Paper type: Scientific paper

Demographic trends and e-inclusion in the Republic of Croatia – a case study of the 54+ population

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Abstract

Global demographic trends indicate that the share of the elderly in the total population is growing due to the increase in life expectancy and the decline in the number of births. The policy of sustainable development addresses this problem because the number of pensioners and life expectancy are increasing, the number of younger employees is declining, and there is a need to extend working life if possible. Consequently, this affects the relief of pension funds on the one hand, and on the other, employers need to make additional efforts to ensure that senior employees develop digital competencies so that they can be active in the business system. Due to their age, numerous members of the 54+ population have limitations (eyesight, motor skills, acquisition of new knowledge, adaptation) making it difficult to develop digital literacy and remain active. Leaving the business environment usually brings a kind of personal sense of "liberation" from the obligation to adapt to the challenges of the digital age and raise digital literacy, which in turn leads to isolation and a growing digital generation gap. This is a social problem that requires an active and systematic approach to solution through public policies. The paper presents key indicators that can support all previously stated claims. The main data sources are mainly secondary databases such as the data of the Croatian Bureau of Statistics on the Census of Population, Households and Dwellings 2011 and 2021 (hereinafter referred to as Census) in the Republic of Croatia, Eurostat data on e-society, scientific papers and public policies on the issue.

Keywords: digital literacy, demographic trends, e-inclusion, public policies

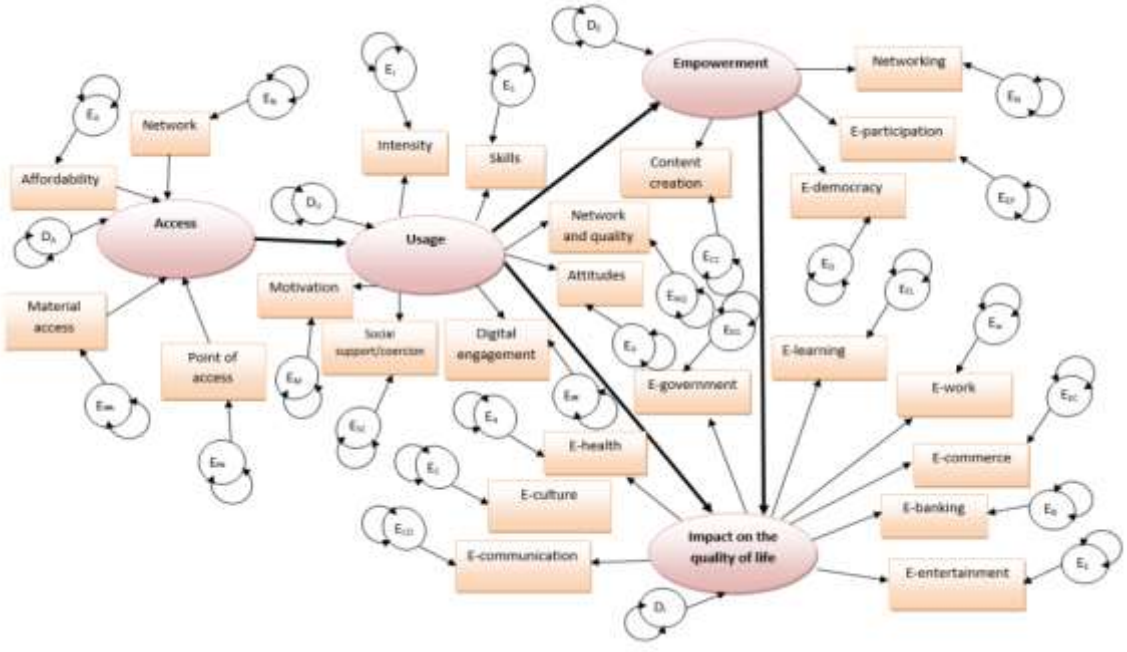
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Introduction

The contemporary age is characterized by a dynamic environment that increasingly imposes the need and obligation to adapt to new technologies. The last decade has been particularly affected by digitization or digital transformation. To investigate public policy readiness for 54+ e-inclusion, the research methodology was based on the fact that the 54+ population is more susceptible to the digital divide in e-inclusion than the younger population. Furthermore, the paper determines and comparatively analyses the best practices of European countries and their systematic measures which improved the entire population's e-inclusion. Two models, based on recent research, were used to monitor the 54+ e-inclusion, the proposed reference model called the General Theoretical Conceptual Model for Monitoring e-inclusion RM-1 (Figure 1) and the Integrated Model for Measuring Digital Inequality RM-2 (Figure 2). Specific characteristics of that population (experience, motivation, motor skills, sharpness of vision, activity in the labour market, etc.) were considered. A composite index for measuring public policy readiness for 54+ e-inclusion was proposed and tested. The research methodology contained research on public policymakers' views on the need to incorporate the 54+ e-inclusion in public policies, along with their individual e-inclusion (Zdjelar, 2022).

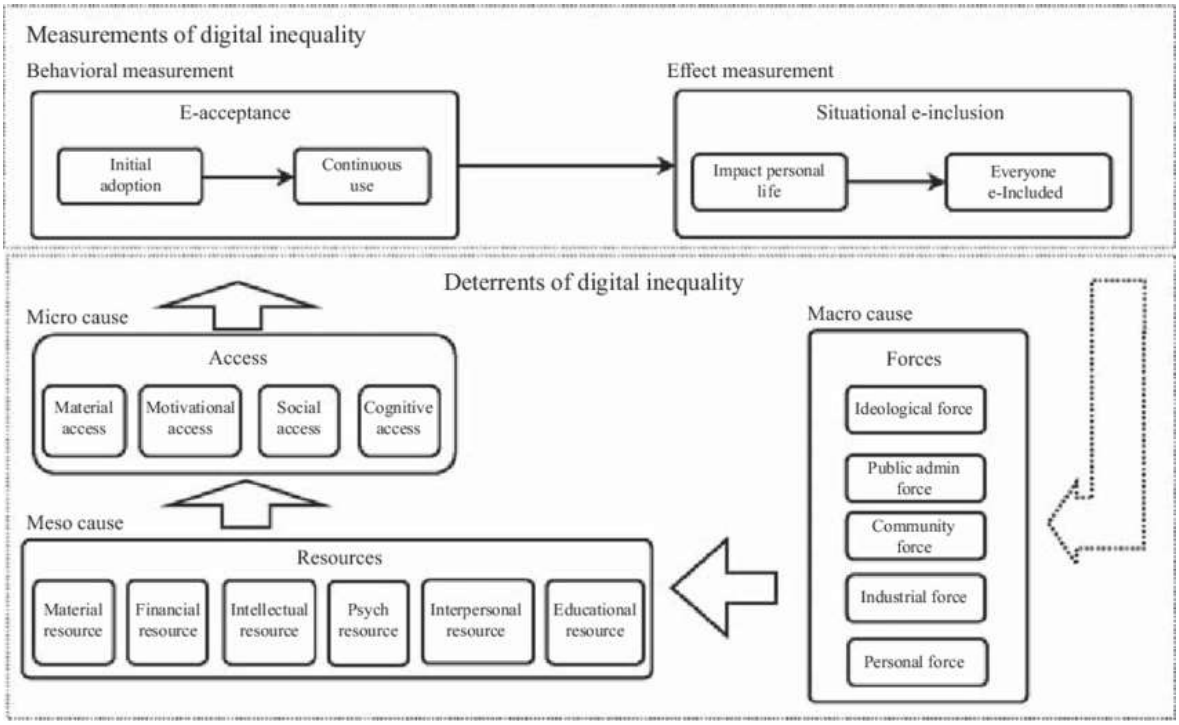
Figure 1 Proposed general theoretical conceptual model for monitoring e-inclusion (RM-1)



Source: Žajdela Hrustek, (Žajdela Hrustek, 2015)

M-1 includes four key components of e-inclusion: access, use, empowerment and impact on quality of life. The research process validated this model (Žajdela Hrustek, 2015), so it is considered valid and reliable for the research conducted in this paper.

Figure 2 An integrated model for measurement of digital inequality (RM-2)



Source: Yu, Ndumu, Mon and Fan, (Yu et al., 2018)

RM – 2 was chosen as a reference because the research by Yu et al. (Yu et al., 2018) points to the fact that public administration is at the highest level of causes – the macro level of the digital divide. It was previously mentioned in the paper that public administration must recognize and solve social issues and challenges, using a systematic approach.

The aim of this paper is to compare general data on demographic trends in the world, Europe, and particularly in the Republic of Croatia with global and national data on the 54+ e-inclusion, followed by a description of the research methodology and the obtained results.

Research methodology

The source of the data and information needed for the research was publicly available documents and scientific papers on the problem of the growing number of 54+ residents and the increased share of the 54+ population in the total population. The United Nations publications and scientific papers were the key resources in the preparation of the paper.

The United Nations estimate for the World and Europe and the Croatian Bureau of Statistics data were used to investigate demographic trends and the share of the 54+ population in the total population. Furthermore, the first part of the research discusses

the relativization of the term "population age", based on scientific sources and United Nations publications.

Two Censuses were conducted in the Republic of Croatia between 2010 and 2022, the 2011 and the 2021 Census. In the part of the research, these two censuses were significantly different, namely, in 2011, the respondents' digital skills self-assessment (the entire population) was carried out, while the same was not examined in 2021.

EUROSTAT has continuously measured the 54+ e-inclusion at the European level for more than a decade, except in 2020. The research was set up in two methodologically different ways, so the secondary data sources of the EUROSTAT database contain data up to 2019 and from 2021. The ranking of European countries, especially EU member states, was compared regarding the EU average for a particular year.

The conclusion contains recommendations for further research based on the objective data collected from the sources to encourage the e-inclusion of non-inclusive age groups, especially the 54+ population.

Research results

a) Demographic trends

Many governments worldwide and the United Nations are trying to figure out the concept of "ageing nations". As life expectancy increases and the number of births decreases, the share of the elderly in the total population is on the rise. Plos One published the research by Sanderson and Scherbov in June 2020 on ways of approaching the concept of age, essential to understanding the ageing of nations. Two indicators have been established, the Potential Support Ratio (PSR) and the Prospective Potential Support Ratio (PPSR). The PSR is calculated as the ratio of the 20–64 population to the 65+ population regardless of where and when they live. On the other hand, PPSR considers the time and space in which the population lives, and a set of additional criteria equivalent to years of life, such as the need for support from others (Sanderson and Scherbov, 2020). A person’s old-age threshold is the need for someone's assistance. Also, the age at which the remaining life expectancy is 15 years is an indicator of old age. The projection of these two old-age indicators is shown in Figure 1 - World, Figure 2 – Europe, and Figure 3 - Croatia (Sanderson and Scherbov, 2020).

In the paper "Older people and sustainable development", Vincent (Vincent, 2019) investigates the growing number of elderly people in the total population and projections indicating further growth. The problem of ageing nations raises many other issues, such as the digital gap hindering the achievement of the planned digital transformation goals, i.e., insufficient digital inclusion (e-inclusion).

The Prospective support ratio (PSR) is the number of people aged 15-64 per one elderly person aged 65+. This ratio describes the burden placed on the working population (unemployment and children are not considered in this measure) and the non-working elderly population.

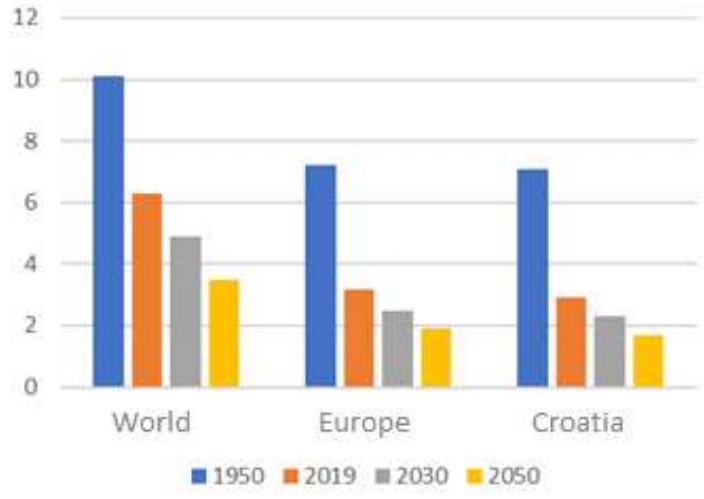
Due to increased life expectancy, the researchers proposed an additional measure, the Prospective potential support ratio (PPSR) by which the upper age limit of population cohorts can be flexibly changed depending on the part of the population that has passed a certain measure of longevity over the expected life expectancy limit. Table 1 exemplifies the calculation in case the number of years above life expectancy is 15, for the World, Europe, and Croatia. According to the presented methodology, it is evident that the term "age" can be relativized.

Table 1 Prospective support ratio and Prospective potential support ratio, World, Europe, Croatia

Regions	Age / Indicators	1950	2019	2030	2050
World	Prospective support ratio	10.1	6.3	4.9	3.5
	Prospective potential support ratio	5.1	8.6	7.3	5.8
Europe	Prospective support ratio	7.2	3.2	2.5	1.9
	Prospective potential support ratio	5.4	5.2	4.4	3.7
Croatia	Prospective support ratio	7.1	2.9	2.3	1.7
	Prospective potential support ratio	4.0	4.0	3.5	3.1

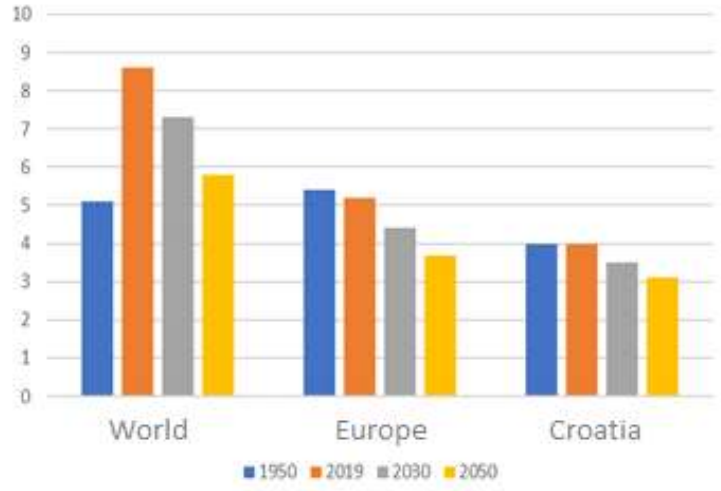
Source: UN, Profiles of Ageing 2019, https://population.un.org/ProfilesOfAgeing2019/index.html, saved 28 Aug 2020 (Sidenote: PSR – Prospective support ratio (ages 20-64/ages 65+), PPSR – Prospective potential support ratio (ages 20-X/ages X+, where X = the age at which remaining life expectancy is 15 years))

Graph 1 Prospective support ratio (PSR), World, Europe, Croatia 1950 - 2050



Source: Table 1

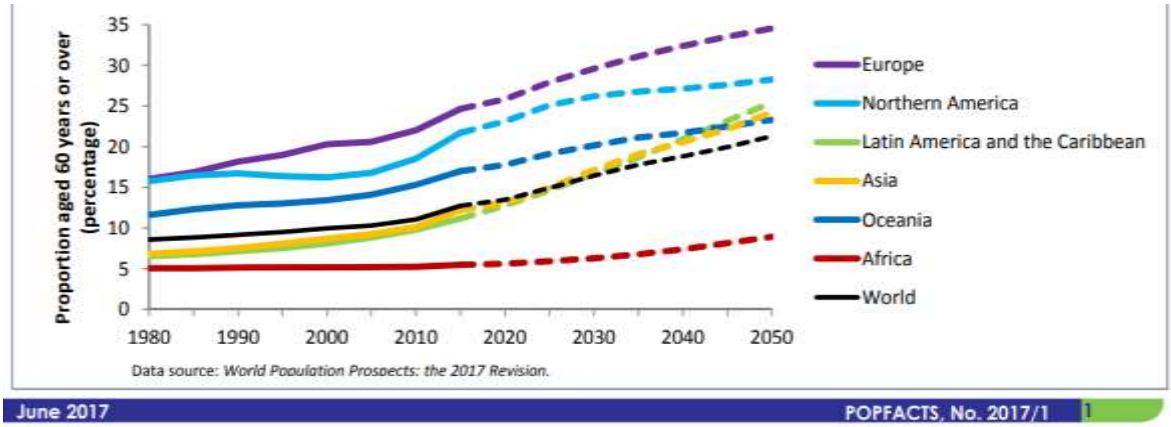
Chart 2 Prospective potential support ratio, World, Europe, Croatia 1950 - 2050



Source: Table 1

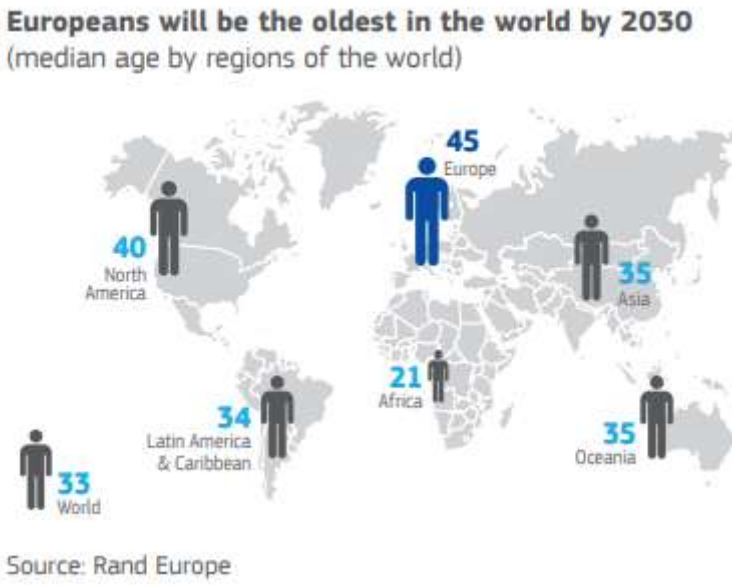
The demographic shifts in the number of 60+ residents by continent are demonstrated in Graph 3 and the average population age by continent is in Figure 3. These depictions motivate experts and scientists to actively engage in a wide area of research.

Graph 3 Percentage of the population aged 60 or over, estimated for 1980-2017 and projected to 2050



Source: United Nations (United Nations, 2017) Population facts: Population ageing and sustainable development. Department of Economic and Social Affairs, Population Division, No. 2017/1, 1993

Figure 3 Average population age by continent (2017)



Source: European Commission, (European Commission, 2017a), page 10

This paper emphasizes various impacts of demographic ageing on contemporary trends. According to the European Commission (European Commission, 2017a, page 10 of 32): "Making the most of the new opportunities whilst mitigating any negative impact will require a massive investment in skills and a major rethink of education and lifelong learning systems...". These complicate acquiring digital skills and practical usage of e-services, which is why the European Commission has recently emphasized skills development and lifelong learning. Maier-Rabler (Maier-Rabler, 2010) states that the analysis of European e-policies has proven the importance of the awareness of user/citizen/customer-oriented future investments in achieving the digital society benefits.

Tables 2 - 4 and Charts 4 – 6 show the population structure for the World, Europe, and Croatia by age for the years 1950, 2019, 2030, and 2050. Estimates for 2030 and 2050 mention a population decline in Europe and Croatia, with a growing proportion of the 80+ population. According to the UN estimates, in 2050, Croatia will experience a nearly 30% decline in the most significant population group, the working population (ages 15-59) compared to 2019.

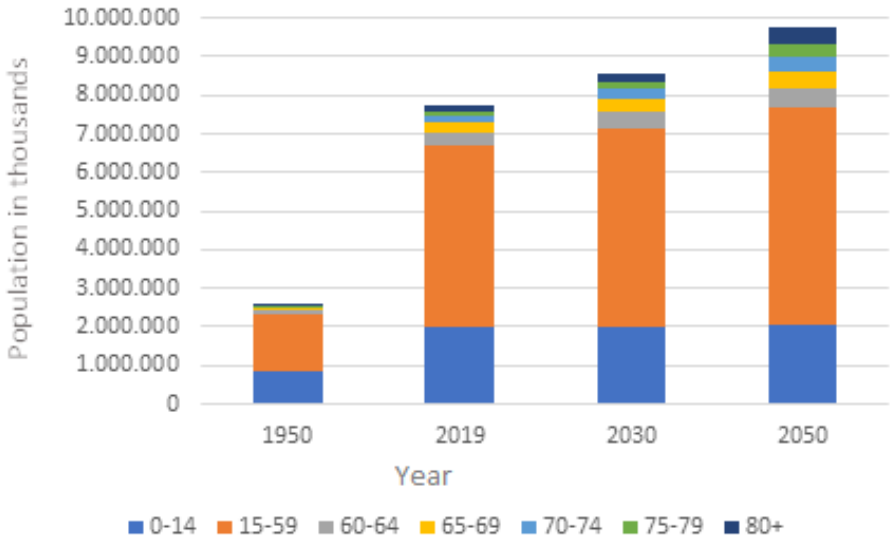
Table 2 Population by age groups, World, in thousands

Age	Year				Index 2050 / 2019
	1950	2019	2030	2050	

Total	**2,536,431**	**7,713,467**	**8,548,487**	**9,735,035**	**126.2**
0-14	**869,609**	**1,975,280**	**2,019,462**	**2,055,659**	**104.1**
15-59	**1,464,665**	**4,719,925**	**5,121,788**	**5,599,736**	**118.6**
60-64	**73,448**	**315,329**	**409,748**	**530,787**	**168.3**
65-69	**55,143**	**260,475**	**340,038**	**447,800**	**171.9**
70-74	**37,383**	**179,308**	**261,881**	**367,975**	**205.2**
75-79	**21,902**	**120,047**	**194,427**	**306,711**	**255.5**
80+	**14,281**	**143,103**	**201,143**	**426,367**	**297.9**
80-84	9,627	80,377	113,822	221,727	275.9
85-89	3,475	41,160	55,810	127,935	310.8
90-94	947	16,593	23,737	55,852	336.6
95-99	198	4,439	6,602	17,659	397.8
100+	34	533	1,173	3,195	599.4

Source: UN, Profiles of Ageing 2019, https://population.un.org/wpp/Download/Standard/Population/, saved 28 Aug 2020

Graph 4 Population by age groups, World, in thousands



Source: Based on UN, Profiles of Ageing 2019, https://population.un.org/wpp/Download/Standard/Population/, saved 28 Aug 2020

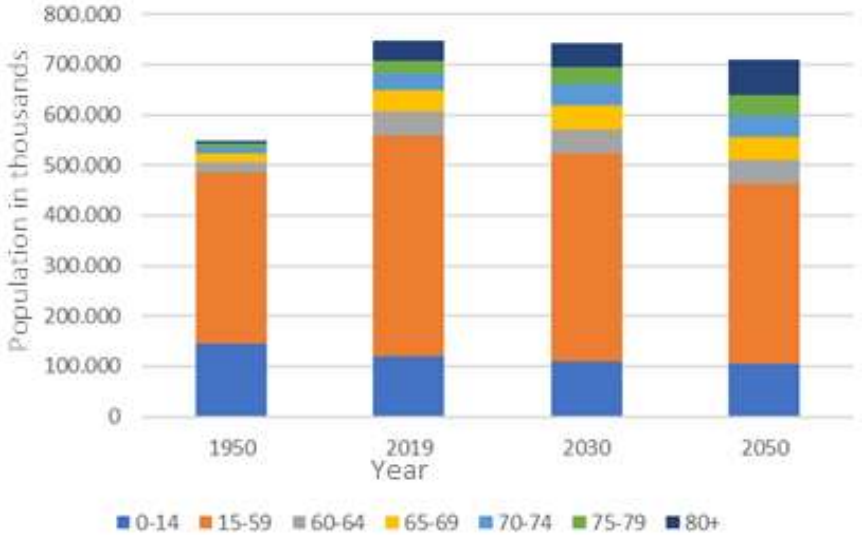
Table 3 Population by age groups – Europe, in thousands

Age	**Year**				**Index 2050 / 2019**
	1950	**2019**	**2030**	**2050**	

Total	**549,330**	**747,183**	**741,303**	**710,486**	**95.1**
0-14	**144,637**	**119,936**	**110,796**	**103,701**	**86.5**
15-59	**339,682**	**438,454**	**411,942**	**358,463**	**81.8**
60-64	**21,275**	**48,384**	**48,292**	**48,427**	**100.1**
65-69	**17,240**	**42,283**	**47,677**	**46,440**	**109.8**
70-74	**12,823**	**33,832**	**42,031**	**42,899**	**126.8**
75-79	**8,026**	**24,977**	**34,134**	**38,616**	**154.6**
80+	**5,647**	**39,317**	**46,431**	**71,940**	**183.0**
80-84	3,745	21,015	24,261	32,363	154.0
85-89	1,449	11,496	13,310	23,486	204.3
90-94	373	5,304	6,775	11,826	223.0
95-99	69	1,385	1,807	3,672	265.1
100+	11	118	276	594	503.4

Source: UN, Profiles of Ageing 2019, https://population.un.org/wpp/Download/Standard/Population/, saved 28 Aug 2020

Graph 5 Population by age groups – Europe, in thousands



Source: Based on UN, Profiles of Ageing 2019, https://population.un.org/wpp/Download/Standard/Population/, saved 28 Aug 2020

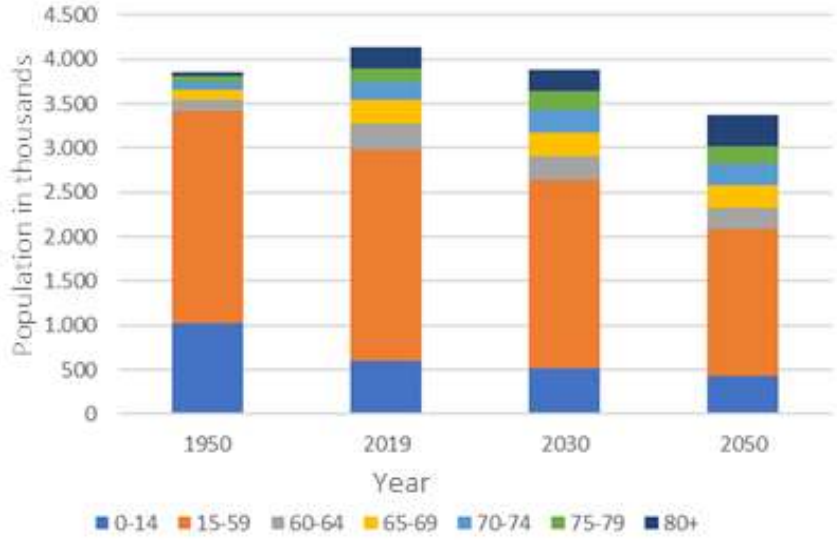
Table 4 Population by age groups – Croatia, in thousands

Age	**Year**	

	1950	2019	2030	2050	Index 2050 / 2019
Total	**3,851**	**4,130**	**3,878**	**3,367**	**81.5**
0-14	**1,030**	**601**	**507**	**423**	**70.4**
15-59	**2,384**	**2,377**	**2,135**	**1,667**	**70.1**
60-64	**133**	**291**	**263**	**237**	**81.4**
65-69	**111**	**270**	**271**	**249**	**92.2**
70-74	**86**	**198**	**247**	**238**	**120.2**
75-79	**62**	**157**	**214**	**198**	**126.1**
80+	**45**	**236**	**241**	**355**	**150.4**
80-84	30	135	132	166	123.0
85-89	12	70	70	119	170.0
90-94	3	26	32	54	207.7
95-99	0	5	6	14	280.0
100+	0	0	1	1	-

Source: UN, Profiles of Ageing 2019, https://population.un.org/wpp/Download/Standard/Population/, saved 28 Aug 2020

Graph 6 Population by age groups – Croatia, in thousands



Source: Based on UN, Profiles of Ageing 2019, https://population.un.org/wpp/Download/Standard/Population/, saved 28 Aug 2020

The research of this paper does not focus on "elderly people" because of the relativeness of the term. The conducted study is related to the 54+ population because

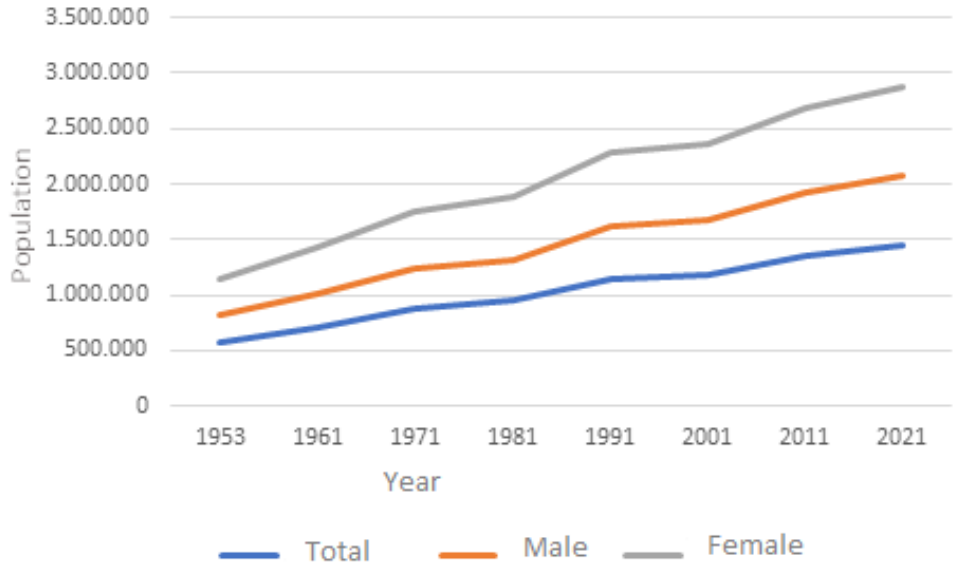
this is the age limit after which e-inclusion begins to decline in comparison to the younger population.
National institutes of statistics monitor population trends by conducting censuses over a period of about ten years. The last Census in the Republic of Croatia was in 2021, and data on the number of residents by age group has been publicly available since 1953. The growth of the 54+ population in the Republic of Croatia is shown in Table 5 and Graph 7.

Table 4 The number of 54+ residents in the Republic of Croatia 1953 - 2021

Year	Total	Male	Female
1953	575,560	237,969	337,591
1961	712,560	303,871	408,689
1971	877,564	370,124	507,440
1981	944,640	376,479	568,161
1991	1,146,390	474,869	671,521
2001	1,185,331	494,448	690,883
2011	1,343,191	577,809	765,382
2021	1,438,300	633,531	804,769

Source: made by the author, based on Croatian Bureau of Statistics data, saved 30 Jul 2022

Graph 7 Shifts in the 54+ age group by population total and gender 1953 - 2021



Source: Table 5

Table 5 Share of the 55+ population in the total population in the Republic of Croatia 1953 - 2021

Year	%
1953	14.6
1961	17.1

1971	**19.8**
1981	**20.5**
1991	**24.0**
2001	**26.7**
2011	**31.3**
2021	**37.0**

Source: made by the author, based on Croatian Bureau of Statistics data

The 55+ population shift in the Republic of Croatia is similar to European. The 14.6% share of the observed group in 1953 has significantly increased to 37.0% of the total population in 2021 (Table 6).

An insight into the global statistics on the usage of the Internet and ICT proved the existence of heterogeneous groups which are not included in the information/digital society for various reasons, influenced by various factors: level of education, personal income, work activities, age, gender, language barriers, cultural differences and the like. The EUROSTAT e-society research data concludes that the age of 55 and above is the age limit at which people with no digital skills are no longer motivated enough to change their attitude toward e-inclusion (Eurostat, 2022). Due to the lack of digital skills, this part of the population belongs to sensitive groups when seeking employment, which, in combination with other socio-economic factors (level of education), significantly reduces personal motivation for e-inclusion. The higher the age limit, the greater the risk of information/digital exclusion. The 54+ age group was chosen as the paper's target group because the people who are no longer employed due to illness, lack of information, etc. are also excluded from current trends. Due to the global trend of digitization, these trends impose the need for the individual to be involved in the digital world. If there is no imposed obligation, there is a great threat that the individual will not have the opportunity to gain motivation and empowerment to acquire the necessary skills.

The working population aged 55-64 is a statistically significant category because of the specific public costs associated, and it is evident that in some countries this part of the population constitutes a significant part of the workforce. There are over 10% of employees aged 55-64 in Sweden, Denmark, Finland, and the United Kingdom, and that percentage is estimated to grow in all countries. Estimates which have been accepted and published by the European Commission (European Commission, 2009a, page 279 of 456), show that the share of the workforce aged 55-64 in the total number of employees will increase (population aged 15-64). The situation in 2020 indicates that this percentage is mostly between 15% and 20%. The European average in 2020 is 16%, and it is predicted that it will amount to an average of 18% by 2060. These indicators point to the importance of 54+ e-inclusion, considering that the working part of that population makes up a significant share of the workforce. This issue is especially important in the context of using modern solutions stemming from digital transformation.

For research and providing an overview of the trends in the 54+ population in Croatian counties in 2011 and 2021, the data below is categorized in the area in km2, number of inhabitants, number of inhabitants/km2, number of cities and towns, number of municipalities and settlements (Table 7).

Table 6 Counties, area in km2, population, population density (people per km2), cities and towns, municipalities and settlements, according to the 2011 Census and the 2021 Census

	Area km 2	Population 2011	People per km2	Population 2021	Index 2021/2011 (%)	Cities and towns (2011)	Municipalities (2011)	Settlements (2011)
Republic of Croatia	56,594	4,284,889	75,71	3,888,529	90,75	127	429	6,756
Zagreb	3,060	317,606	103,79	301,206	94,84	9	25	694
Krapina-Zagorje	1,229	132,892	108,13	120,942	91,01	7	25	423
Sisak-Moslavina	4,468	172,439	38,59	140,549	81,51	6	13	456
Karlovac	3,626	128,899	35,55	112,596	87,35	5	17	649
Varaždin	1,262	175,951	139,42	160,264	91,08	6	22	302
Koprivnica-Križevci	1,748	115,584	66,12	101,661	87,95	3	22	264
Bjelovar-Bilogora	2,640	119,764	45,37	102,295	85,41	5	18	323
Primorje-Gorski Kotar	3,588	296,195	82,55	266,503	89,98	14	22	510
Lika-Senj	5,353	50,927	9,51	42,893	84,22	4	8	255
Virovitica-Podravina	2,024	84,836	41,92	70,660	83,29	3	13	188
Požega-Slavonia	1,823	78,034	42,81	64,420	82,55	5	5	277
Brod-Posavina	2,030	158,575	78,12	130,782	82,47	2	26	185
Zadar	3,646	170,017	46,63	160,340	94,31	6	28	229
Osijek-Baranja	4,155	305,032	73,41	259,481	85,07	7	35	263
Šibenik-Knin	2,984	109,375	36,65	96,624	88,34	5	15	199
Vukovar-Srijem	2,454	179,521	73,15	144,438	80,46	5	26	85
Split-Dalmatia	4,540	454,798	100,18	425,412	93,54	16	39	368
Istria	2,813	208,055	73,96	195,794	94,11	10	31	655
Dubrovnik-Neretva	1,781	122,568	68,82	115,862	94,53	5	17	230
Međimurje	729	113,804	156,11	105,863	93,02	3	22	131
City of Zagreb	641	790,017	1,232,48	769,944	97,46	1	-	70

Source: Croatian Bureau of Statistics, www.dzs.hr, August 2022

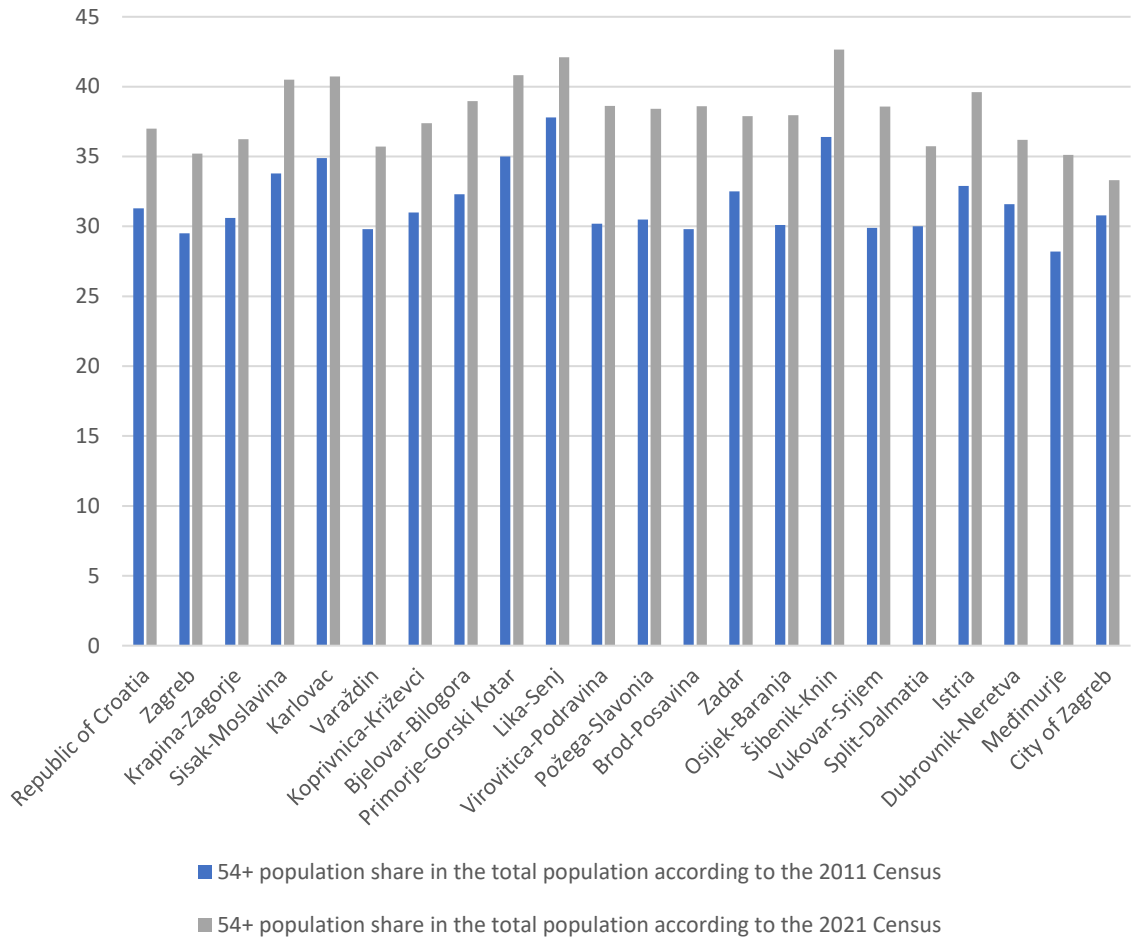
Table 8 contains the data on the 54+ population shifts according to the 2011 and 2021 Census, depicted graphically in Chart 8. Rank 1 refers to the highest share of the 54+ age group in the total population. There is a visible change in population structure, that is, a change in the population group that is the subject of this research.

Table 7 Comparison of the Croatian counties' ranking according to the 54+ share in the total population, according to the 2011 Census and the 2021 Census

Rank	54+ share in the total population according to the 2011 Census			HR area; COUNTIES	Rank	54+ share in the total population according to the 2021 Census			Difference (% 54+ population in 2021 - % 54+ population in 2011)
	Total	Male	Female			Total	Male	Female	
	31.3	28	34.5	Republic of Croatia		36.99	33.8	39.96	5.69
20	29.5	26.4	32.4	Zagreb	19	35.2	32.03	38.18	5.7
12	30.6	26.2	34.7	Krapina-Zagorje	15	36.24	32.94	39.38	5.64
5	33.8	29.5	37.8	Sisak-Moslavina	5	40.49	36.95	43.87	6.69
4	34.9	30.8	38.7	Karlovac	4	40.73	37.31	43.95	5.83
18	29.8	25.8	33.5	Varaždin	18	35.71	32.29	38.95	5.91
10	31	26.9	34.9	Koprivnica-Križevci	14	37.38	33.84	40.73	6.38
8	32.3	28	36.2	Bjelovar-Bilogora	7	38.96	35.19	42.56	6.66
3	35	32.4	37.4	Primorje-Gorski Kotar	3	40.82	37.69	43.7	5.82
1	37.8	34.2	41.5	Lika-Senj	2	42.1	39.58	44.59	4.3
14	30.2	26.3	34	Virovitica-Podravina	8	38.63	35.26	41.78	8.43
13	30.5	26.4	34.4	Požega-Slavonia	11	38.42	35.04	41.65	7.92
18	29.8	25.9	33.5	Brod-Posavina	9	38.59	35.21	41.81	8.79
7	32.5	30.4	34.6	Zadar	13	37.88	35.95	39.73	5.38
15	30.1	26.4	33.6	Osijek-Baranja	12	37.96	34.58	41.1	7.86
2	36.4	33.4	39.2	Šibenik-Knin	1	42.66	40.4	44.86	6.26
17	29.9	25.9	33.7	Vukovar-Srijem	10	38.58	34.88	42.05	8.68
16	30	27.3	32.5	Split-Dalmatia	17	35.74	33.08	38.25	5.74
6	32.9	29.9	35.6	Istria	6	39.61	36.73	42.31	6.71
9	31.6	29	34.1	Dubrovnik-Neretva	16	36.19	33.43	38.83	4.59
21	28.2	24.8	31.4	Međimurje	20	35.12	32.04	38.07	6.92
11	30.8	27.3	33.8	City of Zagreb	21	33.3	29.55	36.59	2.5

Source: made by the author, based on Croatian Bureau of Statistics data, www.dzs.hr

Graph 8 Comparison of the 54+ share in the total population of the Republic of Croatia, according to the 2011 Census and the 2021 Census



Source: Table 8 Comparison of the Croatian counties' ranking according to the 54+ share in the total population, according to the 2011 Census and the 2021 Census

Lika-Senj, Šibenik-Knin, Primorje-Gorski Kotar, Sisak-Moslavina, and Karlovac are among the "oldest" counties.

Table 8 The 54+ share in the total population of the Republic of Croatia, according to the 2011 Census and the 2021 Census

Republic of Croatia / County	The 54+ share in the total population according to the 2011 Census (%)	The 54+ share in the total population according to the 2021 Census (%)
Republic of Croatia	31.3	36.99
Lika-Senj	37.8	42.1
Šibenik-Knin	36.4	42.66
Primorje-Gorski Kotar	35.0	40.82
Karlovac	34.9	40.73

Sisak-Moslavina	33.8	40.49
Istria	32.9	39.61
Zadar	32.5	37.88
Bjelovar-Bilogora	32.3	38.96
Dubrovnik-Neretva	31.6	36.19
Koprivnica-Križevci	31.0	37.38
City of Zagreb	30.8	33.3
Krapina-Zagorje	30.6	36.24
Požega-Slavonia	30.5	38.42
Virovitica-Podravina	30.2	38.63
Osijek-Baranja	30.1	37.96
Split-Dalmatia	30.0	35.74
Vukovar-Srijem	29.9	38.58
Varaždin	29.8	35.71
Brod-Posavina	29.8	38.59
Zagreb	29.5	35.2
Međimurje	28.2	35.12

Source: made by the author, based on Croatian Bureau of Statistics data, www.dzs.hr

The data from Table 9 shows an increase of 54+ residents in the total population of the Republic of Croatia. In 2021, their share increased by 5.69 percentage points compared to 2011.

b) E-inclusion of the 54+ population

The results of several years of EUROSTAT research suggest a low rate of 54+ e-inclusion in the digital society in certain countries and a high in a few others. The best overview is the data presented in the following table (Table 12) - it is evident that the countries of Northern and Central Europe are at the top of the list of 55-74 population e-inclusion: Iceland (1%), Norway (3%), the Netherlands (5%), Sweden (5%), Luxembourg (10%), Great Britain (10%), Germany (13%) and France (17%). Also, the percentage of people who have never used the Internet is decreasing but is still significantly high in many countries. There is a need for comparative public policy analysis of countries that have successfully included the 54+ population in the digital society and the use of the Internet, but that research is not part of this paper.

Table 10 provides an overview of the percentage of 54+ individuals who have never used the Internet. The percentage of respondents aged 55-74 who have never used the Internet in 2010 reflects the effects of measures implemented by individual countries. Initiatives for the e-inclusion of the general population in Sweden began as early as 1980. A significant result for the 54+ population group is visible in the table below for the year 2010. Other Northern European countries realized very quickly that certain population groups deviated from the average of the entire population's e-inclusion,

resulting in systematic work on designing measures and promoting e-inclusion at the beginning of 2000. The social policy of the EU served as an additional incentive for various types of inclusion of vulnerable groups. In 2010, Poland (acceded to the EU in 2004), Romania, and Bulgaria (EU members since 2007) had an extremely high percentage of the 54+ population who had never used the Internet. Although these countries are at the bottom of current rankings according to the same indicator, they have made significant progress over the past nine years by cutting the percentages in half, as shown in the table. Further efforts still need to be made to achieve improvement. The example of Greece shows that despite being an EU member since its beginnings and the fact they did not have transition problems like Eastern European countries (Romania, Bulgaria, Poland, and even Croatia, which also fought the War of Independence), the 54+ e-inclusion has not significantly changed. In 2019, Greece remained at the European average of 2010. All these facts should be considered when looking at the comparative analysis.

Table 9 Percentage of individuals aged 55-74 who have never used the Internet 2010 - 2019

Year GEO (Codes)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	change in % points (2019-2010)
European Union - 27 countries (since 2020)	58	55	52	48	44	40	37	33	29	25	-33
European Union - 28 countries (2013-2020)	55	52	49	45	41	38	34	31	27	23	-32
Belgium	42	36	36	36	30	31	26	24	21	17	-25
Bulgaria	84	76	76	73	69	67	64	59	54	51	-33
Czechia	59	53	45	43	39	34	33	29	27	25	-34
Denmark	25	20	16	10	8	8	7	6	4	5	-20
Germany (the former territory of the FGR until 1990)	42	41	37	33	29	25	21	20	15	13	-29
Estonia	56	52	51	42	33	26	28	26	23	20	-36
Ireland	62	52	47	46	45	42	38	35	42	24	-38
Greece	89	85	83	76	70	69	68	62	58	50	-39
Spain	71	68	64	60	55	49	45	37	33	21	-50
France	49	39	37	34	30	28	25	24	19	17	-32
Croatia	83	81	73	64	60	57	55	58	47	42	-41
Italy	72	70	67	63	60	55	51	47	39	35	-37
Cyprus	84	81	75	73	69	62	61	49	43	39	-45
Latvia	70	62	58	53	47	43	42	39	33	30	-40
Lithuania	76	73	71	65	58	56	51	45	39	36	-40
Luxembourg	21	24	18	12	11	9	5	7	10	10	-11
Hungary	67	61	57	56	51	49	43	40	39	36	-31
Malta	74	59	63	61	50	48	50	45	44	37	-37
Netherlands	24	20	17	13	12	10	10	7	7	5	-19

Austria	55	50	45	44	39	36	31	27	27	27	-28
Poland	73	70	68	66	60	57	53	49	46	39	-34
Portugal	78	76	71	68	64	60	56	50	52	49	-29
Romania	88	86	81	74	72	64	62	56	46	40	-48
Slovenia	67	65	64	52	55	54	52	45	38	34	-33
Slovakia	53	57	50	43	41	45	40	39	36	33	-20
Finland	30	25	21	17	15	15	12	14	12	9	-21
Sweden	19	14	15	12	12	11	6	6	9	5	-14
United Kingdom	32	29	26	22	16	15	11	11	12	10	-22

Source: EUROSTAT, e-society, saved on 11 Oct 2020, Dataset: Individuals - internet use [ISOC_CI_IFP_IU], Last updated: 15/04/2020 23:00, Time frequency: Annual, Information society indicator: Internet use: never, Unit of measure: Percentage of individuals, Individual type: Individuals, 55 to 74 years old

Monitoring of the indicator by the value "the individual has never used the Internet" ended in 2019, followed by a new monitoring methodology that introduced the rule "the individual has not used the Internet in the last 3 months prior to the day of the survey". Data based on these criteria is available in Table 11.

Table 10 Percentage of individuals aged 55-74 who have used the Internet in the last 3 months, 2012 - 2021

Year / Country	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		ranking 2021	ranking 2012
European Union (since 2020)	43	47	51	53	58	61	64	69	72	76	b		
European Union (2013-2020)	46	50	54	57	61	64	67	71	:	:			
European Union (2007-2013)	47	50	54	57	61	64	67	:	:	:			
Belgium	58	61	67	66	71	72	74	78	81	85		9	9
Bulgaria	19	22	23	24	27	32	34	37	41	50		29	28
Czechia	44	44	52	55	57	61	64	67	67	70		20	15
Denmark	80	85	89	90	92	92	95	93	96	97		4	4
Germany	58	62	66	70	74	75	80	82	85	83	b	11	9
Estonia	45	50	59	67	65	68	72	73	71	77		15	14
Ireland	47	49	49	52	56	60	55	74	84	98	b	1	13
Greece	15	21	27	28	31	36	40	46	50	52		28	29
Spain	33	36	43	48	52	61	64	77	81	84		10	20
France	58	60	64	65	68	69	74	76	:	82		12	9
Croatia	22	30	35	37	37	36	46	53	47	55		27	27
Italy	26	30	34	39	42	46	51	56	60	66		22	23
Cyprus	23	25	27	35	38	49	55	60	72	71		18	26
Latvia	38	43	47	53	53	55	61	66	74	80		13	18
Lithuania	26	31	38	38	42	50	54	58	60	69		21	23
Luxembourg	77	85	86	90	93	93	89	88	96	96		5	6
Hungary	39	40	45	42	53	48	45	55	63	71		18	17
Malta	34	37	46	50	47	52	53	62	64	64		23	19

Netherlands	80	84	85	86	87	90	90	93	92	92		7	4
Austria	51	51	54	59	63	68	68	70	70	79		14	12
Poland	27	28	34	36	41	44	46	52	58	63		24	22
Portugal	25	26	30	35	39	44	43	46	52	59		26	25
Romania	14	19	21	23	27	31	39	46	53	61		25	30
Slovenia	32	40	38	38	43	49	53	60	67	74		16	21
Slovakia	40	43	49	42	52	53	50	55	73	74		16	16
Finland	73	77	80	80	84	83	86	88	92	91		8	7
Sweden	82	85	84	82	91	91	88	93	94	93		6	3
Iceland	87	89	94	:	:	94	97	97	99	98		1	1
Norway	83	84	87	90	91	93	93	95	93	98		1	2
United Kingdom	70	75	78	81	85	86	86	87	92	:			8

Source: EUROSTAT, saved 3 Aug 2022 Dataset: Individuals - internet use [ISOC_CI_IFP_IU__custom_3156444], last updated 30/03/2022 11:00, Time frequency: Annual, Unit of measure: Percentage of individuals, Individual type: Individuals, 55 to 74 years old

EUROSTAT has also published data on the percentage of individuals with no digital skills and of those (Table 12) whose digital skills cannot be assessed because they have not used the Internet in the last three months. According to the data, 45% of the Croatian 54+ population do not use the Internet at least once every three months, meaning they are not active daily in the digital society.

Table 11 Percentage of individuals aged 55-74 with no digital skills or whose skills cannot be assessed because they have not used the Internet in the last 3 months, in 2021

Indicator Country	% of individuals with no digital skills	% of individuals whose digital skills cannot be assessed because they have not used the Internet in the last 3 months
European Union - 27 countries (since 2020)	5	24
Belgium	5	15
Bulgaria	6	50
Czechia	2	30
Denmark	2	3
Germany	5	17
Estonia	5	23
Ireland	4	2
Greece	3	48
Spain	5	16
France	3	18
Croatia	0 n	45
Italy	4	34
Cyprus	7	29
Latvia	5	20
Lithuania	7	31
Luxembourg	4	4
Hungary	4	29
Malta	3	36

Netherlands	1	8
Austria	4	21
Poland	10	37
Portugal	5	41
Romania	14	39
Slovenia	6	26
Slovakia	5	26
Finland	1	9
Sweden	3	7
Iceland	1	2
Norway	1	2
Switzerland	3	4

Source: EUROSTAT, saved on 3 Aug 2022 Dataset: Individuals' level of digital skills (from 2021 onwards) [ISOC_SK_DSKL_I21__custom_3156397], last updated 30/03/2022 11:00, Time frequency: Annual, Unit of measure: Percentage of individuals, Individual type: Individuals, 55 to 74 years old; 0 – not significant

The 2021 Census did not contain questions on digital literacy or digital skills. General population digital skills proficiency in the Republic of Croatia was last tested in the 2011 Census. Although the data is ten years old, and people who were then 44+ are now 54+, we can conclude that the issue of digital skills has been addressed systematically over the years. The EUROSTAT data suggests that 45% of the 54+ population cannot assess digital skills because they do not use the Internet in their daily lives. Even though the data was obtained ten years ago, the researchers used data for the year 2011. At that time, advanced and developed European countries had already carried out numerous initiatives and measures to encourage the development of digital skills of population groups unable to develop them by themselves.

Table 12 Percentage of 54+ residents who answered that they do not know how to use four selected types of computer programmes, based on the 2011 Census in Croatian counties

County	**%**			
	Text processing	**Table calculations**	**Email usage**	**Internet usage**
Zagreb	85	89	86	83
Krapina-Zagorje	91	94	92	90
Sisak-Moslavina	89	92	90	88
Karlovac	88	91	89	87
Varaždin	88	91	89	87
Koprivnica-Križevci	89	92	90	88
Bjelovar-Bilogora	90	93	91	89
Primorje-Gorski	77	83	77	75
Lika-Senj	91	93	91	90
Virovitica-Podravina	91	94	92	91
Požega-Slavonia	91	93	92	90
Brod-Posavina	90	93	91	89
Zadar	85	89	85	83
Osijek-Baranja	87	90	88	86

Šibenik-Knin	87	90	87	85
Vukovar-Srijem	90	93	91	89
Split-Dalmatia	83	86	82	80
Istria	80	84	80	77
Dubrovnik-Neretva	81	85	80	77
Međimurje	89	92	90	88
City of Zagreb	72	78	72	70

Source: made by the author, based on Croatian Bureau of Statistics data from the 2011 Census

Conclusion

Social and economic development depends on economic strength and the individuals' willingness to use contemporary e-services, especially public and commercial e-services. Today, development is closely related to digital transformation. The goals of digital transformation include sustainable and green economy and society. Achieving digital transformation is challenging in a demographic environment with 37% of its population older than 54 (according to the Croatian 2021 Census). 45% of the 54+ population (per 100 respondents), according to official EUROSTAT statistics, do not use the Internet even once in 3 months. The issue of digital skills needs to be approached and solved systematically, while encouraging e-inclusion of all vulnerable population groups, including the 54+ population.

The purpose of this research was to show objective circumstances related to the population, which can affect the highly set goals of introducing public and commercial e-services to a broader population. Digital transformation implies different projects, more or less financially demanding. Investing public funds in the digital transformation co-financing (especially EU funds), along with a significantly limited ability to use e-services (customers, users of services, employees) resulting from the transformation is an environmental risk for all those planning to enter development projects. Digital transformation projects are going to be implemented because they are controlled by supervisory bodies that approve and monitor the implementation of co-financing of EU projects. However, this paper's research results indicate that it is necessary to assess the impact of 54+ e-inclusion (regarding the share in the total population) on project sustainability and perform risk analysis when planning projects.

Further research should focus on finding the best practice by analysing countries that do not have a problem with e-inclusion of vulnerable population groups, including the 54+ population. Also, advanced European countries have communicated their experiences publicly through reports, various analyses and scientific community, so it is advisable to gain insight into their public policies on e-inclusion. Measuring public policy readiness for e-inclusion of population groups not as e-inclusive as the younger population of digital natives remains a significant challenge.

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