

Age-friendly human resource practices: a comparison of Baltic and Nordic countries

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Abstract

Purpose – Due to population ageing, the European Union (EU) has adopted active ageing as a guiding principle in labour and retirement policies. Among the strategies for active ageing, age-friendly workplaces play a crucial role. This study compares age-friendly human resource (HR) practices in the Baltic and Nordic countries. The latter are pioneers in active ageing, and as the employment rate of older employees in the Baltics is like that in the Nordic countries, we may assume equally age-friendly workplaces in both regions.

Design/methodology/approach – We used the latest CRANET survey data (2021–2022) from 1,452 large firms in seven countries and constructed the fuzzy logic model on age-friendliness at the workplace.

Findings – Despite a high employment rate of older individuals in the Baltics, HR practices in these countries fall short of being age-friendly compared to their Nordic counterparts. Larger firms in the Nordic countries excel in every studied aspect, but deficiencies in the Baltics are primarily attributed to the absence of employer-provided health and pension schemes. The usage of early retirement is more frequent in the Nordic countries; however, its conceptualisation as an age-friendly HR practice deserves closer examination. Our findings suggest that the success of active ageing in employment has translated into age-friendly HR practices in larger organisations in the Nordics, but not in the Baltics. It is likely that high employment of older individuals in Estonia, Latvia and Lithuania is a result of the relative income poverty rate.

Originality/value – Our model represents one of the few attempts to utilise fuzzy logic methodology for studying human resource practices and their quantitative evaluation, especially concerning age-friendly workplaces.

Keywords CRANET, Age-friendly workplace, Fuzzy modelling

Paper type Research paper

Introduction

Population ageing around the world is a global trend for all countries and is especially pronounced in developed countries (Kim and Kim, 2022; Froehlich *et al.*, 2023). Labour shortages are becoming a problem that has economic, social and political aspects. Several prominent researchers (e.g. Raemdonck *et al.*, 2015; Oude Mulders *et al.*, 2017; Weiss *et al.*, 2022) point out the economic imperative for societies to extend working years beyond the legal retirement age. Furthermore, Central and Eastern European countries, to which the Baltic countries belong, have some of the world's fastest ageing and shrinking populations (Aidukaite *et al.*, 2022; Chand, 2024), which makes older employees' participation in the workforce especially pertinent.

In response to these challenges, the concept of active ageing has become one of the guiding principles of labour and retirement policy in the European Union (Krekula and Vickerstaff, 2020) and a tool for persuading employees to remain active in the labour market. As a region, Nordic countries are at the forefront of implementing active ageing policies (Piekkola, 2006; Zaidi, 2014; Zaidi *et al.*, 2017; Aidukaite *et al.*, 2022). One of the aims of active



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ageing according to the European Commission is “enabling women and men to remain in employment longer—by overcoming structural barriers and offering appropriate incentives” (European Commission, 2012, p. 3). That means avoiding or reversing early retirement practices and promoting mechanisms for the continued presence of older employees in the labour market. Here we know that the Baltic countries are performing exceptionally well in terms of their share of older employees in employment (Zaidi, 2014; Zaidi *et al.*, 2017; Aidukaite and Blaziene, 2021). For example, according to the OECD (2022), in both 2012 and a decade later Estonia was even outperforming Finland and Denmark. Could the firms’ policies be given credit for such an achievement?

Strategies at the company-level are crucial in making macro-level policies, such as active ageing in employment, work (Piekkola, 2006; Naegele and Bauknecht, 2019; Nagarajan *et al.*, 2019; Salminen *et al.*, 2019; Zhang and Gibney, 2019; Aidukaite and Blaziene, 2021; Eppler-Hattab *et al.*, 2023). Unfortunately, companies find it difficult to facilitate active ageing while making their production or service processes more efficient (Sánchez and Diaz, 2022). In this light, the study of the processes of ageing at work is becoming a major area of research in management and organisational psychology (Zacher *et al.*, 2021; Rudolph and Zacher, 2022). Existing research is not sufficient to inform organisations about the most appropriate management approaches to respond to these challenges (Andrei and Parker, 2022). Thus, research into the organisational aspects of creating and maintaining a work climate favourable to older employees is urgent and important.

Focussing on the company-level to promote active ageing is known as creating an age-friendly workplace environment, hereafter age-friendly workplace (Eppler-Hattab *et al.*, 2020, 2023). Given the high employment rate of older employees in the Baltic and Nordic countries, we investigate how age-friendly the workplaces in these countries are, using the latest CRANET survey results. The CRANET survey covers large firms, although in small countries the threshold for the minimum number of employees is 100 instead of the traditional 250. We focus on two regions, the Nordic and the Baltic, because their geographical proximity has spurred close connections in trade, migration and foreign investments. For the last thirty years, the Baltics have looked up to the Nordic countries and tried to learn from their best practices (Aidukaite *et al.*, 2022).

The paper is guided by two research questions:

- RQ1. Does a high share of older employees indicate age-friendly HR practices in the Nordic and Baltic countries?
- RQ2. Can we spot specific age-friendly HR practices where the two regions differ?

The paper is structured as follows. First the concept of an age-friendly workplace and a few previous comparative studies on the topic are presented, followed by the method and subsequent model and then the results. It ends with the discussion, implications and potential future research avenues.

Literature review

Age-friendly workplace

An age-friendly workplace is defined as “a place that adopts and maintains an organizational culture and climate in which its older employees are able to know and feel that they are accepted and treated according to their competencies and needs” (Eppler-Hattab *et al.*, 2020, p. 14). Culture and climate are endorsed by HR practices, attitudes and values, which should all be age-friendly, sometimes also referred to as age-aware, age-inclusive, age-supportive or age-conscious (Eppler-Hattab *et al.*, 2020). Zhou *et al.* (2023) review age-inclusive, age-diversity and mature-age HR practices, and regardless of the term, the practices end up being

similar. That said, we acknowledge the multitude of concepts and treat age-friendly HR practices as an umbrella term.

The age-friendly workplace comprises measures that support older employees to retain (or even improve) their physical and emotional well-being and task performance, which implies an increase in paid employment and duration of work activity (Zacher *et al.*, 2021). Wöhrmann *et al.* (2018) created the *Silver Work Index*, which is a meso-level analogue to the Active Ageing Index at the macro level. The construct covers indicators in seven areas: culture and leadership; work design; health management; individual development; knowledge management; transition to retirement; and employment during retirement age. More recently, the *Later Life Workplace Index* (LLWI) has been developed by Wilckens *et al.* (2021). Compared to the *Silver Work Index*, the LLWI distinguishes culture and leadership domains and adds health and retirement coverage, resulting in nine dimensions. Nagarajan *et al.* (2019) conducted a review of 122 academic studies since 1990 that addressed several organisational factors promoting age-friendly workplaces. They identified the most frequently researched measures and aggregated them to five categories: HR management (HRM); human capital; institution; health; and technology tools. Eppler-Hattab *et al.* (2023) consider workplace age-friendliness a higher order construct comprising four sets of indicators: organisational values; development; wellness; and flexibility. Since there is no unified approach for the categorisation of indicators, we adopt the broadest approach and divide them into three areas to organise our empirical findings and discussion.

Physical well-being measures help older workers retain health and well-being in the workplace. Examples in this category are reduced work hours, implementing flexible work arrangements, ergonomic workplaces, minimising shift work, avoiding repetitive motions and organising frequent medical examinations. Work-(space) (re-)design and health management practices, as per Wöhrmann *et al.* (2018), Wilckens *et al.* (2021) and Zacher *et al.* (2021), are mostly targeted to improve the physical well-being of older employees. Oude Mulders and Henkens (2017), based on a large-scale survey among 60–64-year-old Dutch employees, demonstrated that when employers paid more attention to employees' health, it postponed their intention to retire. Andrei and Parker (2022) talk about age-related adaptations under the “individualise” meta-strategy because the strengths and needs of employees change to a varying extent and at a different pace. Bal (2015) makes the case that an individualised approach may be needed with overall HRM because employees' career preferences become more heterogeneous with age (Zacher *et al.*, 2018).

Emotional well-being encompasses HR practices aimed at avoiding the threat of stereotyping and ensuring equal opportunities for older employees in training and promotion, among other aspects. Age discrimination and age stereotypes at work are a major impediment for an age-friendly workplace (Raemdonck *et al.*, 2015; Van Dam *et al.*, 2017; Rothermund *et al.*, 2021; Froehlich *et al.*, 2023). Emotional well-being is at the core of the “inclusion” meta-strategy coined by Andrei and Parker (2022). The result of inclusion is a workplace where employees of all ages are welcomed, valued and accepted for their uniqueness and are fairly treated. In a recent study among Spanish organisations, the following HR practices facilitating emotional well-being were mentioned (Sánchez and Diaz, 2022): strengthening the role of the older employees in training younger workers; recognition of experience and promotion of older employees; and educating the employees on the issue of active ageing.

Piekkola (2006) gives best practice examples from Finnish companies. These included transferring tacit knowledge in age-diverse teams, conducting regular well-being surveys, giving longer holidays for older employees who have an extended period of service with the firm and providing age management training programmes. To emphasise the last point, educating managers and supervisors against negative age stereotypes and instead creating a “positive image of age” is crucial (Zacher *et al.*, 2018; Wilckens *et al.*, 2021; Froehlich *et al.*, 2023). Knowledge transfer in age-diverse teams and collaboration between members of

different ages has been specifically addressed under the “integrate” meta-strategy by [Andrei and Parker \(2022\)](#), the knowledge management dimension by [Wilckens et al. \(2021\)](#) and policy recommendations by [Chand \(2024\)](#).

There is some controversy regarding early retirement programmes. Encouraging older employees to retire earlier without suffering financially has historically been considered an age-supportive practice by employers ([Sánchez and Diaz, 2022](#)). However, with the aim of an active ageing policy to keep older employees in the labour market even after their official retirement age ([Weiss et al., 2022](#)), the programmes that encourage older employees to leave earlier than necessary are no longer age-friendly; they actually serve to reduce personnel cost and are even negatively related to older employees’ affective commitment ([Herrbach et al., 2009](#)). In truth, these programmes were meant to combat persistent unemployment in Europe between the 1970 and 1990s to create jobs for younger unemployed individuals replacing older employees ([Boehm et al., 2021](#)). Therefore, the abolition of early retirement schemes to promote the work ability and employability of older workers has been proposed by [Hartlapp and Schmid \(2008\)](#) and [Focarelli and Zanghieri \(2005\)](#), state-financed early retirement has indeed been ceased in Austria and Germany. Recently, it has been suggested that even supporting gradual retirement runs counter to the active ageing policy aim ([Oude Mulders and Henkens, 2017](#)). According to the LLWI, individualised phased retirement concerns reducing working hours and making them more flexible, but not the option to retire earlier ([Wilckens et al., 2021](#)).

Retaining task performance of older employees is assisted by technology like artificial intelligence and offering older employees (technology) training ([Nagarajan et al., 2019](#); [Kim and Kim, 2022](#)). Increasing older employees’ human capital has received special attention since technological advancements and keeping knowledge up to date directly affect employee productivity. [Armstrong-Stassen and Schlosser \(2008\)](#) show that there is a direct linkage between the job development climate and older workers’ propensity to engage in development activities. [Kim and Kim \(2022\)](#) studied different cohorts of employees in South Korea and found the same: particularly for older employees, perceived organisational support enhanced their willingness to learn and develop. Thus, in an age-friendly work environment, special emphasis is put on offering and nudging older employees towards development activities, i.e. to learn both formally and informally ([Raemdonck et al., 2015](#); [Zacher et al., 2018](#); [Kim and Kim, 2022](#)). Employer-provided training and development is similarly or even more important to older employees than it is to younger employees ([Kim and Kim, 2022](#); [Masso et al., 2023](#); [Vuuren et al., 2023](#)).

These three areas are interconnected of course. One measure can positively affect more than one area, and an improvement in one area has a spill-over effect. In this study, we utilise indicators from all three areas. However, due to the comprehensive nature of HR practices as described above, our coverage in this regard is limited because of the lack of empirical data.

Comparative studies involving Baltic and Nordic countries

Comparative studies on age-friendly workplaces covering a broad range of sectors are scarce. Several studies have investigated age-friendly workplace practices in specific organisational settings, for example public transport organisations ([Van Dam et al., 2017](#)), selected sectors in Israel ([Eppler-Hattab et al., 2023](#)), selected companies in the Netherlands ([Oude Mulders and Henkens, 2017](#)), in Norway ([Hermansen and Midtsundstad, 2015](#)), or in Spain ([Sánchez and Diaz, 2022](#)). Larger surveys are typically country-specific, like a convenience sample of mature-age employees in China ([Zhou et al., 2023](#)) or older employees in Germany ([Tisch, 2015](#)). [Oude Mulders et al. \(2017\)](#) studied top managers’ age-related norms in six countries in 2009, and they found that top managers from Denmark, Poland and Germany were overall

much more likely to retain or recruit older workers than their peers from the Netherlands, Italy and Sweden. We note the unexpected differences between the two Nordic countries.

Aidukaite and Blaziene (2021) compared age-friendly HR practices in the Baltic and Nordic countries based on secondary data from Eurostat. They argue that high employment among older population cohorts (see data for 2022 in Appendix 1) is not commendable if workplaces are not age-friendly, as appears to be the case in the Baltics. Older employees in the Baltic (Nordic) countries are lower (higher) paid, are less (more) confident about their job security and are less (similarly) trained by the employer when compared to the general working population. It may be surprising then that the highest levels of experienced ageism in the workplace were reported in a 2015 *Eurofund* survey in Denmark, Finland, Sweden and the Netherlands, compared to other EU countries (Zhang and Gibney, 2019). According to their results, the Baltic states, together with Romania and Bulgaria, were the next highest ageist countries.

McNamara *et al.* (2012) analysed CRANET data on firm training activities and its effectiveness based on the age composition of the firm. They found that training, in general, increased firm productivity in Anglo cultures but was insignificant in Nordic and Eastern European countries. Moreover, in Anglo cultures, firm productivity was positively associated with higher percentages of the workforce aged 45 and older, while the productivity effect of organising one or few trainings, i.e. training concentration, was significantly weaker for organisations with larger percentages of the workforce aged 45 or older. No such effects were present in Eastern European and Nordic countries.

In summary, it is evident that the study of HR practices for creating, maintaining and developing an age-friendly workplace is a pressing research need. Due to the ageing of the population and the need to prolong work activity, it is imperative to study the main factors that create comfortable working conditions for older employees. However, there are very few studies containing a comparative analysis of this issue for several countries or regional comparisons. In this research area, the main source of data is local (specific) surveys. The authors found only a few publications that used comparable data for several countries. This makes it difficult to compare the state of the issue for several countries, which requires searching for the most suitable, generalised, reliable and complete source of initial data. CRANET data, focused on HRM, is a promising source, but it has only been used once to address a specific issue in age-related HR practices, namely, training effectiveness (McNamara *et al.*, 2012). Furthermore, the data was two decades old.

In conclusion, a paradox seems to exist. Despite the Baltic countries' low performance in overall active ageing, the employment rate among the elderly population in the Baltic and Nordic countries is comparable. Yet, it is unclear whether these workplaces are equally age-friendly (RQ1) and, if not, where the most crucial differences lie (RQ2).

Materials and methods

Data and analytical approach

The 2021–2022 CRANET survey provided the data for this study [1]. The poll addresses hiring, promotion and training, among other HR practices. The survey was initially drafted in English, translated into national languages, and then back translated into English by a different translator to ensure consistent interpretation of all questions. The data were collected through an online questionnaire directed towards the most senior HR specialist in organisations. The questionnaire link was emailed to a representative national sample of private and public organisations, administered by a local principal investigator. The subsample used in this analysis included 1,452 organisations in seven countries: Finland, Denmark, Norway, Sweden, Estonia, Latvia and Lithuania. The sample description is presented in Table 1.

There are several advantages to using the CRANET database for our study (Parry *et al.*, 2021). Firstly, it ensures comparability of data across all studied countries. Secondly, CRANET data are proven to be reliable. The surveys have been conducted, validated and updated for many years by scholars in the HR field, and responses have been collected using the key informant approach, i.e. the most senior HR specialist in the firm, from a representative sample in the country. Finally, an important feature of CRANET is that it targets only large companies. For older employees, large enterprises are the most important employers (Tisch, 2015).

Classical statistical methods are very demanding on the initial data, and these requirements are often difficult to meet in management studies. This study applies the fuzzy inference system, which is useful when (Bağ and Oesterreich, 2023):

- (1) Initial information is noisy – sources are subjective and/or variables are measured imprecisely. Indeed, conventional assessment techniques in HRM are expert opinions, interviews and empirical judgements, which can be biased or inadequately capture the interplay of many components (Zhang, 2023). By utilising fuzzy mathematics and calculation models based on it, fuzzy logic enables converting subjective evaluations into numerical calculations and assess them thoroughly for a more objective outcome (Bağ and Oesterreich, 2023; Imanov, 2021).
- (2) The data comprises different units of measurement and distinct types of measurement scales, among other elements. Unlike statistical methods, fuzzy modelling does not require any additional transformations before the main calculations, such as normalisation, reduction to the same units of measurement and the like.
- (3) The goal of the study is to compare the phenomena or variables relative to each other, not to assess their level, i.e. absolute estimates have no independent meaning;
- (4) The phenomenon of interest is not fixed – it can be studied in a more or less profound manner depending on data availability, and its elements may obtain different weights depending on context. If more (contextual) information becomes available, the fuzzy model can be expanded and refined.

Taken together, we are dealing with subjective, country-averaged, fuzzy information. Fuzzy modelling for HRM in Matlab is implemented based on the theory of fuzzy sets, enabling reliable simulation of multicriteria assessments for several input parameters, which may be measured in different scales and units of measurement (Demirel and Çubukçu, 2021; Ivanov *et al.*, 2020). While the authors did not find the use of a fuzzy-set approach for assessing age-friendly HR practices in prior literature, fuzzy methods have been applied to solve other HRM issues in organisations (e.g. Jia *et al.*, 2023; Zhang, 2023). These studies use fuzzy inference for multiple estimations, implemented by constructing models in the Matlab programme [2].

The model

We first identified all questions in the CRANET questionnaire that were related to age-friendly HR practices. When selecting the questions from the larger set, we relied on prior research. We selected four variables of the first level, one (fifth) variable added at level 2 and another (sixth) variable added at level 3 of the model. The original questions and answer options, as they were formulated in the CRANET survey and resulting database, are presented in Appendix 2. As a result, we will consider the joint assessment of four variables of level 1 and two variables in subsequent levels from 2 to 4 (see Figure 1).

	Estonia (N = 79)	Latvia (N = 61)	Lithuania (N = 120)	Denmark (N = 313)	Finland (N = 127)	Norway (N = 202)	Sweden (N = 550)
<i>Sector (%)</i>							
Agriculture, hunting, forestry, fishing, mining and quarrying	4	0	3	1	2	1	1
Manufacturing	18	7	20	11	19	11	12
Electricity, gas, steam and water supply, waste management	4	18	3	6	1	7	3
Construction	4	9	8	8	6	13	6
Wholesale and retail trade	10	5	13	5	8	5	6
Transportation and storage	4	9	8	6	6	6	7
Accommodation and food service activities, publishing, broadcasting activities	1	5	5	2	2	2	2
Telecommunications, IT and other information services	4	14	5	5	3	7	3
Financial and insurance activities	9	9	2	9	3	6	4
Accounting, management, architecture, engineering, science, research, administrative, support services	1	0	9	5	2	3	1
Public administration and compulsory social security	17	5	6	9	5	15	26
Education	3	0	8	7	9	3	4
Human health services, residential care and social work activities	3	5	5	4	6	4	9
Other industry or services	13	0	3	17	28	17	15
Foreign subsidiaries (%)	32	5	15	11	16	20	17

Source(s): Created by the authors according to the CRANET database

The first level input variables in the original CRANET database were categorical: the answers were 0 (no) or 1 (yes) and a higher value is considered more age-friendly:

Recruitment programmes (*Recruitment*) – First input variable, reflecting the availability of special recruiting programmes for older employees. This variable is mostly related to emotional well-being of older employees as it indicates lack of ageism in the firm and gives existing older employees a sense of better prospects with the employer (Wilckens *et al.*, 2023).

Training/career programs (*Training*) – Second input variable, reflecting the availability of special training programmes for older employees. This variable is an indication of the employer’s dedication to retain task performance of older employees. Such programmes may include both formal and informal development activities (Raemdonck *et al.*, 2015; Zacher *et al.*, 2018).

Pension schemes (*Pension*) – Third input variable, reflecting the availability of additional employer-provided pension programmes for employees.

Private health care schemes (*Health*) – Fourth input variable, reflecting the availability of additional health care for employees. Health is a crucial determinant in employees’ retirement age and retirement intentions (Wilckens *et al.*, 2023). Offering health-related benefits shows a contribution to the physical well-being of employees.

All initial parameters, i.e. individual variables characterising specific levels of any component of age-friendly practices, are situated at the initial levels. The membership function of a parameter is set triangular: “more age-friendly” or “less age-friendly”, with a crossing point in the middle. By combining these parameters, we derive overall estimates for higher levels in a sequential manner. The combination is constructed based on decision rules set by the authors. These rules reflect our understanding of the quality or numerical

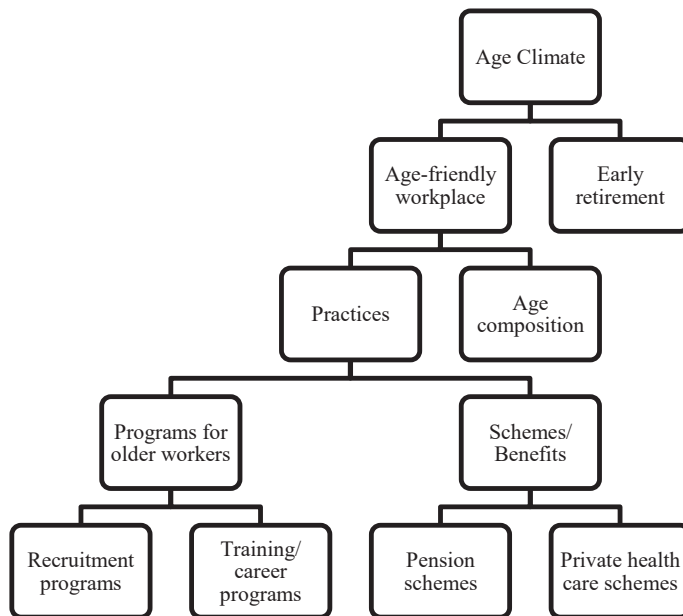


Figure 1.
The structure of
the model

Source(s): Figure created by the authors according to the tree for the model in MatLab

assessment of the phenomenon of interest, depending on the level of the initial parameters. For example, if *Recruitment* is “more age-friendly” and *Training* is near the crossing point, or *vice versa*, the higher-level variable *Programmes* is “more age-friendly”. If both are near the crossing point, *Programmes* are in the middle as well. If either *Recruitment* or *Training* is “less age-friendly”, then *Programmes* are also “less age-friendly”, unless one of the input variables is “more age-friendly”. In the latter case, *Programmes* are assigned in the middle. The same decision rules are applied throughout the model. As intermediate variables always comprise two input variables, each belonging to one of the three memberships, nine decision rules are needed. Appendix 3 shows selected inputs, intermediate and output variables, decision rules and their interaction. We assigned equal importance to each input variable.

Given the above, we end up with the following model reflecting age-friendly HR practices:

Programmes for older workers – an intermediate variable that combines *Recruitment* and *Training*; it takes a value from 0 to 100; a higher value is better.

Schemes/Benefits – an intermediate variable that combines *Pension* and *Health*; it takes a value from 0 to 100; a higher value is better.

Practices, the output variable of the first level combining *Programmes* and *Schemes*; it takes a value from 0 to 100; a higher value is better.

The second level variables are:

Age composition – Fifth input variable, reflecting the percentage of workforce 50 years and above. The range of answers were as follows: 0 (0%), 1 (1–5%), 2 (6–20%), 3 (21–50%), 4 (more than 50%). A higher value is better because firms with a greater share of older employees have a greater tendency to include age management as an integral part of their HRM policy (Salomon, 2012).

Practices – is the output variable of the first level and the input variable for the second level.

Age-friendly workplace – the output variable on the second level combining *Practices* and *Age composition*; it takes a value from 0 to 100; a higher value is better.

The third level variables are:

Early retirement (*Retirement*) – Sixth input variable, reflecting the practice of decreasing the number of employees by offering early retirement; response categories were from 0 (not at all) to 3 (to a very large extent); a higher value is worse.

Age-friendly workplace – the output variable of the second level and the input variable for the third level.

Age climate – result of the third level, combining *Retirement* and *Age-friendly workplace*; it takes a value from 0 to 100; higher value is better.

We consider the results of the second and third levels as additional. This is because the interpretation of the age composition and early retirement values as either good or bad is ambiguous. The influence of the share of older employees and use of early retirement on the overall assessment (and, accordingly, the decision rules in the model) can be interpreted differently, depending on the specific organisational context and stakeholder.

To obtain the value of the input variable for the country, we summed up all responses, subtracted the number of non-respondents from the total number of respondents and calculated the average result.

Results

The final input data values are presented in Table 2. As described above, they represent the average of the responses to the questions selected as input variables in the model, excluding records with a missing response to the corresponding question. The table contains data for three Baltic and four Nordic countries.

Table 2 shows that *Recruitment* and *Training* of older employees varies within the two regions. Latvian and Lithuanian firms perform better in *Recruitment* than Finnish and Norwegian firms. *Recruitment* is the weakest among Estonian firms and the strongest in Danish firms. It is interesting to note that Denmark’s outperformance of Sweden confirms the data collected by Oude Mulders *et al.* (2017) a dozen years earlier. *Training* of older employees is reported the most in Finland, but more Latvian firms train their older employees than Norwegian and Swedish firms. Lithuanian firms exhibit the lowest share of all. When it comes to *Pension* and *Health care* schemes, all Nordic countries outperform the Baltics and the differences are notable. The share of employees aged 50 years or older is more similar in the regions, although all Nordic countries have slightly higher average scores. Finally, *Early retirement* gives precedence to the Baltics: although we lack data for Norway, we can say that, on average, twice as many firms in the Nordic countries use early retirement compared to the firms located in the Baltics.

Development of and calculations in the fuzzy model

The model for calculations was created using MatLab software. After creating the structure, the main elements of the model were created (linguistic variables, their terms, decision rules and connections) and their values were set. The calculation in the model is carried out sequentially from the lower levels of the tree to the upper ones using intermediate variables. These intermediate variables are the output variables of one level, which in turn become the input variables of the next level. For example, the variables *Programmes* and *Schemes* that we introduced into the model are intermediate results obtained from the first level. At the same time, they are the initial data for input and calculation at the second level. Thus, in a tree that is constant for calculations, sequential data transfer from initial values to the final generalising combined estimate is implemented. The sequential results of this calculation are presented in Table 3.

Our main analysis concerns *HR Practices*, determined from the initial variables, namely *Recruitment programmes*, *Training programmes*, *Pension schemes* and *Health care schemes*. We get a final score on a 100-point scale, and it turns out to be lower for the Baltic countries, both as a whole cluster and in each country, separately. The result of *Practices* for Estonia,

Country	Recruitment programmes	Training programmes	Pension schemes	Health care schemes	Workforce 50+ years	Early retirement
<i>Baltic</i>						
Estonia	0.013	0.063	0.025	0.253	2.453	0.141
Latvia	0.082	0.082	0.049	0.148	2.650	0.130
Lithuania	0.083	0.017	0.167	0.308	2.675	0.200
<i>Nordic</i>						
Denmark	0.137	0.102	0.450	0.470	2.795	0.324
Finland	0.055	0.197	0.252	0.795	2.701	0.276
Norway ^a	0.074	0.064	0.767	0.470	2.686	NA
Sweden	0.100	0.067	0.504	0.351	2.686	0.348

Table 2. Model’s input data for the Baltic and Nordic countries

Note(s): ^aThe question on early retirement practice in Norway was not asked

Source(s): Created by the authors according to the CRANET database

Countries	Level 1		Level 2		Level 3		Level 4	
	input	output→ input	output	input	output	input	output	
Names of variables in MatLab model	Recruitment	Programs	Practices	Age-friendly workplace	Age-friendly workplace	Age-friendly workplace	Age Climate	
	Training	Schemes	PRACTICES	Age composition	Age-friendly workplace	Age-friendly workplace	Age Climate	
	Pension					Early retirement		
	Health							
Estonia								
	0.013	5.4319	12.5548	12.5548	40.6437	40.6437	65.1012	
	0.063		12.5548		40.6437		65.1012	
	0.025	14.5271		2.453		0.141		
	0.253							
Latvia								
	0.082	12.1091	16.0259	16.0259	44.2398	44.2398	67.0186	
	0.082		16.0259		44.2398		67.0186	
	0.049	12.2890		2.650		0.130		
	0.148							
Lithuania								
	0.083	6.8426	16.9623	16.9623	44.8194	44.8194	65.8949	
	0.017		16.9623		44.8194		65.8949	
	0.167	24.1135		2.675		0.200		
	0.308							
Denmark								
	0.137	15.3809	29.3177	29.3177	49.7302	49.7302	68.3003	
	0.102		29.3177		49.7302		68.3003	
	0.450	43.6320		2.795		0.324		
	0.470							
Finland								
	0.055	14.5099	34.4555	34.4555	50.7444	50.7444	69.9006	
	0.197		34.4555		50.7444		69.9006	
	0.252	51.4854		2.701		0.276		
	0.795							
Norway								
	0.074	10.4207	39.5559	39.5559	52.8540	52.8540	76.9991	
	0.064		39.5559		52.8540		76.9991	
	0.767	60.8869		2.686		NA		
	0.470							
Sweden								
	0.100	11.7108	26.8140	26.8140	47.9192	47.9192	66.3151	
	0.067		26.8140		47.9192		66.3151	
	0.504	41.9887		2.686		0.348		
	0.351							

Source(s): Calculated in the model, created in MatLab by the authors

Table 3. The input data, intermedia calculations and results from the model (for a country in general)

Latvia and Lithuania are 12, 16 and 17, respectively; while for the Nordic countries the scores are: Sweden – 27, Denmark – 29, Finland – 34 and Norway – 39. Thus, there is a notable gap in the *Practices* category. Therefore, the answer to our RQ1 (Does a high share of older employees indicate age-friendly HR practices in the Nordic and Baltic countries?) must be “No”.

When calculating *age-friendly workplaces*, we considered the *Age composition* of employees in the organisation. In our model and calculations, a higher share of older employees was considered more age-friendly. As it appears, the studied countries are remarkably similar in that respect. The seven countries share similar demographic tendencies, and the composition of the entire population trickles down to firms. However, the interpretation of this input variable may be the opposite depending on specific circumstances, for example the specifics of the enterprise, socio-economic conditions and the like. According to [Eppler-Hattab et al. \(2023\)](#), the proportion of older workers in the firm is not itself a component of age-friendliness but is rather a derivative of variables such as organisation size or sector.

The situation is similar with the *Age climate* result at the final level. We interpreted the *Early retirement* input variable as an inverse relationship. In other words, a larger extent of early retirement usage was considered worse. As can be seen, Nordic countries (apart from Norway, where the data is missing) use more early retirement practices, which in our interpretation makes them less age-friendly. In practice, the opposite interpretation is possible, depending on the point of view of a particular employee, his years of work, age, work and pension prospects. As noted in the literature review, the shift in the early retirement paradigm is quite recent.

Addressing our RQ2 (Can we spot specific age-friendly HR practices where the two regions differ?), we noted in [Table 2](#) that HR practices systematically differ in employer-provided additional pension and health schemes in favour of the Nordic countries. Conversely, early retirement practices are used twice as frequently in Sweden, Finland and Denmark – the interpretation of which, however, is ambiguous.

Consequently, we can note that the value of the overall result of *Age climate* for the Baltic countries (65–66) is quite close to the Nordic countries (66–76). Falling short in the *Practices* domain in Estonia, Latvia and Lithuania is levelled off by workforce composition and less usage of early retirement schemes.

Discussion

Our results demonstrated that despite the high employment rate of older people in the Baltics, their workplaces cannot be considered as age-friendly as in the Nordic countries. This is in line with the suggestion made by [Aidukaite and Blaziene \(2021\)](#). Also, it implies that the Active Ageing Index, which considers older people's employment rate among other indicators, should be treated with a grain of salt. The relative income poverty rate among people aged 66+ exceeds 25% in the Baltic states, whereas in Denmark or Norway it is below 6% ([OECD, 2023](#)); therefore, firms in the Baltics can keep older employees without being age-friendly. But not all our studied age-friendly HR practices were equally inferior in the Baltics.

We did not find that the firms in Nordic countries fared better than their peers in the Baltics in recruiting and training older employees. Here, Latvian firms were even better than Norwegian or Swedish firms. This indicates that the problem of ageism as claimed to exist in the Nordic countries ([Zhang and Gibney, 2019](#)) is quite similar in the Baltics. [Salomon \(2012\)](#) found more positive attitudes toward older employees in Nordic countries than in Eastern Europe; a decade later this might still hold, but the differences are marginal. Also, it might be true that older employees in the Baltics are less trained by their firms than younger colleagues ([Aidukaite and Blaziene, 2021](#)), but, at least in Latvia and Estonia, older employees are trained as much as the same age cohort in Norway or Sweden. The scores for the training of older employees in general were low. The reason for this might be what [McNamara et al. \(2012\)](#) noted based on earlier CRANET data: in Northern and Eastern Europe, training was not related to perception of an increase in productivity. The exception here was Finland, with notably higher scores for the training of older employees. This is in line with a survey by [Järnefelt et al. \(2022\)](#), according to which more than 80% of Finnish employers paid attention to the development of their experienced workers' professional skills.

Theoretical implications

Paradoxically, in the Nordic countries with a well-developed social welfare system the firms still offer more voluntary health and pension schemes. This is interesting in the light of substitutive (crowding-out) *versus* supplementary (crowding-in) interplay between the state and market actors. [Järvi \(2021\)](#) reviews the development of public–private mix of offering

sickness benefits in Finland and finds support for the crowding-in hypothesis, whereby high-level public benefits facilitate generous occupational benefits. Stretching this relationship to other age-friendly HR practices, we might expect that government initiatives, such as training of the elderly, leads to more age-friendly practices by the firms as well.

Another theoretically relevant aspect concerns early retirement practices. In this respect, Nordic countries are “worse” or less age-friendly than the Baltics. However, it is probable that employers who use these practices have good intentions in mind, as noted by [Sánchez and Diaz \(2022\)](#). There is a need for a consensus regarding retirement-related age-friendly practices. [Wöhrmann et al. \(2018\)](#) outline the transition into the retirement phase as timely planning, *individual* transition solutions, preparation for retirement stage, and continuous inclusion and maintaining contact. Early retirement can only be age-friendly if it is tailored to the employee’s genuine wish and need.

Practical implications

Based on our study findings, we would highlight three practical implications for managers and HRM professionals. Our study reveals that employer-provided health and pension schemes are underdeveloped in the Baltic countries. This implies that the dimension of physical well-being of older employees ([Oude Mulders and Henkens, 2017](#); [Wöhrmann et al., 2018](#); [Zacher et al., 2021](#)) should be improved in the firms in the Baltic countries. If firms are to become more age-friendly, especially health-related benefits could be introduced. Based on the Nordic example, there are no grounds for fear that if firms offer the schemes voluntarily, the state will withdraw from social security and employees will be forced to rely more on the market. And *vice versa*: when governments increase access to social security for employees, it is likely that the firms are likely to offer even more benefits to be attractive in the labour market.

Second, recruitment of older employees in Estonia and training them in Lithuania seems to be less age-friendly, pointing to potential ageist attitudes among managers ([Oude Mulders et al., 2017](#)). As noted by [Zacher et al. \(2018\)](#) and [Froehlich et al. \(2023\)](#), managers and supervisors should be trained on ageing issues. Recruitment and especially training are relevant for both the emotional well-being of older employees and their task performance ([Raemdonck et al., 2015](#); [Zacher et al., 2018](#)).

Finally, concerning early retirement programmes, the authors of this study believe that their appeal reduces with time, but firms who utilise such programmes should make sure that it is best for the employee and not just for the firm ([Wöhrmann et al., 2018](#); [Boehm et al., 2021](#)). With this practice in particular, the individualised approach ([Bal, 2015](#); [Andrei and Parker, 2022](#)) is an imperative. Designing age-friendly HR practices are part of the humanisation of work, and as such relevant for any employer to consider in the long term. Nevertheless, it is a pressing issue for the Baltic firms, especially in Latvia and Lithuania, because these countries are projected to lose more than 20% of their population by 2050 ([Chand, 2024](#)). Not only will there be less workforce, but it will also inevitably be older ([Kim and Kim, 2022](#)).

Limitations and future research directions

As with all methods based on survey data, the accuracy and reliability of the source data – the input information – is extremely important. This study used CRANET data, which is based on self-reports and may show larger organisations in a slightly better light than they really are. Objective data should complement the survey and fuzzy modelling can easily integrate it. The directions and possibilities for further development of the model can be divided into two components: those relating to its application and improvement as such. The application of the model can be developed in the direction of increasing the number of input variables, as well as the simultaneous and combined use of variables of several types – numerical, linguistic and in different units of measurement. Ideally, the variables should

include objective data to mitigate self-report bias (e.g. turnover rate, grievance procedures, reviews on social networks and mass media, and state and industry statistics). An important advantage of the proposed approach is the ability to easily upgrade the model by adding or removing input variables. In terms of age-friendly HR practices, a substantial number of indicators could be added. The most comprehensive to date are LLWI or ISO standard 25550:2022.

In fuzzy modelling, an important aspect is the formation of a correct and complete set of decision-making rules, i.e. the importance assigned to input variables. These rules can be derived from various sources: the academic literature, collective or individual expert assessments and analysis of similar practical situations. Given the same initial data, different rules can lead to different results. Therefore, the formation of rules and then their adjustment in the process of setting up the model are necessary elements in bringing the model to its final, usable form. The model allows us to consider subjective requirements or assessments of the situation, expert or managerial opinions about the relative importance of the criteria that determine the organisational climate in specific fields (e.g. health and safety climate). This can be done without changing the model by introducing criterion weights as input variables. In this study, the rules were the authors' deliberate choice, which were consistently applied throughout the variables, but validation of these rules would be desirable.

Also, the choice of the type and numerical parameters of the membership functions that are used in calculations in the model can be criticised. It is recommended to first use simple, triangular membership functions (as done in this study), and then, if necessary, move on to more complex ones – trapezoidal or custom ones. This process is also a step-by-step process of fine-tuning the model.

It should also be noted that the proposed calculation methodology provides only relative results, allowing one to compare estimates for different countries. In other words, the use of alternative multicriteria multivariate comparison methods may produce different outcomes in absolute terms. However, the relative positioning for different countries should not fundamentally change. Therefore, other regions from the CRANET database, e.g. Central and other Eastern European countries, could be added and compared with the Baltic and Nordic countries. Statistical analysis with multi-level modelling or fuzzy set qualitative comparative analysis would advance our understanding of the determinants or effectiveness of age-friendly HR practices in different countries.

Conclusions

This study confirmed that active ageing policy on a societal level has translated into age-friendly HR practices in larger organisations in the Nordic countries, whereas the Baltic countries lag behind in providing age-friendly workplaces, just as they lagged far behind in the Active Ageing Index (Zaidi, 2014) and social welfare policies toward the older population (Aidukaite *et al.*, 2022). A high employment rate among older employees does not necessarily indicate age-friendly HR practices. However, there are nuances in this result: deficiencies in the Baltics are attributed to the lack of voluntary health and pension schemes offered by firms, whereas early retirement is commendably less used in the Baltic countries. Age-friendly workplaces are not only important for older employees, however; age-friendly HR practices contribute to the further humanisation of work relevant for all ages (Zacher *et al.*, 2018). To the best of the authors' knowledge, this study is one of the few attempts to use fuzzy logic and a fuzzy modelling methodology to study age-friendly workplaces.

Notes

1. More on the project and methodology can be read from: <https://cranet.la.psu.edu/methodology/>

2. Another fuzzy approach is fuzzy set qualitative comparative analysis (fsQCA), which has gained popularity in management and business research in recent years (Kumar *et al.*, 2022). Our method, fuzzy inference system (FIS), is distinct from fsQCA. In the context of multicriteria assessment, FIS has different goals, approaches and necessary input data compared to fsQCA. The latter is for studying causal relationships and equifinal configurations with respect to outcome variable, based on set logic with partial use of classical statistical methods. FIS is designed to model and evaluate systems with a high degree of uncertainty in data and decision conditions. In terms of data processing methods, fsQCA focuses on set logic and condition analysis, while FIS uses fuzzy rules to derive solutions.

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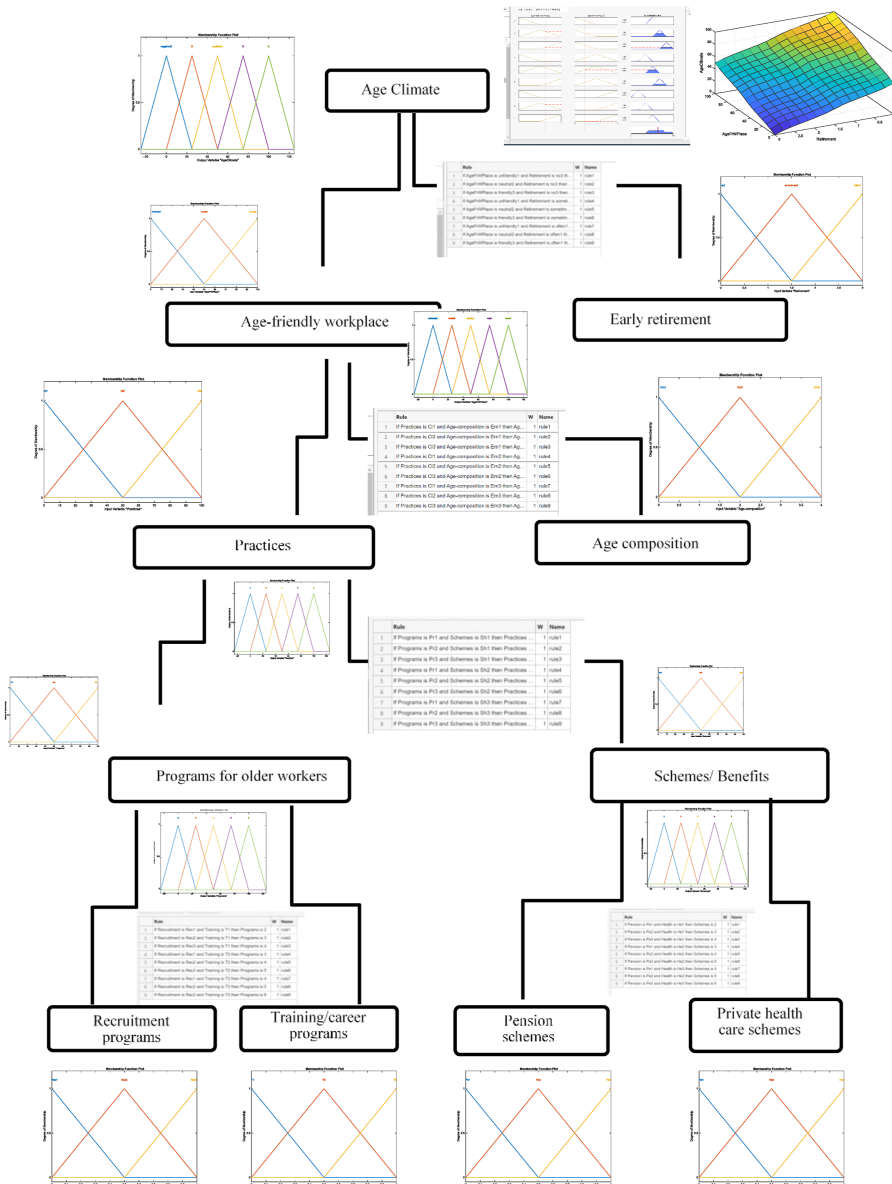
Country	55–64 years (%)	65–69 years (%)
Estonia	73.8	35.6
Denmark	73	24.9
Finland	71.2	19.4
Latvia	69.5	30.9
Lithuania	69.8	28.8
Norway	74.5	32.2
Sweden	77.3	27.6
EU (27) average	62.3	16.7

Source(s): OECD database Labour Market Statistics

Designation of the initial question in the CRANET questionnaire	In the MatLab model	The original questions and answer options in the CRANET questionnaire										
section 2 question 5b subquestion r	Recruitment programs	<p><i>Question:</i> Does your organisation have action programmes covering any of the following groups to improve their participation in the workforce. (Please tick all that apply):</p> <p><i>Answer's scale</i> [0:1]. B. Older workers (aged 50 plus) – Recruitment (check the box if yes)</p>										
section 2 question 5b subquestion t	Training/ career programs	<p><i>Question:</i> Does your organisation have action programmes covering any of the following groups to improve their participation in the workforce. (Please tick all that apply):</p> <p><i>Answer's scale</i> [0:3]. B. Older workers (aged 50 plus) - Training/career progression (check the box if yes)</p>										
section 4 question 3 subquestion g	Pension schemes	<p><i>Question:</i> Do you offer any of the following schemes in excess of statutory requirements? (Tick all that apply)</p> <p><i>Answer's scale</i> [0:1]. G. Pension schemes – Yes (check the box if yes)</p>										
section 4 question 3 subquestion i	Private health care schemes	<p><i>Question:</i> Do you offer any of the following schemes in excess of statutory requirements? (Tick all that apply)</p> <p><i>Answer's scale</i> [0:1]. I. Private health care schemes – Yes (check the box if yes)</p>										
section 6 question 12	Age composition	<p><i>Question:</i> What is the proportion of employees 50 years old and above?</p> <p><i>Answer's scale</i> [0:4]. (check the box)</p> <table border="1"> <tr> <td>0%</td> <td>1-5%</td> <td>6-20%</td> <td>21-50%</td> <td>>50%</td> </tr> <tr> <td><input type="checkbox"/>0</td> <td><input type="checkbox"/>1</td> <td><input type="checkbox"/>2</td> <td><input type="checkbox"/>3</td> <td><input type="checkbox"/>4</td> </tr> </table>	0%	1-5%	6-20%	21-50%	>50%	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
0%	1-5%	6-20%	21-50%	>50%								
<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4								
section 2 question 2 subquestion b	Early retirement	<p><i>Question:</i> To what extent have you used any of the following methods as part of your workforce management strategy to change the number or composition of your workforce (in the last 3 years)?</p> <p><i>Answer's scale</i> [0:3]. Changed from employee groups to a single scale (0 Not at all – 3 To a very great extent) covering all employees.</p> <table border="1"> <tr> <td>Not at all</td> <td></td> <td></td> <td>To a very great extent</td> </tr> <tr> <td>B.Early retirement</td> <td><input type="checkbox"/>0</td> <td><input type="checkbox"/>1</td> <td><input type="checkbox"/>2 <input type="checkbox"/>3</td> </tr> </table>	Not at all			To a very great extent	B.Early retirement	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2 <input type="checkbox"/> 3		
Not at all			To a very great extent									
B.Early retirement	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2 <input type="checkbox"/> 3									

Table A2.
Examples of questions for input variables

Source(s): Authors extraction from CRANET database



Source(s): Created by the authors

Figure A1. The full model in MatLab