, even in developed countries, are seemingly difficult, older CEOs would need to use their influence and experience to systematise, coordinate, and communicate the CSI agenda coherently as part of the firm's business-level strategy. Recently, scores of studies seem to agree that promoting females into the upper echelons of firms enhances corporate innovation (Adams et al., 2023; Javed et al., 2023; Khushk et al., 2023). Therefore, given the robustness of our data from 13 emerging economies, the analysis, and results, EMNEs need to hire more experienced CEOs and promote females to the Upper Echelons of the firm and include them in key CSI decisions. Recruiting female managers and board members could help shape CSI initiatives and become central to the business model. Doing this would persuade employees to institutionalise CSI practices. This approach could also convince other stakeholders to see the trustworthiness of what EMNEs say and practice (Dionisio & de Vargas, 2020a, 2020b; Rao-Nicholson et al., 2017). Top Management Teams of EMNEs need to introduce sustainable performance reward systems for middle-level managers who achieve the triple bottom line by reducing fragile imbalances in nature (Brown, 2002).

For many years, business activities in most underdeveloped markets have singularly focused on attracting inward foreign direct investments (Adams et al., 2015; Cleeve, 2008) without much consideration for managerial practices that support financial inclusion and poverty reduction, education and lifelong learning, employment, environment and climate, energy supply, and health and social care. Thus, in line with the EU's policy areas for social innovation, TMTs in emerging markets should demonstrate responsibility for driving CSI by implementing new production processes that improve employee motivation.

5.3 Limitations and Future Research

The data used for this study are based on 115 healthcare MNEs currently operating in 13 emerging economies. Our content analysis used to operationalise social innovation was primarily based on available textual data on the social innovation practices within the sample MNEs in the healthcare sector (McTavish & Pirro, 1990; Stemler, 2015). This means that new forms of social innovation happening in other sectors have not been captured. Future research would need to widen the data and sample to include other sectors to understand the differences and similarities in social innovation depth and breadth in underdeveloped economies. Future studies can use our measurement and follow the same operationalisation approach to further explore wider issues with wider samples, such as how and why firms engage in social innovation differently (i.e., high depth and low breadth or low depth but high

breadth), how and why firms' social innovation engagement strategies differ, and a processual understanding of how firms engage in social innovation. This study is also biased towards emerging and underdeveloped economies. Whether data from MNEs operating in strong institutional contexts will confirm if younger or older CEOs are better at social innovation is an attractive motivation for our future studies.

In addition, while the content analysis objectively and systematically identified specific characteristics of the text data, our study relied on EU-funded social innovation framework to guide and capture the themes and direction of social innovation practices (Oeij et al., 2019). This implies that the existence of other important themes and sub-themes outside of this framework would have been missed. Finally, we hired native language speakers to code the annual reports written in foreign languages. While the authors discussed all disagreements, resolved disparities, and ensured the consistency of the data, certain key meanings might have been lost through the translation to English (Marschan-Peikkari et al., 1999). Therefore, future studies may follow the same approach of using content analysis but with more advanced content analysis techniques such as natural language processing or supervised machine learning to build up a larger sample of observations for theory testing.

5.4 Conclusion

This study began by asking whether MNEs engage in corporate social innovation identically, and if not, what factors influence their engagement in social innovation. Our findings confirm that MNEs approach social innovation differently in underdeveloped markets marked by weak institutions. We also find that CEO age, female board chair, institutional investors, and/or single largest shareholders significantly influence the depth, breadth, and corporate commitment to social innovation. Using the life span and upper echelons theory, our principal argument is that age makes a difference in decision-makers attitudes, goals, motivations, and values. This study concludes by arguing that social innovation is crucial for building inclusive communities in underdeveloped economies where the north–south dichotomy affects people who are at the bottom of the pyramid (Ullah et al., 2021).

Acknowledgements We would like to express our appreciation to Ms Thuy Linh Vu for her collaborative efforts and excellent assistance with our data collection.

Data availability Data will be made available on request.

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