Chapter 3

Examining the Nexus Between Digitalization and Elderly Employment in the European Union Using Selected Socioeconomic Indicators: A Critic Based Mabac Method Application[1]

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Abstract

The aim of this study is to examine the adaptation of elderly employment to developments in the digitalized world and to investigate how successful the EU countries are in managing this process. This study is evaluating the performances EU countries with CRITIC based MABAC Method in terms of adaptation of the elderly employment to the developments in the digitalized world using some socio-economic indicators that are important in the adaptation of the elderly employment to the process. According to the findings of the CRITIC method used for criterion weighting with the help of the variables included in the study, the most important eight criteria affecting performance are Adults working at home (20.59%), Population (15.48%), Adult Employment Rate (10.42%), Life Expectancy (9%, 63), Average Income (7.91%), Internet Usage Rate (7.70%) and Digital Skill Level (7.67%). On the other hand, in the findings of the MABAC method using the weights obtained by the CRITIC method, it was found that the countries in the first place in the performance ranking were Germany, Denmark, Sweden and Italy, while the countries with low performance were Poland, Croatia, Bulgaria and Greece. As a result of the study, it is seen that the countries in the first place have higher digital skill level, internet usage

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rate, adult employment rate, per capita income and average income level and active aging index values in the population aged 55-64 compared to other countries, while the poverty threshold is lower. On the contrary, when the countries in the lowest ranks are examined, it is seen that there are countries with low digital skill levels, adult employment rate, average income and high poverty threshold.

1. INTRODUCTION

The impact of digitalization on employment can be quantitative (job creation or job loss), qualitative (the type of contract and its impact on employment quality related to the employment relationship), or both. However, changes in job profiles within jobs and the skills required by the job can affect employment. It is seen that one of the changes that digitalization has created in the business sector and working life is recruitment methods. Employers generally prefer individuals who have high digital skills and use digital platforms more actively when choosing their employees. This accelerates the selection process as it provides much more information about the roles that candidates can take in working life. However, it is also thought that this situation may lead to inequality as the chance factor disappears (Lalive & Oesch, 2019: 9).

With the increase in the average age in the workforce due to demographic change, the factors affecting this group have become important. Elderly workers need to be successfully integrated into the process as a part of the whole, ensuring that their potential is recognized and their experience is benefited from, that they have a larger proportion in the existing workforce day by day. Considering the demographic change in the world, the increase in the elderly population in business life and society shows that this process should be managed well in social development and human resources management.

Changes in many physical, sensory and cognitive skills during the aging process cause incompatibility between being able to do the job in the workforce and the requirements of the job. In particular, decrease in physiological skills (muscle strength, fine motor skills, etc.), decrease in sensory abilities (hearing, vision, etc.), changes in cognitive and mental functions (mental flexibility, information processing speed, weakened memory) and the amount of information that can be processed simultaneously. Being open to learning new things and changes, being less willing to work with new tools and technologies are among the reasons that negatively affect employability for the elderly. On the other hand, life and work experience, problem solving strategies, leadership, organization, reasoning ability in complex situations, communication and teamwork etc. skills increase with age (Wolf et al., 2018: 70).

The aim of this study is to evaluate the effects of the digitalization of the whole world with technological developments on the employment of the elderly and how successful the EU countries are in managing the digitalization process and the digitalization relationship with the elderly workforce. For this reason, the performances of EU countries were evaluated with the CRITIC-based MABAC method, using some socio-economic indicators that are considered important in the adaptation of the elderly workforce to the digitalization process.

2. THEORY AND LITERATURE

According to OECD data, when the employment status of older workers is examined, it is seen that they are exposed to longer-term unemployment compared to young people and their probability of being re-employed is low (OECD, 2018: 276, 289). The fact that the probability of finding a job again is low and difficult for older workers causes them to work part-time, irregularly or without insurance (Basu et al., 2018: 14). When the reasons for leaving the job in individuals over 50 years old are examined; many things can be counted, such as being redundant in a low-paid and low-skilled workforce, not being able to provide work responsibilities and life balance, and health problems, age-related prejudices and discrimination, not being seen as a part of the constantly renewed dynamic business world.

When all these situations are evaluated, it is seen that different skills should be developed and training opportunities should be offered to the employees in order to ensure the harmony of the workforce in a digitalized world. In particular, individual and social skills attract more attention than before. In this context, it is becoming more and more important to cooperate with experts, as well as communication skills, so that employees can cope with high technical challenges due to digitalization and an aging workforce.

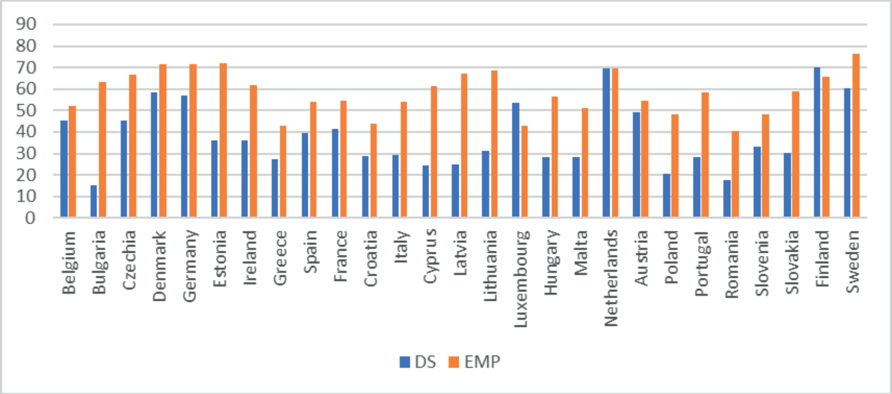
Employers offer career development and advancement opportunities to employees at all levels by coping with age prejudices that prevent development in older employees plays a very important role in the adaptation of this population to society. For this reason, necessary arrangements should be made in recruitment activities in order to make the best use of the experience and skills of older employees (Lincoln, 2017: 8).

Today, the fact that production has different processes, structures and techniques has led to the emergence of new jobs and professions, and artificial intelligence and robotic technologies have been at the center of business life with increasing automation. The use of robots and technological tools in the production process will increase unemployment gradually, the role of unions in social life will decrease, new regulations should be introduced in the fields of work and social security, etc. brought many thoughts with it (Yankın, 2019: 4-5).

The results of the effects of technological developments on employment are discussed in two ways as optimistic and pessimistic. The optimistic view is that technological change will open new doors and have positive contributions in employment as new job opportunities are created over time. In this situation, there is also the idea that the relationship between unemployment and technological development should not be handled unilaterally (Akın, 2017: 47). The pessimistic view is that digitalization will lead to unemployment as technology will replace human power and skills. In this view, it is stated that although technological progress creates new opportunities, it poses a great threat to the workforce that cannot develop themselves in newly formed professions. It is emphasized that quality improvements in labor should be faster than technological developments in order to achieve this balance (Temel, 2001; Brynjolfsson & Mcafee, 2014).

Another effect of technological developments on employment is the quality of the workforce. With the development of technology, it is expected that the qualifications of the workforce that will manage it will also increase. This situation leads to an increase in the demand for highly skilled workers and a relative increase in the wages of workers with this equipment (Autor, Levy, & Murnane, 2003; Berman, Bound, & Machin, 1998; Omay, 2013). When this situation is evaluated in terms of elderly employment, considering the decline in their individual skills, it will turn into a threat for individuals who cannot keep up.

Graph 1. Digital Skill Level and Employment of Elderly in the EU



Looking at the graph, it is seen that the countries with the highest level of digital skills are Finland, Netherlands, Sweden, Denmark and Germany. Also, it has been determined that the countries with the highest employment of the elderly are Sweden, Sweden, Denmark, Estonia, Germany and Estonia.

Fougere and Merette (1999) stated that for 7 OECD countries including England and the USA, the negative effects of aging can be significantly reduced and growth can be sustained by investing more in human capital in the 1996-2050 period.

Karapetyan et al. (2012) argue that the main reason for the exclusion of older employees in the technological renewal process in a business is technoagism (exclusion of the elderly from the digital field). He also states that with the inclusion of professional equipment and new technologies in the process, older workers completely lose their previous position or job for no clear reason. In the study, it was concluded that the digital skill levels of employees aged 50 and over are 2 times lower than those of younger employees, and that there is a relationship between digital exclusion and motivation to acquire digital skills and computer literacy.

Arntz, Gregory, and Zierahn (2016) evaluated the tasks that technological development can replace by focusing on the task content of those working in the same occupation. They stated that although 9% of the jobs are under the risk of automation depending on the average technological development, it may not turn into a loss of employment.

Frey and Osborne (2016) stated that as robots become smarter, faster and cheaper over time, they will go beyond repetitive, tedious and dangerous tasks and be used in other industrial sectors besides the automotive industry (where most industrial robots are used today).

Chandy (2017) stated that with technological developments, automation is more likely to replace jobs rapidly in developing countries than in developed countries.

IMF (2017) states that technological progress in developed country economies explains about half of the total decline in the share of labor force in national income and has a greater negative impact on medium-skilled worker earnings.

Piva and Vivarelli (2017) examined the effects of the change in technology on employment, and discussed the 1998-2011 data in the manufacturing - service sectors of 11 European countries from the past to the present. In the findings of the study, it was seen that while R&D expenditures on product innovation had a labor-friendly effect in medium and high technology sectors, it did not have any effect in low technology sectors.

In the study of Doğru and Meçik (2018), in which they discussed the effects of the digital transformation that emerged with Industry 4.0 on the Turkish labor market, they concluded that the digital transformation is progressing slowly in the labor market in Turkey, and that the mobility in these markets in the short and long term will be ensured by the increase in the qualified workforce. However, it is predicted that the expectations for the labor market will be positive in the long run and will cause unemployment in the short run.

In the study of Roy, Vertesy and Vivarelli (2018) in which the effects of innovation activities on employment are discussed, the 2003-2012 period data of approximately 20,000 European patent firms are discussed. As a result of the study, it has been stated that the innovations have a labor-friendly structure and have a positive effect on employment in high and medium technology manufacturing sectors, but not in low technology sectors.

Aydın and Demiral (2019) evaluated the relationship between Industry 4.0 and workforce diversity using data from companies operating in the technology sector in Turkey. In the study, with the finding that women's labor force participation rates decreased with the transition from labor-intensive approach to technological-intensive approach, it was predicted that blue-collar workers would decrease and white-collar workers would increase with the fourth industrial revolution.

Karabulut et al. (2019) discussed the relationship between the variables of ICT, unemployment, GDP per capita and fixed capital formation per workforce for the 2003-2017 period of 42 countries (21 developed and 21 developing). In the findings of the study, a positive relationship was determined between unemployment and information and communication technologies expenditures in developing and developed countries.

Kılıçaslan and Töngür (2019) evaluated the relationship between information and communication technologies and employment for the Turkish manufacturing sector in the 2003-2013 period. As a result of the study, it has been found that information and communication technologies have a creative effect on employment.

Lee and Shin (2019), in their study of 142 countries for the 1950-2014 period, found that the increase in the share of the elderly population in the total population negatively affects growth, and the negative effect of the elderly population on growth in developed countries has become more evident in recent years.

In their study, Zhang & Nedospasova (2022) evaluated the impact of three levels of digital divide (access gap, use gap, knowledge gap) on the labor force participation of the elderly using Chinese data and found that the digital divide has a significant impact on the labor force participation of individuals aged 55-70.

3. METHODOLOGY

In this study, the performances of EU countries were evaluated with the CRITIC-based MABAC method, using some socio-economic indicators that are considered important in the adaptation of the elderly workforce to the digitalization process. The CRITIC and MABAC methods, which are among the multi-criteria decision making methods used in the study, are mentioned below.

3.1. Criteria Importance Through Intercritera Correlation (CRITIC) Method

One of the commonly used weighting methods among the Multi-Criteria Decision Making (MCDM) methods is the CRITIC method. While ranking the alternatives, the criteria importance weights are determined by objective or subjective methods. Diakoulaki et al. (1995), while calculating the weighting coefficients, the standard deviation of the criteria and the correlation coefficients between the other criteria are used (Ünlü et al., 2017; 71). In this method, the decision variables are normalized with the help of equation (1) for the benefit criterion and equation (2) for the cost criterion, and a normalized matrix is obtained for the calculations. Afterwards, the correlation coefficient values and the weights of the criteria are calculated with the help of equality (4) and equation (5) by using the equation (3), respectively (Jahan et al., 2012; 413).

$$r_{ij} = \frac{x_{ij} - x_j^{min}}{x_j^{max} - x_j^{min}} \qquad (1)$$

$$r_{ij} = \frac{x_{ij}^{max} - x_{ij}}{x_{ij}^{max} - x_{ij}^{min}} \qquad (2)$$

$$\rho_{jk} = \frac{\sum_{i=1}^{m}(r_{ij} - \bar{r}_j)(r_{ik} - \bar{r}_k)}{\sqrt{\sum_{i=1}^{m}(r_{ij} - \bar{r}_j)^2 \sum_{i=1}^{m}(r_{ik} - \bar{r}_k)^2}}, \quad j,k = 1, \dots, n \qquad (3)$$

$$w_j = \frac{c_j}{\sum_{k=1}^{n} c_k}, \qquad j = 1, \dots, n \qquad (4)$$

$$c_j = \sigma_j \sum_{k=1}^{n} (1 - \rho_{jk}), \qquad j = 1, \dots, n \qquad (5)$$

3.2. Multi Attribute Border Approximation Area Comparasion (MABAC) Method

In the MABAC (Multi Attribute Border Approximation Area Comparasion) method developed by Pamućar and Ćirović (2015), the distances of the criterion functions to the border closeness area, loss and potential gain values are used while determining the performances of the decision units (Ecer, 2020: 282). The application steps of the MABAC method are explained below (Pamućar and Ćirović, 2015: 3019-3020; Ecer, 2020: 283-286).

Stage 1: Creating the Decision Matrix

The matrix, where m is the number of alternatives and n the number of criteria, is given in equation (6).

$$X = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{matrix} C_1 & C_2 & \cdots & C_n \end{matrix} \\ \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \end{array} \qquad (6)$$

Stage 2: Standardization of Decision Matrix:

The utility criterion is $n_{ij} = \frac{x_{ij} - x_i^-}{x_i^+ - x_i^-}$ (7)

The cost-oriented criterion is $n_{ij} = \frac{x_{ij} - x_i^+}{x_i^- - x_i^+}$ (8)

The standardized matrix is as follows, with x_i^+, being the minimum value of the decision matrix and x_i^-, being the maximum value of the decision matrix.

$$N = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{matrix} C_1 & C_2 & \cdots & C_n \end{matrix} \\ \begin{bmatrix} n_{11} & n_{12} & \cdots & n_{1n} \\ n_{21} & n_{22} & \cdots & n_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ n_{m1} & n_{m2} & \cdots & n_{mn} \end{bmatrix} \end{array} \qquad (9)$$

Stage 3: Weighting the Standardized Matrix:

$$v_{ij} = w_i n_{ij} + w_{ij} \quad (10)$$

The weighted matrix (V) in Equation (11) is obtained by using the standardized values of v_{ij} obtained with the help of Equation (10) by using w_{ij} weight values.

$$V = \begin{matrix} A_1 \\ A_2 \\ \vdots \\ A_m \end{matrix} \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ v_{m1} & v_{m2} & \cdots & v_{mn} \end{bmatrix} \quad (11)$$

Stage 4: Obtaining the Boundary Approach Area Matrix

The elements in this matrix are calculated by the geometric mean of the column elements in the weighted matrix, as expressed in equation (12).

$$g_i = \left(\prod_{j=1}^{m} v_{ij} \right)^{1/m} \quad (12)$$

Boundary approach area matrix is obtained with the help of equation (12). Each element of this matrix represents the boundary approach area of each criterion.

$$\begin{matrix} & C_1 & C_2 & \cdots & C_n \\ G = & [g_1 & g_2 & \cdots & g_n] \end{matrix} \quad (13)$$

Step 5: Obtaining the Distances of the Decision Alternatives to the Boundary Approximation Area Matrix (Q)

This matrix is obtained with the help of equation (14).

$$Q = \begin{bmatrix} v_{11} \cdot g_1 & v_{12} \cdot g_2 & \cdots & v_{1n} \cdot g_n \\ v_{21} \cdot g_1 & v_{22} \cdot g_2 & \cdots & v_{2n} \cdot g_n \\ \vdots & \vdots & \ddots & \vdots \\ v_{m1} \cdot g_1 & v_{m2} \cdot g_2 & \cdots & v_{mn} \cdot g_n \end{bmatrix} = \begin{bmatrix} q_{11} & q_{12} & \cdots & q_{1n} \\ q_{21} & q_{22} & \cdots & q_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ q_{m1} & q_{m2} & \cdots & q_{mn} \end{bmatrix} \quad (14)$$

In the decision alternative, the area suitable for the A_i alternative is determined by the conditions specified in equation (15), with the best alternative being A_i^+,, and the worst alternative being A_i^- in the upper bound approach area.

$$A_i \epsilon \begin{cases} G^+ \; if \; q_{ij} > 0 \\ G \; if \; q_{ij} = 0 \\ G^- if \; q_{ij} < 0 \end{cases} \quad (15)$$

The fact that the A_i decision alternative is the best among the existing decision alternatives depends on the fact that this alternative is in the upper approach area according to many criteria. Thus, if $q_{ij} > 0$is to ensure that the decision alternative is the best, if $q_{ij} < 0$ it is to ensure that the decision alternative is the worst.

Stage 6: Calculating the Performance of Decision Alternatives

For each decision alternative, the sum of their distances to the boundary approach ratios is calculated and the calculated values are ordered from largest to smallest.

$$S_i = \sum_{j=1}^{n} q_{ij}, \quad j = 1,2, \ldots, n \;\; ve \; i = 1,2, \ldots, m \qquad (16)$$

4. DATASET AND FINDINGS

The criteria set used in the study is given in the table below.

Table 1. Criteria Set Used in the Study

Criteria	**Criteria Info**	**Sources**
DSL	Digital Skill Level (55-64 ages)	Eurostat
IUR	Internet Usage Rate (55-64 ages)	Eurostat
AER	Adult Employment Rate (55+ ages)	Eurostat
PCI	Per Capita Income	Eurostat
PT	Poverty Threshold (55-64 ages)	Eurostat
AI	Avergae Income (55-64 ages)	Eurostat
AWH	Adults Working at Home(55+ ages)	Eurostat
P	Population (55-64 ages)	Eurostat
ALE	Average Life Expectancy (55-65 ages)	Eurostat
AAI	Active Aging Index	UNECE

4.1. CRITIC Method Findings

The criteria and optimization aspects discussed in the study are given in Table 1. With the creation of the decision matrix, the optimization aspects of the criteria were taken into account and the normalized matrix was obtained with the help of equation (1) and equation (2). The correlation matrix of the criteria calculated with the help of equation (3) is given in Table 2.

Table2. Correlation Coefficients of the Criteria

	DSL	IUR	AER	PCI	PT	AI	AWH	P	ALE	AAI
DSL	1	0,904691	0,46128	0,736863	0,60191	-0,81621	-0,83104	0,632567	0,499817	0,795412
IUR		1	0,487636	0,712804	0,531073	-0,81198	-0,75453	0,662822	0,477659	0,856381
AER			1	0,084254	0,242395	-0,23699	-0,20243	0,559493	-0,02819	0,727737
PCI				1	0,477775	-0,94046	-0,77295	0,474558	0,680779	0,599712
PT					1	-0,60687	-0,57923	0,266698	0,388069	0,523126
AI						1	0,847081	-0,57579	-0,68696	-0,74989
AWH							1	-0,53766	-0,56183	-0,70848
P								1	0,26514	0,63438
ALE									1	0,454123
AAI										1

Considering the values in Table 2, there is a high level of positive correlation between digital skill level (DSL) and internet usage rate (IUR), per capita income (PCI), active aging index (AAI), and average income (AI), number of adults working at home. It is observed that there is a high level of negative relationship between (AWH) and Considering this situation, it shows that the increase in the digital skill level of the elderly workers is closely related to the increase in the welfare level of the elderly workers, that is, it is directly related to the high income per capita and the high active aging index. It shows that the digital skills of older employees with low average income (AI) are negatively affected by this situation, and that it has a negative effect on the development of digital skills as the number of adults working at home (AWH) increases.

On the other hand, it is observed that there is a high level of positive relationship between internet usage rate (IUR) and per capita income (PCI), active aging index (AAI), and a high level of negative relationship between average income (AI) and the number of adults working at home (AWH). While per capita income (PCI) and average income (AI) and the number of adults working at home (AWH) are negatively related, the average income (AI) is negatively related to the number of adults working at home (AWH) and active aging index (AAI), and the number of adults working at home (AWH) and active aging index (AAI) are negatively correlated.

Table 3. CRITIC Method Weighting Results and Criteria Importance Rankings

criteria	r_{0i}	sıra
DSL	0,076766484	7
IUR	0,077013326	6
AER	0,104200353	3
PCI	0,063840986	10
PT	0,076563348	8
AI	0,079183622	5
AWH	0,205930161	1
P	0,154889369	2
ALE	0,096378119	4
AAI	0,065234232	9

In the findings obtained as a result of the application of the CRITIC method, the most important first eight criteria are Adults working at home (AWH), Population (P), Adult Employment Rate (AER), Life Expectancy (ALE), Average Income (AI), Internet usage rate (IUR), and Digital Skill Level (DSL).

4.2. MABAC Method Findings

In the first step of the MABAC method, a decision matrix was created with equality 7. The said decision matrix is shown in Table 4.

Table 4. Normalized Matrix

Criteria	max	max	max	max	min	max	min	min	max	max
Countries	**DSL**	**IUR**	**AER**	**PCI**	**PT**	**AI**	**AWH**	**P**	**ALE**	**AAI**
Belgium	45,23	86,43	52,1	24442,5	13	25909	27,7	30,8	24,8	37,7
Bulgaria	15,4	55,71	63,5	11186,7	17,9	4829	1,4	23,6	19,93333	31,8
Czechia	45,51	82,27	66,7	16799,1	10,6	10467	12,1	17,7	22,43333	36,5
Denmark	**58,51**	**97,56**	**71,3**	**25277,6**	**7,9**	**37195**	29,3	30,8	23,93333	**43**
Germany	**56,99**	**90,55**	**71,6**	**24601,8**	17,9	**24822**	14,2	26,9	24,03333	**39,6**
Estonia	36,23	84,93	71,9	15721,4	21,1	11686	13,5	38,2	22,86667	37,9
Ireland	36,28	81,82	61,7	22128	15,5	26690	25,9	32,2	25,06667	39,1
Greece	27,58	62,15	42,9	16162,6	18,7	8833	6,3	23,1	24,56667	27,7
Spain	39,53	86,9	53,8	19497,3	16,8	17190	10	26,7	26,26667	33,7
France	41,33	83,76	54,5	22725,4	10,3	25154	26	24,5	26,1	38,6
Croatia	28,93	67,7	43,9	14027	20,3	7324	8,5	18,1	21,86667	29,3
Italy	29,51	**71,14**	54	**21336,8**	17,8	19489	5,5	**12,8**	**25,76667**	33,80
Cyprus	24,43	71,61	61,1	20707,5	12	18193	2,6	27,5	24,6	35,7
Latvia	24,94	76,94	67,3	14649,6	26,4	7774	4,1	27,8	21	35,3
Lithuania	31,43	71,36	68,4	18445	18,1	8523	5,4	30,4	21,6	33,4
Luxembourg	53,55	91,33	43,1	34822,3	14	40438	36	30,8	25,1	35,2
Hungary	28,47	71,74	56,7	13312,6	14,1	6013	5,4	19,2	20,5	30,5
Malta	28,16	76,28	51,1	17947	17,1	15325	12	13,2	25,46667	35,4
Netherlands	69,33	96,85	69,5	23939,4	13,6	27066	39,6	31	24,56667	42,7
Austria	49,07	81,31	54,5	25206,1	12,3	29105	30,7	25,2	24,56667	35,8
Poland	20,77	66,4	48,3	15437,2	19	7063	15,9	16	22,23333	31
Portugal	28,47	59,26	58,5	18115	19	10312	15,4	15,1	24,76667	33,5
Romania	17,52	67,52	40,4	15282,7	21,1	4024	1,1	9,4	20,46667	30,2
Slovenia	33,27	71,24	48,2	17645,9	14,7	13825	20,2	21,7	24,2	31,1
Slovakia	30,2	73	58,8	14471,2	9,8	8919	9,3	16,1	21,76667	32,3
Finland	70,11	96,25	65,9	23237,4	9,4	29713	30,8	40,9	24,86667	40,8
Sweden	60,11	**98,98**	**76,5**	**23635,8**	9,3	**31319**	34,9	32,1	**25,26667**	**47,2**

In the second step of the method, it is standardized with equation 8 and a standard decision matrix is provided with equation 10. A standardized decision matrix was created. Standardized decision matrix values were weighted with equation 11 and decision matrix was formed with equation 12. Boundary approach area values were calculated with equation 13 and boundary approach area matrix was provided with the help of equation 14. In this context, the boundary approach area matrix is shown in Table 5.

Table 5. Boundary Approach Area Matrix (G Matrix)

G	0,002383	0,002960	0,006326	0,001316	0,003291	0,002372	0,047483	0,019414	0,005979	0,001508

Equation (15) and equality (16) and the distances of decision alternatives (countries) to the boundary approach area matrix (Q Matrix) were measured. In the last step of the method, the performance values (Si) of the countries were calculated with the equation (17).

Table 6. Performance Values (S_i) and Rankings of Countries from the Q Matrix

Countries	S_i	Rankings	Countries	S_i	Rankings
Belgium	1,396948	16	**Latvia**	1,349246	21
Bulgaria	1,313679	25	**Lithuania**	1,380863	18
Czechia	1,495613	5	**Luxembourg**	1,398663	15
Denmark	1,534698	2	**Hungary**	1,369479	19
Germany	1,54093	1	**Malta**	1,467485	8
Estonia	1,361609	20	**Netherlands**	1,446749	11
Ireland	1,40048	14	**Austria**	1,413642	13
Greece	1,334649	24	**Poland**	1,300289	27
Spain	1,470422	7	**Portugal**	1,396139	17
France	1,46141	9	**Romania**	1,341258	23
Croatia	1,310719	26	**Slovenia**	1,343855	22
Italy	1,519862	4	**Slovakia**	1,427135	12
Cyprus	1,485382	6	**Finland**	1,454225	10
Sweden	1,529469	3			

In this context, the performance values and performance rankings obtained with the help of the distances of the countries to the border approach area matrix are given in Table 6. When Table 6 is examined, it is seen that Germany, Denmark, Sweden and Italy are among the top countries in terms of performance in adult employment adaptation to digitalization. It is seen that the countries with low performance are Poland, Croatia, Greece and Romania.

5. CONCLUSIONS

A country's labor market dynamic for older workers largely depends on the level of education, the size of the product and service sectors, government spending, and the strength of financial regulation. In this context, welfare spending, industry changes, financial support and education and training will play a key role in preventing widespread layoffs of older workers. Without appropriate interventions, societies face serious problems as a result of these trends. Problems such as unemployment and underemployment, increasing inequality and severe lack of skills will worsen in countries where older workers are not properly included in businesses' digitalization and automation strategies (Basu et al., 2018: 15, 20).

By prioritizing concepts such as "life-long learning" and "active aging index", the EU has ensured that the elderly population in the whole society can easily adapt to life, thus ensuring that they are less affected by the negativities to be experienced. However, it is seen that not all EU member countries have similar success in the adaptation of digitalization and employment for the elderly. Even though the EU is a single union, when the socio-economic indicators of the member countries are examined, it can be easily seen that each country is at a different level. Although the decisions taken are valid for all countries, of course, existing socio-economic differences will change the adaptation of elderly employment to the process with the innovations brought by digitalization to the business world. In this study, in order to examine how successful the EU countries are in managing this process, some socio-economic indicators that are important and the performance evaluation of the adaptation of the employment of the elderly to the developments by the CRITIC-based MABAC method of the EU countries has been made.

With the help of the variables included in the study, according to the findings of the CRITIC method used for criterion weighting, the most important eight criteria affecting performance are Adults working at home (20.59%), Population (15.48%), Adult Employment Rate (10.42%), Life Expectancy (9%, 63), Average Income (7.91%), internet usage rate (7.70%) and Digital Skill Level (7.67%). However, in the findings of the MABAC method using the weights obtained by the CRITIC method, it was found that the countries in the first place in the performance ranking were Germany, Denmark, Sweden and Italy, while the countries with low performance were Poland, Croatia, Bulgaria and Greece. As a result of the study, it is seen that the countries in the first place are the countries with high digital skill level, internet usage rate, adult employment rate, per capita income and average income level and active aging index values among the population aged 55-64, and with a lower poverty threshold compared to other countries. . Looking at the last countries, it is seen that there are countries with low digital skill levels, adult employment rate, low average income and high poverty threshold.

Invest in lifelong learning and continuing education to enable older workers to acquire digital skills. Providing an appropriate vocational training system to equip the workforce with the right qualifications and skills, and age-appropriate human resource management are important factors for employees to remain productive in employment. As the aging population average and the shortage of skilled labor increase, employing a high potential older workforce is essential for sustainable human resource management. To support the work of an older workforce, job and workplace design must adapt in a socially acceptable and inclusive way that is sensitive to the changing needs of workers as they age.

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