Digital Divide and E-Inclusion as Challenges of the Information Society – Research Review

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Abstract

The issue of e-Inclusion has become an important topic and increasingly gains significance if one takes into account the global trend of digital transformation in the development of the information society and that the digital divide is still present. The reason more for taking the e-Inclusion of all social groups as a challenge has recently been the Covid-19 pandemic and natural disasters (earthquakes, floods) that change the norms of social behavior, require adaptation and create new rules. Users' ability to use digital services and goods as well as open data provided by public and private organizations which ultimately results in greater access to relevant information as well as improved quality of life and are a key factor for the effectiveness of digital transformation and the economic justification of investing in advanced digital technologies, goods and services. The digital divide manifests itself on certain social groups, which is a social problem. However, despite these initiatives, there are still limitations that prevent certain population groups from becoming e-inclusive members of the information society. This paper presents an overview of the analysis results of the research perspective in which scientific and professional papers consider the concepts of e-Inclusion and digital divide as a challenge. The multiperspectiveness and multidimensionality of the concept of e-Inclusion indicates its significant role in the development of the information society.

Keywords: e-Inclusion, digital divide, digital inequality, information society, open data, empowerment, impact on quality of life

1. Introduction

Development of a global digital society is a common vision shared by all countries, especially in today's pandemic situation caused by the COVID-19 virus, as well as the natural disasters like earthquakes and floods. However, it should be noted that the individual's ability to use digital technology and services, which are the products of digital transformation, whether for personal or business purposes, is critical for creation of information society. Throughout history, societies have been divided into

various social groups or strata that distinguish people's rights and benefits based on a variety of factors such as ethnicity, race, gender, age, and disability. These distinctions are still important in today's digital-based era. Inequality in access to and use of digital technology and the Internet may play a significant role in the emergence of social inequalities.

The "digital divide" is a term used in literature to describe this phenomenon [1], [2], [3], [4], [5], [6], [7]. We may classify digital divide as a special form of social exclusion. Digital divide and social exclusion are complicated concepts, and most scholars in the field do not agree that this divide can be bridged simply by providing computers or connecting people to the Internet. The term "digital divide" was coined in the mid-1990s and was seen as an indicator of inequality in access to ICT and the Internet, as well as an appeal to society to address the problem of inequality [8]. National Telecommunications and Information Administration (NTIA) [9] of the US Department of Commerce in its second study, Falling Through The Net II: New Data on the Digital Divide, published in 1998, mention this concept among the first. Telephone and computer penetration rates of low-income groups, minorities, women, and the elderly and other vulnerable groups in society were examined in the survey [9]. Early studies were first to identify digital divide as a result of observed inequalities in accessing technology in the general population [9], [10] and majority of research was focused on technical aspect of access to a computer and the Internet, but also other technological devices such as mobile phones and digital television have been studied [11], [12].

A variety of academic studies have been conducted at the macro and micro level related to the "digital divide" [7], [3], [13], [14]. At the macro level, the key causes of the digital divide, according to Bindé [12], include a country's income, availability of technology and costs of ICT and the Internet, digital literacy education in school systems, etc. At the micro level, research shows that socio-cultural and economic factors such as gender, age, ethnicity, place of residence, income levels, social support, educational background, and others have an impact on "digital divide" [13], [15], [16], [17], [18]. Afterwards, researchers clarified that it refers not only to differences in access, but also to disparities among Internet users in terms of their ability to benefit from their use of technology [6].

Various scholars have established different forms and levels of digital divide over time. According to Molnar [19] (2003), there are three different forms of digital divide:

The access divide, also known as the early digital divide, refers to the disparity between those   with and those without access to ICT and the Internet.

2)   The usage gap, also known as the main digital divide, focuses on those who have access but do not use it, as well as the distinction between users and non-users.

3)   The quality of usage, also known as the secondary digital divide, focuses on the disparities in participation rates among those who have access to and use the internet, as well as the distinctions between various types of users. Dewan and Riggins [11] further characterized the digital divide into three levels. The first level of the digital divide encompasses both hardware and software use. The second level is the disparity in IT capacity, or the ability to use technology. One of the most important

aspects of disparity of use, according to their study, is disparities in computer skill levels. The digital outcome divide is the third level of digital divide, which is caused by the second level digital divide as well as other contextual factors. Van Dijk [4] distinguishes four forms of digital divide:

1) Physical access to ICT and the Internet (have/don't have); 2) Motivational access (want/don't want); 3) Skills access (are able/are not able); 4) Usage access (enough/not enough). Given the numerous studies conducted, it is clear that the digital divide is influenced by a population's socioeconomic status and geographic location and many other factors. This is a complex issue, and some scholars are advocating for solutions focused on new paradigms and multi-dimensional approaches that foster digital opportunity, such as e-Inclusion, as means of bringing people into the digital world [20]. Proponents of e-Inclusion claim that by implementing this approach, which allows development of democracy, mutual understanding, training and education of the economically most disadvantaged groups such as low-income people, the disabled and the unemployed, this gap can close completely or be reduced to a minimum [21]. There are several ways to improve e-Inclusion by ensuring infrastructure, providing skill-building courses, and ensuring social support for those who are not e-included. The motivational access appears to be the most difficult for achieving these goals because it is solely dependent on the will of the individuals.

The pandemic of Covid-19 has pushed society to change its practices and habits by being even more e-included and adopt e-service [22], [23], [24], [25], [26], [27].

Since digital divide and e-Inclusion have been research topics of many authors in the last two decades, they still represent a space for research because the aforementioned problems are multidisciplinary and multidimensional.

2. Background

The terms digital divide and e-Inclusion are mentioned in numerous papers listed in relevant scientific citation databases (Scopus and Web of Science). The authors have selected those that assure the multidisciplinary point of view about causes of digital divide and effects on raising e-Inclusion rate.

According to the Eurostat Glossary [28]:

- "*Digital divide* refers to the distinction between those who have Internet access and are able to make use of new services offered on the World Wide Web, and those who are excluded from these services. At a basic level, the participation of citizens and enterprises in the information society depends on access to information and communication technology (ICT), i.e. the presence of electronic devices, such as computers, and Internet connections..." (https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Digital_divide)
- "*E-inclusion* refers to the situation where everyone in society can participate in the information society. This requires affordable access to technologies, the accessibility and usability of ICT tools and services, and the ability and skills of all individuals to use these tools." (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:E-Inclusion).

The European Commission confirmed in 2016 in Digital Competence Framework that about 40% of EU population do not have enough digital skills, and 22% do not have it at all. This category includes vulnerable groups such as the elderly population, lower-educated young people, lower-income families and migrants. In addition, around 32% of the workforce lacks sufficiently developed digital skills. As a response to the problems related to ageing of population, the Active Ageing policy has been developed by UN and supported by other relevant world institutions.

At the start of research process, the author considered numerous researches, projects and programs on e-Inclusion of adults, the elderly population, vulnerable social groups (migrants, disabled people, people at risk of poverty), lifelong education of which [39]-[43], [45] are more significant. Components of micro causes represent an integrated measurement model of digital inequality from [32] and are the common denominator for all these researches.

The articles are focused in general to possible aspects of solving reasons of digital divide to increase the degree of e-Inclusion of vulnerable population groups. Mendonc [29] regarded digital divide as a social issue and suggested to measure the inequality by composite index (access, skills, intensity of use and material status). Public policy is a mechanism that has to be used for solving recognized social issues, as well as solving digital divide by building digital skills as a key to combating poverty as Huesing and Selhofer [30] suggest. The communication infrastructure has become necessary to assure solving digital divide so the public administration and corporations whose activities are ICT are responsible to assure the Internet access and, while solving personal skills issues is aimed at the individual and educational institutions as Epstein et al. [31] presented. Yu et al. [32] emphasized that continuity in usage of digital staff and services leads to the desired effects of permanent e-Inclusion and collective awareness of importance of the digital economy and society.

The skills are one of the most needed preconditions for being e-included so the United Nations program and policies focused to lifelong learning and human rights to get the same chances are the base for building the personal capacities [33], [34], [35].

Demographic changes across the world mentioned in research conducted by European Central Bank show that 75% of workforce is 55 to 74 age old [36].

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Hernández-Encuentra, Pousada, Gómez-Zúñiga [41], have researched the lack of motivation for building digital skills and communication about benefits of digital skills as the main reason of being "offline". According the research concluded that new technologies have to be included in everyday life at the time when users feel that they serve for the personal development, and not when they will be used as a substitution of some lost possibilities (mobility, senses, speed, cognitive ability). The similar conclusion has been found by González, Paz Ramírez, Viadel [42]. Active users of tele-services were active during the education process to keep up the mental condition, being socially included and for lifelong learning. During the educational process it is important to avoid barriers that are caused by a lack of technical social support in acquiring digital skills Xie [43]. Additionally, the barriers can be caused by ages, language, physical ability to use ICT. For those adults who decided to take challenge to build their digital skills it is important who is the trainer. Čurin [44] has concluded according the research that young lecturers often do not understand the special needs and advantages of the elderly. The study found that the elderly finds it easier to work with instructors who are generationally closer to them, and who have one level of more developed digital literacy and skills. It is also important what kind of tools are used during the educational process. Public policies are aimed at reducing the overall digital divide through a number of media literacy projects and e-learning projects, but to no avail due to insufficient systematic methodological access L. Abad-Alcalá [45]. Silva, Matos and Martinez-Pecino [46] presented the results of a regression analysis which showed that general stability and public policies have an impact on the will to use the Internet, reinforcing the importance of public policies to encourage e-Inclusion of older people.

R.S. Sharma, et al. "Digital Literacy and Knowledge Societies: A Grounded Theory Investigation of Sustainable Development" [47] have dealt with following issues: a) what are the important policies implemented with a view to promoting digital literacy, digital inclusion and participation in the company known as Sharma Ja; b) how digital literacy policy affects sustainable development (education, health and e-public administration) [48] in 2016. The survey was conducted in Finland, Singapore, New Zealand, Hong Kong and Qatar, also taking into account their socioeconomic parameters (population, GDP, annual GDP growth, country area, net income). Following this research, in 2018 Sharma presented a model of digital literacy maturity [48] which has four pillars (governance, infrastructure, education and human capital, and innovation) and the maturity dimension (the lowest level is access, followed by: use, participation and human values). The conclusion of that research is that public policies by promoting workshops to strengthen digital skills are key to developing an information-based economy.

In order to strengthen digital skills in general, but also with focus on the needs of the elderly, strategies have been planned in this decade, projects have been implemented at national level (albeit in a limited area, such as provinces, large cities, etc.), and countries that have implemented such projects/programs should definitely highlight Spain [45], Finland [49], United Kingdom [50], [51], Czech Republic [52], Lithuania [53], [54], Australia [55], Mexico [56], Canada [57], and United States [58]. For the most part, physical infrastructure projects are the subject of most of the

countries' strategies in the EU. The European Commission has also supported projects to raise the digital skills of the elderly, including a view to raising their competitiveness in the labor market [59], mainly with a view to reducing poverty rates, which is certainly linked to the results of the European Central Bank survey [59]. The economic impact of digital technology was measured by a composite index that, according to R. Evangelista, P. Guerrieri, V. Meliciani [60] includes three sets of aggregated economic variables: a) labor productivity and GDP growth per capita, b) employment growth, c) employment rates of special groups (women, the elderly and long unemployed), which are rising. During the research, it was concluded that there is an impact of several transmission mechanisms from ICT approach, use and digital empowerment on macroeconomic variables (labor productivity, GDP/population, employability growth and employability rates).

Digital literacy not only represents the ability to use programs or digital devices, but includes cognitive abilities, driving abilities, sociological and emotional skills that users need to be able to operate in a digital environment, so in the Digital Era it is recognized as a survival skill [61].

In 2014, the Commission conducted research concerning the inclusion of the elderly population in society through volunteer work in five EU countries (Denmark, Germany, Italy, the Netherlands and Portugal) [62]. The research focused on volunteering as a tool to prevent social exclusion of the elderly population. The authors cited recommendations for public policy makers in the domain of social policy, but also for municipalities and cities, based on knowledge gathered by the research.

On the other hand, just as Siren and Grønborg Knudsen conclude in their research [63], the key problem of the implementation of e-public administration and e-health projects is precisely the inability of users to use such services.

Although it has been almost twenty years since the problem of the digital divide became a topic for discussion and research, it should be said that the problem remains unresolved in the middle of this decade. Namely, technological progress is made at a higher rate than society is ready to monitor and the gap widens, especially in the area of the use of governmental and non-governmental electronic services as well as the increasing opportunities offered related to the use of open data. The European Commission has adopted the Digital Agenda 2020 and the Digital Single Market Strategy, the implementation of which is annually reported by the European Commission via official websites and written reports. The European Parliamentary Research Service said in December 2015 report [64] that digital (il)literacy is a characteristic of four socio-economic categories: "low-educated", "unemployed", "retired" and "aged 55-74". In 2014, according to Eurostat data, about 50% of the population aged 55-74 use the Internet. Since open issues persist, the authors decided to make a cross-section of the area by identifying the status according to referenced models, on the one hand digital inequality and on the other e-Inclusion.

3. Methodology

The goal of this research is to present the crosscut of the causes of the digital divide and effects of e-Inclusion by using two groups of key words, first specified by authors of the paper and second by content search made by authors of this paper.

The research questions we ask are:

1) What are the observable themes in published studies on digital divide and e-Inclusion?

2) What are the observable trends in published studies on digital divide and e-Inclusion?

Based on the research goal and defined research questions, the research procedure is divided into several steps.

In the first step authors have determined what kind of documents will include in the research. The documents that have been considered in this research are articles, survey reports, project reports, and books which are divided in two groups: scientific and professional papers. For documents questionable regarding classification, the authors were contacted to provide additional information about the classification of the paper.

In the second step, the research concept was defined. This step considered multidisciplinary approach by using components and attributes of multidimensional and multiperspective theoretical model of e-Inclusion made by Žajdela Hrustek [65] and integrated model of digital inequality [32] (in following text: referenced models). The theoretical model of e-Inclusion that was taken as theoretical foundation consists of four components: access, use, empowerment and the impact on quality of life. Another side is theoretical model of digital inequalities that consists of: a) deterrents of digital inequalities divided into macro cause, meso cause and micro cause, and b) measurements of digital inequality: behavioral measurement and effect measurement. This research connects the aforementioned two models by observing the cause-and-effect role of detected key words to e-Inclusion and to digital divide and is presented as theoretical relations.

The third step was related to the decision on which sources will be used for searching papers that have to be analyzed. Authors have used library databases from network sources to find scientific papers, regarding multidisciplinary approach, using keywords such as: accessibility, active ageing, ageing society policy (social policy), competence, digital literacy (ICT literacy, computer literacy), elderly citizens (older people, elders, older age), ICT including mobile telephony and all-inclusive infrastructure, e-Inclusion (digital inclusion, info inclusion), rural areas, learning strategy, later life learning (lifelong learning, lifelong education, adult learning), vulnerable groups (people with disabilities, marginalized groups), empowerment, social support, public community policy, e-readiness, digital divide (digital exclusion), user experience ((UX), individual experience). These keywords are related to inclusion issues and mostly present the cause of digital inequalities. Additionally, authors have checked the references of already identified papers. The next condition is that article had to be published in scientific journals, indexed in Scopus, Web of

Science (WoS) or other referred sources specified on network sources on Faculty's library webpage.

Authors have researched the respectable sources of relevant institutions official webpages to find professional papers indexed in other sources (official web pages of institutions, official project web pages, etc.).

The point of including both kinds of papers, scientific and professional, is to get the view of which issues are emphasized by scientific research and which by professional.

In the fourth step authors specify keywords that were used for search of databases. There have been specified two groups of key words: a) specified by authors of the paper and b) by content search made by authors of this paper. The documents that do not specify keywords by authors (older scientific articles, professional articles, reports) were excluded from that part of research. For both groups of classification have been created tuple for further comparation.

Other sources indexed databases are: Index Copernicus International and EBSCOhost, Cabell Publishing, Inc., CrossRef, EBSCO, Google Scholar. Books are published by Springer. Conferences: IFIP Advances in Information and Communication Technology, IFIP International Federation for Information Processing, ESA Research Network Sociology of Culture Midterm Conference: Culture and the Making of Worlds, European, Mediterranean & Middle Eastern Conference on Information Systems.

The key words that researchers and authors of this paper have emphasized are: ageing society (policy), active ageing, elderly citizens/older people, other vulnerable groups, digital literacy, competences/e-readiness, inclusion/e-Inclusion, digital divide, ICT, mobile telephony, learning/informal education/empowerment.

The fifth step involved determining the analysis criteria, and they are grouped in three groups. The first group of research criteria focus on year of publishing, specifying source of the document and indexed database, key words - defined by authors of document, key words - content of the document, county of research, clusters of countries by number of matching in analyzed research.

Second group of research criteria is focused on topics and issues of investigation, data collection method/technique, paper by research population groups. The list of data collection method/techniques is created according to findings. In some researches have been used the mixed method/technique, so the authors have decided to present founded combination. The population groups are presented as they have been found during the research in analyzed documents. There are overlaps between the groups authors decided at the end to few groups: under 20 years, between 25 and 65, over 50 years old, whole population; in some cases the population was not mentioned and in some cases it was not applicable.

The third group of research criteria is defined by multidisciplinary approach for solving problem of digital divide and raising e-Inclusion rate. As the reference models describe, papers are grouped by components and attributes in chronologic array from 2003 to 2020. As it has been mentioned, the papers are divided into two groups: scientific and professional, and are compared with the related components of two reference models (digital inequality and e-Inclusion).

The collected data were analyzed using descriptive statistical analysis and presented through the tables in the following chapters.

4. Results

Summarization and categorization of reviewed papers are grouped by research focus, research approach and by theoretical foundation on referenced models (e-Inclusion model and digital inequality model).

4.1. Research focus

Using described criteria, 58 documents have been included in the research, spanning the years 2003 through 2020 (Table 1). Regarding the data shown in Table 1, 51,8% of papers were published in the last five years. It is interesting to note that after 2014 the number of scientific papers by year is rising. According to the categorization into professional and scientific document, it can be noticed that scientific papers predominate (86.2%).

Year	Total	%	Category of the document	
			Professional	Scientific
2003	1	1,72		1
2007	2	3,45		2
2008	3	5,17	1	2
2009	1	1,72		1
2010	5	8,62	2	3
2011	2	3,45		2
2012	2	3,45		2
2013	3	5,17		3
2014	7	12,07	1	6
2015	2	3,45		2
2016	4	6,91		4
2017	6	10,34	1	5
2018	6	10,34	2	4
2019	7	12,07		7
2020	7	12,07	1	6
Total	58	100	8	50

Table 1. Papers by year and category of the document

Journal, Document	Scopus	WoS	Other	Total	%
Ageing and society		1		1	1,724
BMC public health		1		1	1,724
Book			3	3	5,172
Computer		1		1	1,724
Comunicar Media Education Research Journal			1	1	1,724
Conference paper	3		1	4	6,897

Educational Gerontology		1		1	1,724
Employee Relations		1		1	1,724
European Journal of Ageing		1		1	1,724
Government Information Quarterly		2		2	3,448
IEEE Consumer Electronics Magazine		1		1	1,724
Information Systems Frontiers		1		1	1,724
Information Systems Management		1		1	1,724
International Journal of Business and Social Science			1	1	1,724
International Journal of Computer Science and Information Security		1		1	1,724
International Journal of Electronic Governance	1			1	1,724
IOSR Journal of Humanities And Social Science			1	1	1,724
ISG International Society for Gerontechnology		1		1	1,724
Journal of Aging & Social Policy		1		1	1,724
Journal of Medical Internet Research		1		1	1,724
Lecture Notes in Computer Science		6		6	10,351
New media & society		1		1	1,724
New Zealand Computer Society			1	1	1,724
PLoS ONE	1			1	1,724
Procedia-Social and Behavioral Sciences			2	2	3,448
Profesional de la Información		1		1	1,724
Project report			3	3	5,172
Research publication			3	3	5,172
Revista Latina de Comunicación Social		1		1	1,724
Rural Society		1		1	1,724
Science and Engineering Ethics			1	1	1,724
Sensors		1		1	1,724
Smart Learning Environments	1			1	1,724
Statistika-Statistics and Economy Journal		1		1	1,724
Telecommunications Policy		2		2	3,448
The Information Society		1		1	1,724
Topics in Geriatric Rehabilitation		1		1	1,724
Universal access in the information society		1		1	1,724
Viešoji Politika Ir adMINISTRAVIMS		1		1	1,724
ZDM Mathematics Education		1		1	1,724
Zeitschrift für Weiterbildungsforschung			1	1	1,724
Total	40		18	58	100

Table 2. Papers by source and citation database.

Table 2 shows the selected papers by source (journals) and the citation database that they are indexed in. The 69% of papers are published in journals that are indexed in Scopus or WoS. 30% of other sources are books and project reports. By examination of the list of sources (journals and other types of documents), the previously mentioned can be confirmed - the concepts of digital divide and e-Inclusion are

multidisciplinary (social science, computer science, information science, medical science and geriatric, etc.), and issues related to these concepts are multidimensional.

The analyzed set of documents are mostly related with concept e-Inclusion, the spatial social group of citizens – elderly, ICT. Ageing and specific vulnerable citizen groups, as well as informal education similarly participate in the sample of analyzed documents.

Key words - defined by authors of document	Count	% of documents include the key word
Inclusion/e-Inclusion/	19	32,76
Elderly citizens/Older people	18	31,03
ICT	16	27,59
Digital divide	12	20,69
Digital literacy	7	12,07
Ageing society (policy)	6	10,34
Other vulnerable groups	6	10,34
Learning/Informal education/Empowerment	6	10,34
Active ageing	4	6,9
Competences / E-Readiness	4	6,9
Mobile telephony	2	3,45

Table 3. Key words - defined by authors of documents.

Key words in content of the document	Scientific	Professional	Total	% of all documents	Rank
Elderly citizens/ Older people/ Elders/ Older age	42	8	50	86,2	1
e-Inclusion / eInclusion / Digital inclusion / Info-inclusion	29	6	35	60,3	2
Vulnerable groups / People with disabilities / Marginalized groups	28	7	35	60,3	2
Digital divide / Digital exclusion	28	5	33	56,9	4
Digital literacy / ICT literacy / Computer literacy	29	3	32	55,2	5
User experience (UX) / Individual experience	27	5	32	55,2	5
ICT including mobile telephony and all-inclusive infrastructure	28	2	30	51,7	7
Accessibility	24	5	29	50,0	8
Public / Community policy	22	7	29	50,0	8
Competences	24	4	28	48,3	10
Empowerment (Social support)	21	7	28	48,3	10
Later life learning / Lifelong learning / Lifelong education / Adult learning	22	4	26	44,8	12

Rural areas	16	3	19	32,8	13
Active ageing	14	4	18	31,0	14
Ageing society policy / Social policy	12	3	15	25,9	15
Learning strategy	7	1	8	13,8	16
E-readiness	3	0	3	5,2	17

Table 4. Key words - content of the document.

As it can be seen in Table 4, the content of analyzed documents give a different perspective on keywords than the keywords highlighted by authors. When the digital divide and e-Inclusion are discussed, the interest of scientific and professional community is focused on the elderly citizens and vulnerable societal groups, as well as user experience and digital literacy. That is the landscape of the multidisciplinary and multidimensional researches.

In Table 5 the counties and geographic areas are presented where the researches were conducted. The data are divided national or international research. The 79% of research papers is related with some specific geographic area. The rest of papers, like reviews and general theory research is classified in the category "Not exactly defined". In absolute value in the UK has been conducted 6 research during the observed period. It is very indicative if we take into the consideration that the rate of e-Inclusion of vulnerable group population by Eurostat is on the top level. Which leads to the conclusion that these groups in the population are most affected by the problem of exclusion from the information society.

Geographic area in which the research was conducted	National	International	Total	%	Rank
Not exactly defined	12		12	13,04	1
EU		6	6	6,52	2
United Kingdom	6		6	6,52	2
Italy	3	2	5	5,43	4
Netherland	1	4	5	5,43	4
Spain	3	2	5	5,43	4
Denmark	2	2	4	4,35	7
Finland	2	2	4	4,35	7
Germany		3	3	3,26	9
Portugal	1	2	3	3,26	9
Romania	1	2	3	3,26	9
Australia	2		2	2,17	12
Belgium		2	2	2,17	12
Bulgaria	1	1	2	2,17	12
France		2	2	2,17	12
New Zeeland	1	1	2	2,17	12
Norway		2	2	2,17	12
Slovenia	2		2	2,17	12
Switzerland	1	1	2	2,17	12
United States of America	1	1	2	2,17	12

China (Heilongjiang Province)	1		1	1,09	21
Cyprus		1	1	1,09	21
Estonia		1	1	1,09	21
Greece		1	1	1,09	21
Great Britain		1	1	1,09	21
Hong Kong SAR		1	1	1,09	21
Hungary		1	1	1,09	21
Japan	1		1	1,09	21
Kenia		1	1	1,09	21
Lithuania	1		1	1,09	21
Poland	1		1	1,09	21
Qatar		1	1	1,09	21
Russia	1		1	1,09	21
Singapore		1	1	1,09	21
Scotland		1	1	1,09	21
Slovakia		1	1	1,09	21
Sweden		1	1	1,09	21
Zimbabwe		1	1	1,09	21
Total	44	48	92	100	

Table 5. Papers by country.

The importance of the digital divide and the e-Inclusion issues is seen also according to the fact that the researches have been conducted on the wide area (Table 6), everywhere in the world. Sharing the standards, achieved projects, goals and impacts, good and bad practice is noticed during the analysis.

Count of paper	Country
1	Belgium; Bulgaria; China; Cyprus; Estonia; France; Greece; Hong Kong; Hungary; Japan; Kenia; Lithuania; Norway; Poland; Qatar; Russia; Scotland; Singapore; Sweden; the Slovak Republic; Zimbabwe;
2	Australia; Germany; New Zealand; Slovenia; Switzerland; USA;
3	Denmark; Portugal; Romania;
4	Finland; Netherland
5	Italy; Spain
6	EU; UK

Table 6. Clusters of countries by number of matching in analyzed researches.

Table 7 presents the list of papers by authors and issues of investigation expressed in terms of referenced models. It is evident from the results that according to the causes (macro, meso, micro), most studies have focused on macro causes with emphasis on ideological and personal force. To a much lesser extent, research was focused on behavioral measurement - e-acceptance and effect measurement - situational e-Inclusion if one looks at it from aspect of causes of digital divide (left side of the Table

7). While it is interesting to notice this ultimately results in the fact that effects on e-Inclusion are achieved mostly on the side of access and use and less in terms of empowerment and impact on quality of life (right side of the Table 7).

Researched paper can be divided in 5 groups by research focus of digital inequality and 4 groups by research of e-Inclusion, as it is presented in Table 7.

Causes of Digital Divide					Reference of the document	Effects on e-Inclusion			
E-Inclusion or digital divide: an integrated model of digital inequality						Proposed General Theoretical Conceptual Model of e-Inclusion			
MACRO CAUSE - Forces	MESO CAUSE - Resources	MICRO CAUSE - Access	BEHAVIORAL MEASUREMENT - E-ACCEPTANCE	EFFECT MEASUREMENT - SITUATIONAL E-INCLUSION		ACCESS	USAGE	EMPOWERMENT	IMPACT ON QoL
Personal force			Continuous use		Selwyn, N., Gorard, S., Furlong, J., & Madden, L. (2003).	Material access, Affordability;	Intensity; Social support		
Personal force	Educational resource				Morris, A., Goodman, J., & Brading, H. (2007).	Material access	Skills		all atributes
Personal force		Cognitive access			Boulton-Lewis, G. M., Buys, L., Lovie-Kitchin, J., Barnett, K., & David, L. N. (2007).		Skills; Motivation; Social support		
Community force					Petrauskas, R-A, Bilevičienė, T.,Kiškienė, A. (2008)		Social support		
Personal force					European Social Survey (ESS). (2008).		Attitudes		
		Material access; Motivational access			Repetto, M. and Trentin, G., (2008).		Motivation; Skills		
		Motivational access			Siren, A., & Hakamies-Blomqvist, L. (2009).		Motivation		
			Initial adoption		van Deursen A., van Dijk J. (2010).		Skills		
		Material access; Motivational access			Leahy D., Dolan D. (2010).		Motivation; Skills		
Ideological force					Maier-Rabler, U., (2010).		Social support		
Ideological force					Bunker, B. (2010).		Social support		
Ideological force					European Commission, (2010).		Social support		
	Educational resource; Material resource; Psych resource				Epstein, D., Nisbet, E. C., & Gillespie, T. (2011).	Affordability	Skills		
Ideological force; Personal force	Material resource; Intelectual resource	Cognitive access	Continuous use		Almuwil, A., Weerakkody, V., & El-Haddadeh, R. (2011).	Material access	Skills; Attitudes; Intensity	Content creation	

			Initial adoption		Vishanth Weerakkody, Yogesh K. Dwivedi, Ramzi El-Haddadeh, Ahlam Almuwil & Ahmad Ghoneim (2012).				E-government
				Impact personal life	Näsi, M., Räsänen, P., & Sarpila, O. (2012).		Intensity		E-entertainment
	Educational resource				Lima Oliveira, A. et.al. (2013).		Skills		
Community force; Industrial force; Personal force	Material resource; Educational resource; Psych resource				Rerup Schlichter, B., Danylchenko, L. (2014).	Material access; Affordability; Network			
Public admin force; Community force					Bannier S., Glott R., Meijs V. (2013).		Social support		
Personal force		Motivational access			Ayako, H., Masaaki, K. (2013).		Motivation		
		Cognitive access			Loureiro A., Barbas M. (2014).		Skills		
Personal force					Billestrup J., Stage J. (2014).			E-participation	
Ideological force					Watkins, I., & Xie, B. (2014).		Skills		
Ideological force		Motivational access			Haasjes, M., (2014).	Affordability	Social support; Attitudes; Motivation		
	Educational resource				Nistor, G. (2014).		Skills		
	Educational resource				Alcalá, L. A. (2014).		Skills		
Community force					Comunello F., Mulargia S., Belotti F., Fernández-Ardèvol M. (2015).		Skills		
Ideological force					Chalkia E., Bekiaris E., Madrid R.I. (2015).	Network; Point of access			
Personal force					Sergeyeva, O., & Makarova, L. (2016).		Motivation		
Public admin force; Community force					Sharma, R., Fantin, A. R., Prabhu, N., Guan, C., & Dattakumar, A. (2016).	Network	Skills		
Community force; Industrial force; Personal force	Material resource; Educational resource; Psych resource				Berenguer, A., Goncalves, J., Hosio, S., Ferreira, D., Anagnostopoulos, T., & Kostakos, V. (2016).	Affordability; Material access	Motivation; Skills		
		Material access; Motivational access			Friemel, T. N. (2016).		Motivation; Skills		
		Motivational access			M Viñarás-Abad, L Abad-Alcalá, C Llorente-Barroso, M		Motivation		

				Sánchez-Valle, M Pretel-Jiménez (2017).				
			Impact personal life	Dudek, H., & Szczesny, W. (2017).		Attitudes		All attributes
		Motivational access		Siren, A., & Knudsen, S. G. (2017).		Motivation		
Public admin force; Community force				Silva P, Matos AD, Martinez-Pecino R (2017).		Social support		
Personal force				Padilla-Góngora, D., López-Liria, R., del Pilar Díaz-López, M., Aguilar-Parra, J. M., Vargas-Muñoz, M. E., & Rocamora-Pérez, P. (2017).		Skills		
Ideological force	Material resource	Material access	Initial adoption	Dolničar, V., Setinc, M. (2017).		Social support		
Community force				Galdon Clavell G., Zamorano M.M., Zavala Pérez J.M. (2018).		Social support		
Industrial force				Ruiz-Rodríguez, F., Lucendo-Monedero, A.L., González-Relaño, R. (2018).		Motivation	Content creation; Networking	
Personal force				Chipeva, P., Cruz-Jesus, F., Oliveira, T., & Irani, Z. (2018).		Attitudes		
			Continuous use	Trilar, J., Kos, A., Jazbinšek, S., Jensterle, L., & Stojmenova Duh, E. (2018).		Intensity		
Ideological force; Personal force		Motivational access		Centre for Economics and Business Research (Cebr) (2018)			E-participation; E-democracy; Networking; Content creation	
Ideological force; Personal force	Interpersonal resource	Motivational access		Davidson, S., (2018).		Attitudes; Social support		
	Educational resource			Kirongo, A.C., Huka, G. S., Bundi, D. G., Muketha G. M., (2019).		Skills		
			Initial adoption	Brenna, E. (2019).	Point of access	Intensity		all atributes
Public admin force; Community force				Al-Muwil, A., Weerakkody, V., El-haddadeh, R. et al. (2019).		Social support		
Public admin force; Community force				Atarodi, S., Berardi, A.M., Toniolo, A-M. (2019).		Social support		
Ideological force	Material resource			Moreno, L., & Martinez, P. (2019).	Accessibility	Network and Quality		
Ideological force	Educational resource	Cognitive access		Richards, C. (2019).		Attitudes; Social support		
Ideological force; Public admin force				Arrieta F. (2019).	Affordability	Social support		

	Education al resource				Zhang, X., Tlili, A., Nascimbeni, F. et al. (2020).		Skills		
Ideological force	Education al resource				Gal, I., Grotlüschen, A., Tout, D., Kaiser, G., (2020).		Skills		
				Impact personal life	Bejaković, P., & Mrnjavac, Ž. (2020).		Digital engageme nt	Content creation; Networking	E-work
Public admin force; Community force					Guenther, J., Smede, B., & Young, M. (2020).		Social support		
Ideological force					Martínez-Bravo, M. C., Sádaba-Chalezquer, C., & Serrano-Puche, J. (2020).		Social support		
Community force					Sun, X., Yan, W., Zhou, H., Wang, Z., Zhang, X., Huang, S., & Li, L. (2020).		Motivation , Social support		
				Impact personal life	Burr, C., Taddeo, M. & Floridi, L. (2020)		Social support; Motivation ;		

Table 7. Papers by issue of investigation, referenced in Appendix 1.

According to the data in Table 7. it could be concluded that 63,79% of analyzed documents are related with macro cause issues (37 of 58 documents), and it follows by meso and micro cause of digital divide 15 of 58 documents, or 25,86%). During the research it was reviled that ideological forces was the topic in 11 documents, and it is followed by personal force that was found in 9 documents. Considering the meso cause the educational resources it was found that it has been mentioned in 8 documents. On micro cause motivation has been the topic of research in 7 documents. Considering e-acceptance the initial adoption has been researched in four documents and continuous use in three documents. Impact on personal life, as the effect of measurement situation e-Inclusion property has been analyzed four times.

Regarding the e-Inclusion referent model, it could be concluded that usage has been the research topic in 53 documents (of 58) or 91,38%, access in 11 documents or 18,97%, empowerment in five (8,62%) and impact on quality of life in 4 documents (6,9%).

The focus of researchers of access issues was directed to skills (14 documents) and social support (13 documents), while on other e-Inclusion components have been noted lower number of occurrence (access: affordability and material access in two documents; empowerment: content creation and networking in two documents; impact on quality of life all attributes have been found in only once).

4.2. Research approach

One of the focuses of the research was to determine the method/methodology or technique of collecting data used by the authors in the research they conducted. Results are presented in the Table 8. At the start it is said that 25 of 58 papers focus on analyses of existing documents (for making reviews; using secondary data), so there are no specific methods or techniques for data collection. The usually used

methods or techniques for collecting data from individuals are: questionnaire (11 of 58, including semi-structured), interview (9 of 58) followed by survey (4) and focus groups (3).

Data collecting method/technique	Count	%
Review	20	34,49
Questionnaire	8	13,80
Interview	6	10,34
Secondary data	5	8,63
Survey	4	6,90
Project	3	5,17
Focus group	3	5,17
Grounded theory method	2	3,46
Experiment	1	1,72
User centred design (UCD)	1	1,72
Secondary data, interview	1	1,72
Grounded theory method, interview, questionnaire	1	1,72
Experiment, questionnaire, semi-structured questionnaire	1	1,72
Experiment, questionnaire	1	1,72
Experiment, interview	1	1,72
Total	58	100

Table 8. Papers by data collecting method/technique.

Unit of analysis is not explicitly mentioned because the papers analyze the documents and second source data (22 of 58), which makes about 38% of all papers. Other 36 papers are based on collected data from individuals of specific age groups, as it stands in Table 9. The data tell the researchers of 11 papers included general population in the research process. Other most occurred population groups included in the research were 60+ and 65+. In general, 31% of papers are focused especially on 50+ population. The reason is certainly because the population of 50+ is vulnerable group from the digital inequality point of view, mostly because of lack of required skills (in correlation with Eurostat data).

Population groups	Count	%	
16+	1	1,72	
up to 18	1	1,72	
18+	2	3,46	10,34
18-74	1	1,72	
19+	1	1,72	
25 - 65	1	1,72	1,72
50 - 74	1	1,72	
50+	2	3,45	
55+	1	1,72	31,04
58+	1	1,72	
60+	5	8,63	

60 -79	1	1,72	
65 - 81	1	1,72	
65+	6	10,35	
General population	11	18,98	18,97
Not Applicable	4	6,90	6,90
Not specified	18	31,03	31,03
Total	58	100	100

Table 9. Paper by population groups.

As many other social issues, the heterogeneity of population characteristics (especially age) has an impact on the phenomenon that is being analyzed. If we exclude the researches where the population hasn´t been the source of data, the e-Inclusion issues and digital divide issues have been analyzed mostly as an issue related with population 50+. This is very indicative, and it could be said that researchers consider the vulnerable population group defined by ages.

4.3. Theoretical foundation on e-Inclusion model and digital inequality model

Following part of data presented in Table 10 to Table 14 are the results of documents analyzes according to two referenced models: a) digital inequality and b) e-Inclusion model. The aforementioned present the third part of research – the analysis of multidisciplinary approach for solving problem of digital divide and raise e-Inclusion rate. As the reference models describe, papers are grouped by components and attributes in chronologic array from 2003 to 2020. Following part of research displays selected papers divided into two groups: scientific and professional. The papers were analyzed by key words which were found in the content of the paper and paired with the related components of two reference models (digital inequality and e-Inclusion model).

Theoretical foundation of causes and effects on referenced models is presented in Table 10 that presents the connection of causes of digital inequalities from the left side of keywords in content, and the effects they have on e-Inclusion described by components on the right side of keywords. The yellow-colored cells present the connections between terms from specific points of view. It can be concluded that, except from terms "e-Inclusion" and "digital divide", the term "public/community policy" has been related with all components of e-Inclusion model, but it is related only to macro cause of digital inequality model. Most key words are related with usage in e-Inclusion model, but on the left side of Table 10 it can be seen that all parts of the model by key words are equally represented. In other words, it could be said that most of keywords are related with or are cause of only one component of the digital inequality model.

Causes of Digital Inequalities					Multidisciplinary view of causes and effect	Effects on e-Inclusion			
E-Inclusion or digital divide: an integrated model of digital inequality						Proposed General Theoretical Conceptual Model of e-Inclusion			
Macro cause - Forces	Meso cause - Resources	Micro cause - Access	Behavioral measurement - e-acceptance	Effect measurement - Situational e-Inclusion	Keywords	Access	Usage	Empo-werment	Impact on QoL
■					**Accessibility**		■		
			■		**Active ageing**				■
■					**Ageing society policy / Social policy**			■	
		■			**Competences**		■		
				■	**Digital literacy / ICT literacy / Computer literacy**		■		
			■		**Elderly citizens/ Older people/ Elders/ Older age**				■
	■			■	**ICT including mobile telephony and all-inclusive infrastructure**	■			■
				■	**e-Inclusion / eInclusion Digital inclusion/ Info-inclusion**	■	■	■	■
■	■				**Rural areas**	■			■
■					**Learning strategy**		■		
	■				**Later life learning / lifelong learning / lifelong education / adult learning**				
			■		**Vulnerable groups/ People with disabilities/ Marginalized groups**	■			
		■			**Empowerment (Social support)**			■	
■					**Public / Community policy**	■	■	■	■
		■			**E-readiness**	■			
■	■	■	■	■	**Digital divide / Digital exclusion**	■	■	■	■
		■			**User experience (UX) / Individual experience**		■		

Table 10. Multidisciplinary approach for solving problem of digital divide and raise e-Inclusion rate.

Table 11 visualizes the dispersion of papers according to components and attributes of referenced models by the year of research. The digital inequality is mostly analyzed according to ideological attribute (16 of 58) and personal force (14 of 58), both on macro cause. Personal force is continually analyzed according to referenced years, but ideological force started to be analyzed from 2010 until 2020, continually. The educational resource as meso causes and motivational access as micro causes of digital inequalities are the topics of research the most mentioned not specifically at one point of time.

Model	Component	Attributes	Total	% (of total number of analyzed 58 articles)	2003	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
E-INEQUALITY	MACRO CAUSE - FORCES	Public admin force; Community force	**6**	**10,34**								1			1	1		2	1
		Personal force	**9**	**15,52**	1	2	1					1	1		1	1	1		
		Industrial force	1	1,72													1		
		Ideological force; Public admin force	1	1,72														1	
		Ideological force; Personal force	3	5,17						1							2		
		Ideological force	**11**	**18,97**					3				2	1		1		2	2
		Community force; Industrial force; Personal force	2	3,45								1			1				
		Community force	4	6,90			1							1			1		1
	MESO CAUSE - RESOURCES	Educational resource	**8**	**13,79**		1						1	2					2	2
		Educational resource; Material resource; Psych resource	1	1,72					1										
		Interpersonal resource	1	1,72													1		
		Material resource	2	3,45												1		1	
		Material resource; Educational resource; Psych resource	2	3,45								1			1				
		Material resource; Intellectual resource	1	1,72					1										
	MICRO CAUSE - ACCESS	Cognitive access	4	6,90		1				1			1					1	
		Material access	1	1,72												1			
		Material access; Motivational access	3	5,17			1		1						1				
		Motivational access	**7**	**12,07**				1				1	1			2	2		

Category	Subcat	Attribute	N	%														
BEHAVIORAL MEASUREMENT - E-ACCEPTANCE		Continuous use	2	3,45						1						1		
		Initial adoption	4	6,90					1		1				1		1	
EFFECT MEASUREMENT - SITUATIONAL E-INCLUSION		Impact personal life	4	6,90							1				1			2
E-INCLUSION COMPONENTS AND ATTRIBUTES	ACCESS	**Accessibility**	**1**	1,72													1	
		Affordability	1	1,72						1								
		Affordability; Material access	1	1,72											1			
		Material access	2	3,45			1			1								
		Material access, Affordability;	1	1,72	1													
		Material access; Affordability; Network	1	1,72								1						
		Network	1	1,72											1			
		Network; Point of access	1	1,72										1				
		Point of access	1	1,72													1	
	USAGE	Attitudes	3	5,17				1								1	1	
		Attitudes; Social support	2	3,45												1	1	
		Digital engagement	1	1,72														1
		Intensity	2	3,45												1	1	
		Intensity	1	1,72									1					
		Intensity; Social support	1	1,72	1													
		Motivation	**6**	**10,34**				1				1			1	2	1	
		Motivation, Social support	1	1,72														1
		Motivation; Skills	4	6,90				1		1					2			
		Network and Quality	1	1,72													1	
		Skills	**14**	**24,14**			1			1	1	1	4	1	1	1	1	2
		Skills; Attitudes; Intensity	1	1,72						1								
		Skills; Motivation; Social support	1	1,72			1											
		Social support	**13**	**22,41**				1		3		1			2	1	3	2

Component	Attribute	n	%													
EMPOWERMENT	Social support; Attitudes; Motivation	1	1,72							1						
	Social support; Motivation;	1	1,72													1
	Content creation	1	1,72				1									
	Content creation; Networking	2	3,45											1		1
	E-participation	1	1,72							1						
	E-participation; E-democracy; Networking; Content creation	1	1,72										1			
IMPACT ON THE QUALITY OF LIFE	All attributes	3	5,17	1								1		1		
	E-government	1	1,72					1								
	E-entertainment	1	1,72					1								

Table 11. Paper by components and attributes in period 2003 – 2020.

The skills (20 of 58) and social support (20 of 58) are the most represented attributes of e-Inclusion model. The social support has often been researched in recent years, but skills are continually in the focus of research during observed period. As both are the attributes of usage component, it is clear the usage is the most analyzed component of the e-Inclusion model. Access and empowerment, as well as the impact on the quality of life are rarely being present in sample of analyzed articles.

The analysis showed, among other things, that some papers are related with more than one component of the referenced models (digital inequality or e-Inclusion), which also confirms the multidisciplinary approach of researches. The component macro cause is relatively the most researched component of the digital inequality models in both of papers type (scientific and professional). As it can be concluded from Table 12, the scientific type of papers follows decreasing trend in the meso cause (13), micro cause (11) components. According to selected papers, the focus of scientific papers on behavioral and effect measurement is relatively low. The point is that scientific type of research focuses much more on general macro causes of the inequalities than on the individual adoption and continual use or impact on people's quality of life, which ultimately leads to a successful e-Inclusion process. The professional papers are focused rarely on resources and measurement (behavioral or effect). Thus, it can be said that all components of the model must be equally represented, in order to achieve progressive results of e-Inclusion.

By viewing data in Table 13 it can be seen that scientific papers are focused on usage (46 of 50) and access (11 of 50). In professional papers the focus on the impact on QoL is not observed, but therefore greater focus is given to the component usage. The component impact on QoL is also rarely represented in scientific research (6 of 50). The component empowerment is represented only in 4 scientific papers and 1 professional one. It is relatively negative that these two components are in such a small extent represented in research, because they are the core point of the whole process of

being e-included for individuals, as well as for other stakeholders (public authorities, business community and other stakeholders).

Type of document	MACRO CAUSE - Forces	MESO CAUSE - Resources	MICRO CAUSE - Access	BEHAVIORAL MEASUREMENT - E-ACCEPTANCE	EFFECT MEASUREMENT - SITUATIONAL E-INCLUSION
Professional	7	2	4	1	1
Scientific	30	13	11	6	3
Total	37	15	15	7	4
%	63,79	25,86	25,86	12,07	6,9

Table 12. Paper by type and digital inequality model component.

Type of document	ACCESS	USAGE	EMPOWERMENT	IMPACT ON QoL
Professional	1	7	1	0
Scientific	11	46	4	6
Total	12	53	5	6
%	20,69	91,38	8,62	10,34

Table 13. Paper by type and e-Inclusion model component.

Most of analyzed papers consider the digital divide and e-Inclusion as a multidimensional and multiperspective issues as it is presented in Table 14. The total number of keywords defined at the start of content research is 17. The analysis of papers has resulted in following conclusions:
-   14% of scientific papers are related with 9, 6 and 5 keywords; in the group of professional papers, 38% of them are related with 11 and 8 keywords in the content of papers.
-   The professional papers have a wider spectrum of view than the scientific ones and are focused only on specific issues related with a reduced number of referenced keywords in the content.

Number of related referenced key words in the papers' content	14	13	12	11	10	9	8	7	6	5	4	3	2	Total
Scientific	1	2	3	1	5	7	5	5	7	7	4	2	1	50
% of scientific total	2	4	6	2	10	14	10	10	14	14	8	4	2	100
Professional	0	1	0	3	0	0	3	0	0	0	1	0	0	8
% of professional total	0	12,5	0	38	0	0	38	0	0	0	12,5	0	0	100

Table 14. Papers by number of related referenced key words in the papers' content.

The authors have also analyzed potential future research suggestions from selected scientific papers indexed in Scopus or in WoS (40 of 58). Seven of 40 papers contain the exact recommendations and future work ideas, as it stands in Table as follows.

Reference of the document	Recommendations and future work ideas
Zhang, X., Tlili, A., Nascimbeni, F. et al. Accessibility within open educational resources and practices for disabled learners: a systematic literature review. Smart Learn. Environ. 7, 1 (2020)	This study opens new research perspectives for researchers and practitioners on the use of open educational resources and practices for accessibility and functional diversity in educational contexts by uncovering gaps in this field that should be investigated.
Morris, A., Goodman, J., & Brading, H. (2007)	There is much to be done to change the perceptions of older people and to provide facilities more suited to their use.
Boulton-Lewis, G. M., Buys, L., Lovie-Kitchin, J., Barnett, K., & David, L. N. (2007)	The need for access to computers for people with lower incomes also needs to be addressed.
van Deursen A., van Dijk J. (2010)	Administrators are responsible for the institution of the public information supply, both internally and externally. They have to decide on the acquisition and implementation of infrastructures, architectures and applications and assess whether these fit within the existing organization or whether they need to be adapted. It is therefore recommended that administrators possess more Internet skills. Policy advisors should support administrators in decision-making and have to be aware of all possibilities that the Internet offers to the government. It is highly recommended to improve the levels of Internet skills among civil servants, especially the levels of information and strategic Internet skills; It is recommended that the Internet skill levels are tested when hiring new employers, preferably using tests or surveys.
Bejaković, P., & Mrnjavac, Ž. (2020)	The government, educational institutions and employers should design new forms to assess digital skills, change standards to reflect the value of 21st century literacy, design and implement intervention programs for workforce digital skills development. For all these demanding tasks, there is a need for a strong partnership on the national and European level, where stakeholders work together to reduce the digital skills gap.
Martínez-Bravo, M. C., Sádaba-Chalezquer, C., & Serrano-Puche, J. (2020)	It is also important to point out that throughout the research process and data processing we identified other terms of interest that have been left out of the analysis such as: computer literacy, e-literacy, internet literacy, among others, which should be considered in future studies.

Table 15. Recommendations from selected scientific researches.

Ten of 40 selected papers have specified the limitations related to those researches. The limitations of scientific researches like reduced number of criteria parameters such as keywords, sample size, population groups, specific factors important for research issues, variables and geographic territory were included in the research.

Future work was specified in eleven of 40 papers, and is mostly related with previously mentioned limitations of the research by providing research on a bigger sample, on wider geographic territory by using more variables or factors important for research topics, including wider population, etc.

Regarding the criteria that was used in this research and two referenced models that presents the backbone of the research methodology it is reviled that e-Inclusion and digital divide attributes of the models did not attracted attention of the researches by the same intensity. The impact on quality of life is not enough emphasized as the motivational factor for raising e-Inclusion of vulnerable population groups. The developed countries have much more research related with key issues and the most important is that they recognized the importance much earlier of that and take practical measures according the public policies to make thing better. So the results of that are visible according the results of e-society research conducted by EUROSTAT.

5. Conclusion

The main contribution of this paper is that it connects two referenced models – the multidimensional and multiperspective theoretical model of e-Inclusion [65] and integrated model of digital inequality [32] by focusing on keywords of analyzed documents. The main idea was to make the landscape of research during the period of 2003-2020 and find out which components of actual referenced models are emphasized. The problem of digital divide is still present, which means the focus of researchers and practitioners must be moved to those components of referenced models that can assure the potential raise of e-Inclusion regarding the attitudes of all kind of e-Inclusion vulnerable social groups. It means that practitioners have to use the scientific results more in the process of making programs for e-Inclusion of vulnerable social groups. According the goal of this research the article presents the crosscut of the causes of the digital divide and effects of e-Inclusion.

The paper presents the bridge between digital divide and e-Inclusion, and keywords are bottleneck for raising e-Inclusion.

According to the results presented in this study, several concluding remarks could be specified:

-   The authors of analyzed papers in their research have been mostly focused on components usage and access, and less on components empowerment and impact on QoL. Empowerment and impact on QoL are more associated with motivational issues and both have a significant impact on raising the e-Inclusion rate. It could be concluded that the impacts of e-Inclusion on quality of life are not presented enough as motivational mechanisms to raise the e-inclusion rate of vulnerable population groups.
-   The causes of digital inequalities are relatively analyzed much more than the behavioral measurement of e-acceptance and effect measurement of

situational e-Inclusion. This is a similar situation to the previous note, but from the point of practice that follows the scientific conclusions, it could be said that the effect measurement of situational e-Inclusion or the behavioral measurement of e-acceptance should be seen as motivational factor for raising e-Inclusion rate in global.

6. Limitations and future work

Regarding the results of presented research, especially those related with bridging two referenced models by keywords from selected papers, the authors of this research can specify few limitations. The limitation of this paper is that the documents considered are in English language. Also, it has to be mentioned that multidimensional and multiperspective theoretical model of e-Inclusion has much more attributes than the analyzed keywords which are taken into consideration during research – like the attributes which together form the component impact of quality of life (e-government, e-health, e-learning…). These attributes are key components of digital society developing processes – and in nature they are a kind of digital services that are the objects of usage and - in authors' opinion - must be separately analyzed from that aspect, which also represents the idea for the future research.

Future work will focus more on components empowerment and raising quality of life by e-Inclusion of vulnerable social groups. Until now, that was recognized by public administration and politicians for distribution of public information of their work. Citizens have to use much more among all e-services that have positive impact on quality of life, so the future research will be oriented to those attributes referenced in e-Inclusion model [65].

Appendix 1. Analyzed scientific and professional papers

Order No.	List of analyzed scientific and professional papers
1.	A. Lima Oliveira, et.al., "Promoting conscious and active learning and aging - How to face current and future challenges?", available on *https://www.uc.pt/imprensa_uc/catalogo/ebook/E-book_Promoting*, 2013.
2.	G. Galdon Clavell, M.M. Zamorano, J.M. Zavala Pérez, "ICTs and Community Policing: An Ethical Framework. In: Leventakis G., Haberfeld M. (eds)", *Societal Implications of Community-Oriented Policing and Technology"*, pp 63-76. SpringerBriefs in Criminology. Springer, Cham, https://doi.org/10.1007/978-3-319-89297-9_8, 2018.
3.	A.C. Kirongo, G.S. Huka, D.G. Bundi, G.M. Muketha, "Competence Network for e-Inclusion and Assistive Technologies", available on *http://www.iosrjournals.org/iosr-jhss/papers/Vol.%2024%20Issue6/Series-7/H2406076670.pdf*, 2019.
4.	E. Brenna, "Adult Education, the Use of Information and Communication Technologies and Their Impact on Elderly's Quality of Life: A Case Study", *International Journal of Business and Social Science*, 10(8), 2019.

5.	O. Sergeyeva & L. Makarova, "E-Inclusion and perception of time among elderly: Russian regional perspective", *International Journal of Electronic Governance*, 8(3), 303-313, 2016.
6.	X. Zhang, A. Tlili, F. Nascimbeni, et al., "Accessibility within open educational resources and practices for disabled learners: a systematic literature review", *Smart Learn. Environ. 7, 1, https://doi.org/10.1186/s40561-019-0113-2*, 2020.
7.	N. Selwyn, S. Gorard, J. Furlong & L. Madden, "Older adults' use of information and communications technology in everyday life", *Ageing and society*, 23, 561, 2003.
8.	A. Morris, J. Goodman & H. Brading, "Internet use and non-use: views of older users", *Universal access in the information society*, 6(1), 43-57, 2007.
9.	G. M. Boulton-Lewis, L. Buys, J. Lovie-Kitchin, K. Barnett & L.N. David, "Ageing, learning, and computer technology in Australia", *Educational Gerontology*, 33(3), 253-270, 2007.
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12.	A. van Deursen, J. van Dijk, "Civil Servants' Internet Skills: Are They Ready for E-Government?. In: Wimmer M.A., Chappelet JL., Janssen M., Scholl H.J. (eds)", *Electronic Government* pp 132-143. EGOV 2010. Lecture Notes in Computer Science, vol 6228. Springer, Berlin, Heidelberg, https://doi.org/10.1007/978-3-642-14799-9_12, 2010.
13.	D. Epstein, E.C. Nisbet & T. Gillespie, "Who's responsible for the digital divide? Public perceptions and policy implications.", *The Information Society*, 27(2), 92-104, 2011.
14.	W. Vishanth, Y.K. Dwivedi, R. El-Haddadeh, A. Almuwil & A. Ghoneim, "Conceptualizing E-Inclusion in Europe: An Explanatory Study", *Information Systems Management*, 29:4, 305-320, DOI: 10.1080/10580530.2012.716992, 2012
15.	M. Näsi, P. Räsänen & O. Sarpila, "ICT activity in later life: Internet use and leisure activities amongst senior citizens in Finland", *European Journal of Ageing*, 9(2), 169-176., 2012.
16.	B. Rerup Schlichter, L. Danylchenko, "Measuring ICT usage quality for information society building", *Government Information* Quarterly Volume 31, Issue 1, January 2014, Pages 170-184, https://doi.org/10.1016/j.giq.2013.09.003, 2014.
17.	S. Bannier, R. Glott., V. Meijs, "How E-Inclusion and Innovation Policy Affect Digital Access and Use for Senior Citizens in Europe. In: Stephanidis C., Antona M. (eds) Universal Access in Human-Computer Interaction. User and Context Diversity. UAHCI 2013", *Lecture Notes in Computer Science,* vol 8010. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-39191-0_1, 2013.
18.	H. Ayako, K. Masaaki, "Active Use of ICTs among the Elderly by Positive User Experience", *International Journal of Computer Science and Information Security*, Vol. 11, No. 3, 2013. http://sites.google.com/site/ijcsis, ISSN 1947-5500, 2013.

19.	A. Loureiro, M. Barbas, "Active Ageing – Enhancing Digital Literacies in Elderly Citizens. In: Zaphiris P., Ioannou A. (eds) Learning and Collaboration Technologies. Technology-Rich Environments for Learning and Collaboration pp 450-459. LCT 2014.", *Lecture Notes in Computer Science*, vol 8524. Springer, Cham, https://doi.org/10.1007/978-3-319-07485-6_44, 2014.
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26.	T.N. Friemel, "The digital divide has grown old: Determinants of a digital divide among seniors", *New media & society*, 18(2), 313-331, 2016.
27.	M. Viñarás-Abad, L. Abad-Alcalá, C. Llorente-Barroso, M. Sánchez-Valle, M. Pretel-Jiménez, "e-Administration and the e-Inclusion of the elderly". *Revista Latina de Comunicación Social*, 72, pp. 197 to 219., http://www.revistalatinacs.org/072paper/1161/11en.html, DOI: 10.4185/RLCS-2017-1161en, 2017
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