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**CONCEPTUAL EVOLUTION  
OF THE DIGITAL DIVIDE:  
A SYSTEMATIC REVIEW OF THE LITERATURE  
OVER A PERIOD OF FIVE YEARS (2010–2015)**

**КОНЦЕПТУАЛЬНАЯ ЭВОЛЮЦИЯ ТЕРМИНА  
«ЦИФРОВОЕ НЕРАВЕНСТВО»:  
СИСТЕМНЫЙ ОБЗОР ЛИТЕРАТУРЫ  
ЗА ПЯТИЛЕТНИЙ ПЕРИОД (2010–2015)**

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*Throughout the last twenty years the digital divide – a multi-dimensional concept – has evolved in a manner that takes account of various technological, socio-economic, socio-political, and socio-cultural considerations. The objective of this study is to access recent conceptualizations of the term and to identify emerging considerations. In this paper I employ Okoli and Schabram’s (Okoli, Schabram, 2010) systematic literature review framework as a basis for examining 21 digital divide focused scholarly articles that were selected from 118 peer-reviewed journal articles published between 2010 and 2015. The findings suggest that scholarly literature published in this domain during the last five years has identified*

*user attitudes towards technology, motivations for use of technology, and socio-cultural backgrounds as factors influencing the notion of the digital divide. Despite the lack of a widely agreed upon definition of the digital divide, recent conceptualizations appear to be moving away from the traditional emphasis on technological and economic gaps. The central theme of the selected articles is that without addressing long existing socio-economic and socio-cultural inequalities, which are real and deep divides, bridging the technological gaps might not end the real issue of digital divide.*

**Key words:** *digital divide, conceptual evolution, skills and usage gaps, socio-cultural disparity, systematic literature review.*

*В течение последних двадцати лет многомерный концепт «цифрового неравенства» развивался, вбирая различные технологические, социально-экономические и социокультурные аспекты. Цель данного исследования — определить установившееся в науке понимание термина, а также выявить теоретический вклад недавних работ в развитие этого концепта. В настоящей работе, основываясь на структуре системного обзора литературы, представленного Околи и Скабрамом (2010), мы приводим результаты исследования 21 научной статьи, рассматривающих проблему цифрового неравенства, выбранных из 118 рецензируемых журналов и опубликованных с 2010 по 2015 годы. Полученные данные свидетельствуют, что работы последних пяти лет в числе факторов, влияющих на цифровое неравенство, рассматривают отношение пользователей к технологии, их мотивацию для ее использования, а также социально-культурные особенности. Несмотря на отсутствие общепринятого определения, актуальные концепции отказываются от традиционного акцента на технологических и экономических проблемах. Центральная идея изученных статей со-*

*стоит в том, что без преодоления долговременных социально-экономических и социально-культурных разрывов устранение технологических пробелов не может по-настоящему решить проблему цифрового неравенства.*

***Ключевые слова:** цифровое неравенство, концептуальная эволюция, проблемы навыков и применения, социально-культурное неравенство, систематический обзор литературы.*

## **Introduction**

The term “digital divide” primarily refers to the disparity between information-rich and information-poor people due to their access to computers and the Internet. Digital divide occurs when a group of people lacks access to information and communication technology (ICT) means and is thereby prevented from various socio-economic opportunities, such as education, income and employment (Eastin, Cicchirillo, Mabry, 2015: 416–437; Nguyen, 2012: 251–268; Sparks, 2013: 27-46; Van Dijk, 2012: 57–75). This research essay based on the systematic literature review method is an attempt to assess recent understanding of the concept of and trends in the digital divide, which has been proliferating in various dimensions and scholarly discourses.

The concept of the digital divide has been evolving and has expanded into several fields since it was first discussed in the mid-1990s. Since the beginning of the 21st century, there has been a paradigm shift with respect to the understanding of the digital divide from users’ access to ICT means to users’ capability to handle these means. During the first five years of this century, the discussion on the concept of the digital divide focused on users’ unequal skills and knowledge of handling ICT devices. This gap was introduced as the second layer of the digital divide (Dewan, Reggins, 2005: 298–337;

Hargittai, 2002). After 2005, usage of digital devices was also added to the discussion, the focus being on whether or not the usage of computers and the Internet has brought any positive changes in users' everyday lives. Scholars (such as Wei et al., 2011) argue that the inequality of users' capacities to exploit ICT means can seriously affect the expected outcomes, creating the third layer – “digital outcome divide”. Hence, the concept of the digital divide – confined in the beginning to a bipolar division with respect to access to computers and the Internet – has been evolving to multiple levels.

Scholars argue that bridging the digital divide is a challenge in any country, either developing or developed. Developing countries are struggling for ICT infrastructure and affordable ICT devices. In contrast, developed countries are working hard to bridge gaps in digital inequalities with respect to skills and usage among various groups, such as immigrants versus non-immigrants, males versus females, young versus old, rural versus urban and high-income versus low-income.

The concept of the digital divide has been developing with respect to various technological, socio-economic and socio-cultural factors. Since the mid-1990s, approximately every five years, a new concept has evolved on the subject of the digital divide, such as access divide during 1995-2000, skills divide during 2000-2005, and usage gap during 2005-2010. Drawing from various scholarly articles written between 1995 and 2015, this essay will identify evolving definitions and trends of the digital divide from 2010 to 2015.

## **Literature review**

Before the terminology “digital divide” was popularized during the mid-1990s, the “information divide” was widely discussed in connection with multiple issues in society, such as education equality, information-

based economy and universal access to information (Compaine, 2001; Yu, 2006: 229–252). From the 1960s to the early 1990s, there were a number of discussion agendas in academia with regard to the information gap and its potential consequences on education, the economy and the social well-being of the public. There was great optimism in contemporary western societies that information equality can help enhance lifestyle, which was possible through universal access to computers, telephones and email (Anderson et al., 2001: 86–87; Katz, Aspden, 1997: 170–188; Maitland, 1984; Yu, 2006: 229–252). Hundreds of studies were conducted focusing on various aspects of information, such as information inequality, the knowledge gap, the information divide, information-rich versus information-poor and information-haves and have-nots (Compaine, 2001).

During the 1980s and the early 1990s, unequal access to the personal computer (PC) was a discussion agenda because the PC was the only tool used to exchange information through electronic mail or “email” (Compaine, 2001). Even though the email system originated in 1969, electronic information exchange became popular only after the availability of the PC in the 1970s and later (Anderson et al., 1997: 86–87). Therefore, during the 1980s and early 1990s, computer literacy, the knowledge gap, PC gaps and email gaps were popular in denoting the present-day “digital divide” (Yu, 2006). Interestingly, the term “digital divide” was initially defined based on computer ownership regardless of the owner’s access to the Internet (Tapscott, 1998).

During the early 1990s, there was a shift from the traditional information divide to a computer and Internet-based information divide because personal computers and the Internet were becoming widely available (Kim, Kim, 2001: 78–91; NTIA, 1999; Yu, 2006: 229–252). The status of having or not having access to information stored in ICT devices, such as computers and the Internet, was termed as the “digital divide” during the mid-1990s (Hoffman, Novak, Schlosser, 2001; Yu, 2006: 229–252).

The National Telecommunications and Information Administration (NTIA), a government agency of the United States, conducted a series of surveys entitled “Falling Through the Net”, which gathered statistics on access to telephone, computer and the Internet (NTIA, 1995, 1998, 1999, 2000). The survey results revealed that Americans were more connected to ICTs than ever before, but at the same time, the digital divide between the information-rich and information-poor had not decreased. Yu argues that during the late 1990s, “the Internet was widely recognized as the most significant divider between information rich and information poor” ((Yu, 2006: 230). During that time, the digital divide was considered to be a binary division between people’s access and non-access to computers and the Internet regardless of users’ knowledge and skills (Anderson et al., 1997: 86–87; Dewan, Riggins, 2005: 298–337; Katz, Aspden, 1997: 170–188). Until 2000, most of the studies on the digital divide concentrated on the gap in access to computers and the Internet, based on various factors, such as income, gender, education, geographic location and ethnicity (Hargittai, 2002; Kim, Kim, 2001; Yu, 2006). By end of the 20th century, there were more than 14,000 publications that discussed the issue of the digital divide (Yu, 2006). The key concept of most of the definitions of digital divide was – the gap between having access to computer and the Internet and not having them (DiMaggio et al., 2004; Harambam, Aupers, Houtman, 2013: 1093–1114; NTIA, 1999; Yu, 2006: 229–252).

Furthermore, the concept of the digital divide began to be understood in a broader perspective in the beginning of the 21st century. Several scholars (such as Dewan, Riggins, 2005: 298–337; DiMaggio et al., 2004; Hargittai, 2002; Paré, 2005: 85–97; Selwyn, 2004: 341–362; Van Dijk, Hacker, 2003: 315–326; Warschauer, 2003: 297–304; Yu, 2006) argue that the concept of the digital divide should be interpreted based on several factors, such as digital devices, quality of Internet connection,

availability of relevant content, knowledge and skills of users and the purposes of usage. In other words, there is more than one digital divide.

During this period, there were two groups of studies on the digital divide. The first group emphasized the divide from a vertical perspective with an emphasis on qualitative growth (Kim, Kim, 2001; Pare, 2005: 85–97; Warschauer, 2003: 297–304). This group looked at access, skills and usage gaps. The second group of studies emphasized a horizontal perspective, focusing on the Internet access on a national and global scale. The first group of studies argued that having access to computers and the Internet is not enough to bridge the gap of the digital divide and proposed a broader definition. For instance, Warschauer (Warschauer, 2003: 297–304) contends that “access to online information” is not sufficient to reduce the digital divide because the divide in people’s everyday lives is connected within political, economic, institutional and linguistic contexts. In a similar tone, Daniel Paré argues that the interpretation of the digital divide as “the binary distinction between haves and have-nots is not appropriate” because the digital divide is “a compendium of interrelated social, economic, and technological considerations that influence Internet access and use” (Pare, 2005: 85).

The second group of studies emphasized the mitigation of the horizontal disparity in Internet access on a global scale (see, Dewan, Riggins, 2005: 298–337; Huang, Chen, 2010: 248–264; Norris, 2001). Researchers of this group argue that transformation of the definition of the digital divide from access to skills and usage is appropriate in the context of a few developed countries, but not for many developing countries that are lagging behind with regard to ICT infrastructure. Huang and Chen, for instance, observe that the digital access divide is still a serious issue on a global scale because the digital gap seems to be narrowing in developed countries, whereas it is widening in many developing countries. Although developed countries have already turned their focus on skills and Internet usage, the gap in Internet

access between developing and developed countries will be deep and wide in the long run because of socio-economic factors.

Hence, most of the studies from 2001 to 2010 looked beyond access to computers and the Internet while defining the concept of the digital divide, and identified second and/or third levels of the divide. During the first decade of the 21st century, the preliminary understanding of the “digital divide” concept evolved to cover users’ skills and usage gaps. Despite there being inconsistencies in the interpretation of the term, scholars defined the digital divide concept as a dynamic and multidimensional phenomenon, which has a constantly evolving nature.

So, what next? How has the concept of the digital divide been evolving now? The main objective of this essay is to identify trends in the understanding of the digital divide during the second decade of the 21st century. I intend to address the following questions:

RQ: What is the definition of the digital divide in the last five years?

Sub-Q: Is there any contribution in shaping up or expanding the definition of digital divide?

## **Methodology**

This study employs Okoli and Schabram’s (Okoli, Schabram, 2010) systematic literature review (SLR) method. SLR is a “systematic, explicit and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners” (Okoli, Schabram, 2010: 4). This method helps to identify the most relevant scholarly articles related to a research question, assess the quality of each article and synthesize the findings in a systematic and impartial way.

There are several studies available on the digital divide. These studies were done using various research methods. They looked at

access to computers and the Internet, as well as knowledge, skills and usage gaps. No scholarly articles, based on a systematic literature review, which can substantially and systematically assess the conceptual evolution and recent trends of the digital divide, have been found however. This study, which uses a SLR method, will be relevant in assessing the current understanding of and trends in digital inequality.

Potential databases were identified as available in the University of Ottawa’s online library through “uozone”, a student interactive portal. Okoli and Schabram recommend that consulting an experienced librarian is an excellent way to begin an SLR. Therefore, four databases – “Communication Source”, “Business Source Complete”, “Web of Science”, and “ProQuest” – were selected in consultation with a librarian at the University of Ottawa. In order to make this research practical, manageable and relevant to recent trends in the digital divide, peer-reviewed articles published in English language scholarly journals between 2010 and 2015 were searched for in the four databases by using the same words or phrases (*Table 1*).

*Table 1*

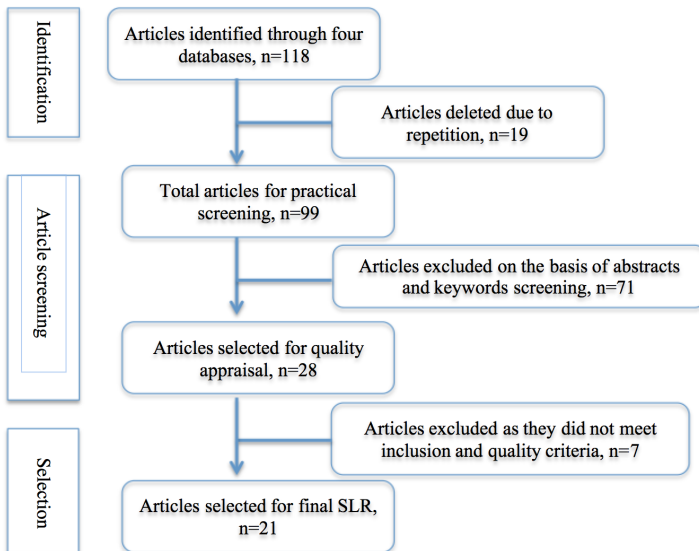
**Article selection criteria**

| Database<br>(# of Articles)      | Boolean/<br>Phrase Used                            | Published<br>Date<br>Range | Journal<br>Type       | Article<br>Type   | Language |
|----------------------------------|--|----------------------------|-----------------------|-------------------|----------|
| Communication<br>source (37)     | “digital<br>divide” OR<br>“digital<br>access*”     | 2010 Jan<br>to 2015<br>Oct | Scholarly<br>academic | Peer-<br>reviewed | English  |
| Business Source<br>Complete (27) | AND<br>“knowledge<br>and skill*”                   |                            |                       | Full text         |          |
| Web of Science<br>(19)           | AND<br>gap OR gaps,<br>disparity or<br>disparities |                            |                       |                   |          |
| ProQuest (35)                    |  |                            |                       |                   |          |

Based on these search criteria, 118 articles were retrieved, and 19 of them were deleted because of repetition. Of the 99 articles, the abstracts and keywords in each article were carefully reviewed and rated on a Likert scale, in which 1 refers to the least relevant and 5 refers to the most relevant to the research topic. A total of 28 articles, which were rated either 4 or 5 were selected for the quality appraisal, the fifth stage of a systematic literature review (Okoli, Schabram, 2010). In this stage, the main parts of the articles (such as introduction, research questions and discussion section) were read to make sure that the articles were relevant to the research topic. Finally, 21 articles were selected for the systematic literature review (*Figure 1*).

*Figure 1*

**SLR flow diagram**



## Findings

Even though studies on the digital divide conducted during the first decade of the 21st century already identified digital inequalities with regard to skills and usage (see, Dewan, Riggins, 2005: 298–337; Dimaggio et al., 2004: 355–400; Hargittai, 2002; Pare, 2005: 85–97; Yu, 2006: 229–252), the authors of the selected 21 articles reiterate the existence of these gaps and try to interconnect them with socio-economic disparities. For instance, Correa stresses that the digital divide has moved beyond the adoption and access concept to “a multifaceted concept that involves cognitive access and width and depth in adoption and use of technologies such as the Internet” (Correa, 2010: 72-73). Wei and Hindman mention that the traditional understanding of the digital divide consisting of “inequalities between technological haves and have-nots” is gradually shifting to actual use (Wei, Hindman, 2011: 217). Hanafizadeh et al. interpret the digital divide as referring to “social stratification due to unequal ability to access, adapt and create knowledge through ICT”, in which stratification is not a binary division but “a continuum based on different degrees of access to information technology” (Hanafizadeh, 2013: 34). This reiteration of an already explored understanding may not sufficiently contribute to the evolution of the digital divide’s conceptual growth.

Article selected for the systematic literature review

| Author               | Coverage  | Article Title  | Study Subjects | Research Method        | Key Arguments/Findings   |
|----------------------|-----------|--|----------------|------------------------|--|
| Abad, (2014)         | Global    | Media literacy for older people facing the digital divide      | Elderly people | Meta-analysis          | The study of the digital divide cannot be limited to the analysis of Internet access, but must go further and become involved in the analysis and determination of the uses and intensity of Internet use, where concepts such as digital literacy, digital skills and digital inclusion acquire a greater impact. |
| Alam & Imran, (2015) | Australia | The digital divide and social inclusion among refugee migrants | Refugees       | Focus Group Discussion | The first level of the digital divide has narrowed in recent years. The second and third levels of the digital divide are found across age, income, gender and employment. The main reasons for not using ICT were cost, language and skills.  |

|                      |    |  |   |  |   |
|----------------------|----|--|---|--|---|
| Chen, (2013)         | US | The implications of social capital for the digital divides in America    | Households                                  | Survey                                 | Even though the digital access divide has narrowed in many aspects around the world, digital divides do not just disappear because socio-economic status affects web skills and Internet activities.                                |
| Correa, (2010)       | US | The participation divide among “online experts”                          | Online participants                         | Survey                                 | This study explores the role of the Internet experience, online skills, and psychological factors in the participation divide with respect to the Web. Psychological factors are the most important predictors of content creation. |
| Dixon, et al. (2014) | US | Digital divide between males and females in Internet public access sites | Low-income households & University students | Participant observation and interviews | The digital divide has emerged along the lines of previously existing social divides. New technologies have benefited those who already had access to other resources at greater rates than people who had fewer resources.         |

| Author                               | Coverage | Article Title  | Study Subjects     | Research Method   | Key Arguments/Findings  |
|--------------------------------------|----------|--|--------------------|---|---|
| Eastin, Cicchirillo & Mabry (2015)   | US       | Digital divide conversation to explain knowledge gap   | Ethnic groups      | Survey  | Although research on the Internet and the digital divide continues to be an important component of knowledge gap research, a holistic approach to the complex media landscape may provide a more accurate perspective on how gaps develop.            |
| Haight, Quan-Haase, & Corbett (2014) | Canada   | Impact of demographic factors on access to internet, level of online activity and SNS usage. | Random individuals | Analysis of Survey on Canadian Internet Use Survey 2010 | The digital divide not only persists, but has expanded the digital inequality in the third level: SNS usage. The first and second levels are: internet access, and online activity. Social and demographic factors affect Internet adoption patterns. |

|   |             |                                |             |                                |  |
|---|-------------|--------------------------------|-------------|--------------------------------|--|
| Hanafizadeh, Hanafizadeh, & Bohlin (2013) | Global      | Digital Divide and e-Readiness | N/A         | Meta-analysis                  | <p>The digital divide suffers from lack of theory and consequently, lack of conceptual elaboration and definition. No single factor, such as gender, age, race, education, income or geographical location alone can fully explain the concept of the digital divide.</p> <p>People's attitude is important in the decision-making process on the domestication of technology. Cultural perception, rather than computer access and skills, plays a vital role in the usage/non-usage of the Internet.</p> <p>There are three types of digital divide across countries. The gap of Internet diffusion between two countries will never close. Factors that are likely to affect the global digital divide in the long run are income, education, national culture.</p> |
| Harambam, Aupers & Houtman (2013)         | Netherlands | The contentious gap            | Individuals | Case study, Survey, Interviews |  |
| Huang & Chen, (2010)                      | Global      | Global digital divide          | N/A         | Data analysis of 48 countries  |  |

| <b>Author</b>              | <b>Coverage</b> | <b>Article Title</b>                                  | <b>Study Subjects</b> | <b>Research Method</b>                 | <b>Key Arguments/Findings</b>   |
|----------------------------|-----------------|---|-----------------------|--|---|
| Nguyen (2012)              | N/A             | The digital divide versus the digital delay           | N/A                   | Argumentative essay                    | The digital divide is unlikely to diminish completely in the near or more distant future for two reasons: due to continuously upgrading nature of the Internet, and socio-economic/socio-cultural phenomena.                                    |
| Olphert & Damodaran (2013) | UK              | Older people and digital engagement                   | Elderly people        | Meta-analysis on case study researches | The digital divide experienced by older people cannot be explained by a simple interpretation of lack of access, lack of skills or lack of interest or motivation. Low-level digital engagement of old people can be the fourth digital divide. |
| Park & Jae Kim (2014)      | South Korea     | Lessons from South Korea's digital divide index (DDI) | Households            | Data analysis of NISA Index 2003-2012  | A second-level digital divide emerges as penetration increases. Even though access gap is diminishing, gaps in skills and uses remain persistent.   |

|                               |             |   |                     |               |  |
|-------------------------------|-------------|---|---------------------|---------------|--|
| Sparks (2013)                 | N/A         | What is the “digital divide” and why is it important? | N/A                 | Meta-analysis | There are three major traditions of research into the subject of the digital divide: (a) physical access, (b) skills and cultural competencies to utilize the ITCs, and (c) socio-cultural role in ICT usage.                  |
| Van Deursen & van Dijk (2014) | Netherlands | The digital divide shifts to differences in usage     | Online participants | Survey        | Even if the access gaps diminish, differences may remain in skills and usage of the Internet. The Internet usage gap, which is different from the knowledge gap, is increasingly reflected in people’s cultural relationships. |
| Van Deursen & Van Dijk (2015) | Netherlands | Internet skill levels increase, but gap widens        | Online participants | Online survey | The second-level divide focuses on gaps in skills and digital engagement. Levels of internet skills change over time. Education influences Internet skills positively.   |

| Author                       | Coverage       | Article Title   | Study Subjects            | Research Method          | Key Arguments/Findings  |
|------------------------------|----------------|---|---------------------------|--------------------------|---|
| van Dijk (2012)              | Netherlands    | Evolution of digital divide   | N/A                       | Literature review        | The discourse of the digital divide has shifted from unequal motivation and physical access to inequalities in skills and usage. Four types of access and six types of skills are proposed to bridge digital gaps.                      |
| Wei & Hindman (2011)         | US             | Comparing the effects of new media and old media use                        | Random adults             | Data analysis and Survey | Social consequences of the digital divide have not yet received adequate attention in research. The differential use of the Internet is associated with a knowledge gap, which can create greater divides than usual.                   |
| Wei, Teo, Chan, & Tan (2011) | US & Singapore | Conceptualizing and testing a social cognitive model of the digital divide. | Secondary school students | Survey                   | There are three levels of the digital divide: digital access divide, digital capability divide, and digital outcome divide. Digital access divide can influence digital capability divide, which in turn impacts digital outcome divide |

|                             |           |  |                     |               |  |
|-----------------------------|-----------|--|---------------------|---------------|--|
| Wijetunga (2014)            | Sri Lanka | Use of the mobile telephone by underprivileged youth in Sri Lanka                            | Mobile using youths | Survey        | Even though mobile phone devices are considered to play a key role in alleviating the digital divide, cheap mobile phones have prevented underprivileged users from utilizing computer-based communication features. |
| Zhao, Collier & Deng (2014) | Global    | A multidimensional and integrative approach to study global digital divide and e-government. | N/A                 | Meta-analysis | Digital divide and e-government development are interrelated because they share the same dimensions and factors. Simply increasing investment in ICT projects may not lead to increasing the use of ICTs.            |

Similarly, thirteen of the 21 articles do not define the concept of the digital divide. They simply borrow definitions from previous studies undertaken between 2001 and 2010, and examine certain features of the digital divide empirically within different demographic segments. For instance, the Organization for Economic Co-operation and Development (OECD) defines the digital divide as “the gap between individuals, households, businesses, and geographic areas at different socioeconomic levels with regard to both their opportunities to access information and communication technologies and their use of the Internet for a wide variety of activities” (OECD, 2001: 5). Several articles selected for this study (such as Abad, 2014: 173–180; Sparks, 2013: 27–46; Wei et al., 2011: 216–235) have used the aforementioned definition, which broadly links the issue of the digital gap with the information gap, the opportunity gap and socio-economic disparities. Moreover, Park and Jae Kim (Park, Jae Kim, 2014: 72) used Warschauer’s (Warschauer, 2003: 297–304) definition, which interprets the digital divide as a social stratification, not as a binary division. It is, rather, a continuum based on different degrees of access to information technology. Similarly, Eastin et al. borrowed Mossberger, Tolbert and Stansbury’s (Mossberger, Tolbert, Stansbury, 2003) definition, which describes the digital divide as “an access divide, a skills divide, an economic opportunity divide, and a democratic divide” (Eastin et al., 2015: 2).

In contrast, some of the scholars try to interpret the digital divide in their own way. For instance, Wei and Hindman believe that “disparities in actual use patterns of the Internet are more pronounced between social strata than gaps in technological access” (Wei, Hindman, 2011: 229). According to Nguyen, the “digital divide is a social rather than technologically driven phenomenon, caused by variation in many factors beyond access and skills” (Nguyen, 2012:

251). For Harambam et al., the digital divide between the haves and the have-nots is just “another manifestation of socio-economic inequality – a reproduction or transformation of already existing disparities, favoring the rich and aggrieving the poor” (Harambam et al., 2013: 1094). Similarly, Chen believes that “digital divides are multidimensional and multilayered – whether and the extent to which individuals have Internet access, how they use it, what they use it for, and the returns they gain from use” (Chen, 2013: 13-14). These definitions, however, are not significantly different from the “borrowed definitions” from the first decade.

Some authors of the selected articles either add elements to or elaborate upon the concept, propose new models to interpret or define the existing definitions of the digital divide, or identify factors that influence the digital divide. For instance, Huang and Chen (Huang, Chen, 2010: 248–264) point out economic, educational and cultural factors as the major causes of digital divides on a global scale. Extending Dewan and Riggins’ (Dewan, Riggins, 2005: 298–337) conceptual framework, Wei et al. (Wei et al., 2011: 170–187) add a third level of digital divide – digital outcome divide – which arises due to the second level digital divide and socio-economic factors.

Van Dijk (Van Dijk, 2012: 57–75) introduces “motivation” as the primary factor that may significantly influence digital divides related to access, skills and usage. He identifies six types of skills used to handle computers and the Internet, and explains usage gaps based on the frequency and diversity of users’ activities. Van Dijk argues, “many of those who remain on the ‘wrong’ side of the digital divide have motivational problems” (Van Dijk, 2012: 62). Extending Van Dijk’s model of the digital divide, Hanafizadeh et al. propose “impact of usage” as the next stage of the digital divide because impact of usage, according to them, is the “ultimate goal of

the process of technological appropriation in the shape of particular applications” (Hanafizadeh et al., 2013: 37). Seventeen scholars of the select studies (such as Dixon et al., 2014: 991–1009; Van Deursen, Van Dijk, 2015: 782–797) argue that socio-economic complexities and cultural aspects behind the digital divide are more important and need closer attention than the focus on technological aspects.

Even though the categorization of various levels of the digital divide vary among scholars, they agree that access, skills and usage are closely interrelated when defining the concept of the digital divide. Nine of the select studies (such as Alam, Imran, 2015: 344–365; Haight et al., 2014: 503–519; Park, Jae Kim, 2014: 72) have indicated that the digital divide should be understood in three levels, namely access, skills and usage. Some scholars (such as Harambam, 2013: 1093–1114; Olphert, Damodaran, 2013: 564–70; Wei, et al., 2011: 170–187; Wijetunga, 2014: 712–726) want to use “capabilities” instead of “skills” because, they argue, the term “capabilities” can incorporate users’ skills and abilities together. Some other scholars (such as Abad, 2014: 173–180; Correa, 2010: 71–92; Wei, Hindman, 2011: 216–235) include skills and usage in the same level because, according to them, skills are tested when they are used, therefore, they are inseparable. Furthermore, scholars’ categorizations of the third level of the digital divide vary significantly. For instance, Correa (Correa, 2010: 71–92) and Olphert and Damodaran (Olphert, Damodaran, 2013: 564–570) propose content creation as the third level of the digital divide, but Park and Jae Kim (Park, Jae Kim, 2014: 72) and Wei et al. (Wei et al., 2011: 170–187) propose “outcomes” and “utilization” respectively as the third level of digital divide. Similarly, Harambam et al. (Harambam et al., 2013: 1093–1114) recommend “cultural divide” and Haight et al. (Haight et al., 2014: 503–519) submit

“SNS (social network site) usage” as the third level. Moving ahead, Olphert and Damodaran (Olphert, Damodaran 2013: 564–70) suggest “digital engagement” as the fourth level of the digital divide. Even though there are strong correlations between the levels of digital divide, there is a lot of confusion and differences among scholars about the classification of various levels.

Nineteen of the select articles for this study (such as Alam, Imran, 2014: 344–365; Chen, 2013: 13–25; Dixon et al., 2015: 991–1009; Harambam et al., 2013: 1093–1114; Hight et al., 2014: 503–519; Park, Jae Kim, 2014; Van Deursen, Van Dijk, 2015: 782–797) point out that access to ICT is just the starting phase of digital exclusion, which can be diminished sooner or later. Digital divides with respect to new skills, content creation, outcomes and impact, however, do not disappear because of the continuously upgrading nature of the Internet and long existing social divide (see Nguyen, 2012: 251–268; Van Deursen, Van Dijk, 2014: 507–526). Further, scholars interpret the digital divide as a social divide, finding its new connection to socio-cultural spheres, because they believe that social and cultural factors are pivotal in technology appropriation in many societies (Haight, 2014: 503–519; Hanafizadeh et al., 2013: 30–75; Harambam et al., 2013: 1093–1114; Sparks, 2013: 27–46; Van Deursen, Van Dijk, 2014: 507–526). Hanafizadeh et al. argue that the digital divide should be interpreted from a socio-cultural perspective, which emphasizes users’ perceptions and psychology while adopting a new technology. In addition, Van Dijk (Van Dijk 2012: 57–75) focuses on users’ feelings towards technology, such as technophobia and computer anxiety. For him, without addressing users’ attitudes, moral reasoning and ethical aspects, the digital divide cannot be understood properly. Similarly, Harambam et al. argue that having access to ICTs or not having them is more a culturally informed decision – “a matter of cultural polarization” –

than the result of socio-economic inequalities (Harambam et al., 2013: 1109). They suggest that research undertaken from a cultural perspective should be seriously considered because people's perception about the significance of technology to their livelihood is very important. Similarly, Van Deursen and Van Dijk (Van Deursen, Van Dijk, 2014: 507–526) observe that use of the Internet is increasingly reflecting users' socio-cultural relationships in the offline world and argue that a portion of inequality will continue for a long time because of users' socio-cultural preferences.

Based on the articles selected for the study, bridging the digital divide with respect to all sorts of disparities – access, skills, outcomes, motivation – is unlikely for two reasons: First, one hundred percent of people in the world will never have access to the Internet because there are not only have-nots, but also want-nots. Van Dijk (Van Dijk 2012: 57–75) points out that nearly 14% of U.S. households made an informed decision not to connect to the Internet either because they were not interested in it or because they did not need the service. Even if there is 100% access to computers and the Internet, access to computers and the Internet may not bridge digital disparities because ICTs need constant updates, which may create a constant gap between users in terms of skills, content creation and outcomes (Haight, 2014: 503–519; Sparks, 2013: 27-46; Van Dijk 2012: 57–75). The digital divide may also never be bridged due to socio-cultural factors, which are pivotal in technology adoption in many societies.

To sum up, although there is no widely accepted definition and classification of the digital divide, the articles reviewed for this study have contributed greatly to extending its understanding, focusing on long-existing socio-economic disparities rather than on technological gaps. Scholars of the select studies realize that the digital divide is a multidimensional phenomenon, and

identify various stages or levels of digital divide, such as unequal motivation, access, skills, usages, outcomes, and so on. Recent conceptualization of the digital divide, according to these journal articles, is moving away from the traditional understanding of technological and economic gaps.

## **Discussion and conclusion**

All countries across the globe – developed or developing – are working hard to bridge the digital divide reflected at various levels, ranging from access, skills, usage and outcomes/ impact. The articles selected for this study have interpreted the concept of the digital divide from both horizontal and vertical perspectives. The horizontal perspective interprets the meaning of the digital divide on individual, regional and global scales, and focuses on ICT infrastructure, as well as the availability and affordability of ICT devices (see Huang, Chen, 2010: 248–264; Haight et al, 2014: 503–519; Wijetunga, 2014: 712–726). The vertical perspective looks at the qualitative growth of digital access, ICT handling skills, usage of digital devices and the outcome of users’ digital activities with respect to facilitating their livelihood (Abad, 2014: 173–180; Sparks, 2013: 27–46; Wei et al., 2011: 170–187). Scholars are optimistic that the access-related digital divide will be overcome sooner than the capability and usage-related digital divide (Chen, 2013: 13–25; Correa, 2010: 71–92; Dixon et al., 2014: 991–1009; Van Dijk, 2012: 57–75). Digital divides other than the access gap, according to these scholars, are more challenging due to various barriers, such as language, skills and knowledge in handling ICT means. For instance, Sri Lanka is struggling to overcome a digital access divide, whereas Canada has almost overcome this divide (Haight et

al., 2014: 503–519; Wijetunga, 2014: 712–726). Canada, however, is focusing on a skills and usage-related digital divide, particularly with respect to users in multicultural communities and First Nation peoples. Unless and until both the vertical and horizontal divides are eliminated, the digital divide will continue.

Through a review of literature on the digital divide written over the past fifteen years (1995-2010), it is found that several past studies focused on technological and digital inequalities with regard to access, skills and usage. Most of the selected articles for the systematic review (2010-2015), however, focus on socio-economic and socio-cultural aspects in order to define and/or interpret the digital divide, in which access is only one of the issues. More than a half of the selected articles borrow definitions from the studies of the first decade of the 21st century (notably from OECD, 2001), and interpret them in their own way (such as Abad, 2014: 173–180; Sparks, 2013: 27–46; Wei et al., 2011). Other scholars (such as Chen, 2013; Harambam et al., 2013; Nguyen, 2012; Wei, Hindman, 2011: 216–235) try to define the concept of the digital divide in their own ways. The common element for both groups is the realization that the digital divide is not just a technological divide, but also a consequence of long-existing socio-economic disparities. There is no agreed upon definition of the digital divide among the selected articles. Scholars have their perceptions of the digital divide and use their own approaches to define it.

Some scholars have significantly contributed to extending the concept of the digital divide (see, Van Dijk, 2012: 57–75; Hanafizadeh et al., 2013: 30–75; Wei et al., 2011: 170–187). They explain the existing understanding of the digital divide by elaborating or re-interpreting their past studies, proposing their own models on digital divides or extending some aspects of others' studies on the divides. For instance, Wei et al. propose a digital divide model that

tries to incorporate both vertical and horizontal perspectives. Based on his past studies, Van Dijk elaborates upon the concept of ICT skills and usage, and argues that motivation is the basic requirement for bridging digital divides of any type. Even though many of the selected studies discuss that gaps in ICT skills and usage are the second and third levels of digital divide, some scholars propose that content creation, SNS usage, impact and culture make up the third level of the digital divide. As the levels of the digital divide increase, diversity of opinions among scholars also increases.

Another important observation on these articles is that definitions and interpretations of the digital divide have been moving away from the grip of a technology-focused conceptualization of the divide. The technological gap is a minor issue with respect to the conceptualization of digital divide, whereas the major issue is socio-economic and socio-cultural inequalities among users. Access to ICTs, skills and usage are also secondary to several scholars who argue that technophobia, psychological factors, attitudes and cultural perceptions are primary factors that motivate users to use or not use ITCs (see Correa, 2010: 71–92; Hanafizadeh et al., 2013: 30–75; Harambam et al, 2013: 1093–1114; Van Deursen, Van Dijk, 2014: 782–797; Van Dijk, 2012: 57–75). More than a decade ago, OECD rightly pointed out that “there is no single, clearly defined divide, but rather a series of gaps, brought about by a variety of factors, which often come together, many of which do not have their roots in technology” (OECD, 2000: 51). The OECD interpretation of the digital divide is still relevant today because there is a growing realization among scholars that socio-economic and socio-cultural disparities, not technology, are the major causes of the digital divide.

Based on the research objectives and the focus of the study, the selected articles can be categorized into three main groups. The first group claims that the disparity between people having access

to ICTs and those who do not have access to them (see, Huang, Chen, 2010: 248–264; Wijetunga, 2014: 712–726; Zhao et al., 2014: 38–62) is a development constraint between and within countries, and has blocked economic progress. This sort of digital disparity can be avoided through government interventions with respect to the development of ICT infrastructures and the availability of affordable ICT devices. The second group of articles portrays the idea that the digital divide is neither just a development constraint, nor merely a technological gap. It is rather a socio-economic issue because some sections of society enjoy better opportunities while the rest are excluded (see, Chen, 2013: 13–25; Eastin et al., 2015: 416–437; Haight et al., 2014: 503–519.; Hanafizadeh et al., 2013: 30–75; Wei, Hindman, 2011: 216–235). Studies from the third group concur with those from the second group, predicting that there is a deep social divide because of culture, attitudes, perceptions and motivations, which may hinder the efforts of bridging digital disparities at different levels (see Alam, Imran, 2015: 344–365; Correa, 2010: 71–92; Harambam et al., 2013: 1093–1114; Van Dijk, 2012: 57–75; Van Deursen, Van Dijk, 2014: 507–526). For instance, Harambam et al. argue that “the digital divide may be more a matter of cultural polarization than of socio-economic stratification and more a culturally informed choices than the result of cultural limitations” (Harambam et al., 2013: 1109). Similarly, Van Deursen & Van Dijk argue that “overcoming digital divides is a rather complex challenge that goes beyond improving access or Internet skills... to individual motivations and socio-cultural preferences” (Van Deursen, Van Dijk, 2014: 522). Hence, the third group of studies seems more innovative with respect to exploring a new level of interpretation of the digital divide from the perspective of human psychology.

Many scholars from the early years of the 21st century (such as Paré, 2005: 85–97; Warschauer, 2003: 297–304) question the idea

that the scholarly discourse focused on the “digital” rather than the long-existing social “divide”. They argued that the digital divide is not caused just by ICT gaps, but also by socio-economic and socio-cultural inequalities, such as income and education. The shift in the focus of the digital divide discourse is reflected in many articles selected for this study (such as Correa, 2010: 71–92; Harambam et al., 2013: 1093–1114; Nguyen, 2012: 251–268; Park, Jae Kim, 2014; Wei et al., 2011: 170–187), which have discussed the digital divide in relation to socio-economic inequalities. In recent studies, scholars express the opinion that current discourse concerning the digital divide has actually distracted from the major problem, which is rooted in socio-economic and socio-cultural grounds (Abad, 2014: 173–180; Chen, 2013: 13–25; Harambam et al., 2013: 1093–1114; Nguyen, 2012). They conclude that without addressing long existing socio-economic and socio-cultural inequalities, which are real and deeper divides, bridging the technological gaps might not end the real issue of the digital divide.

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