



## DIMENSIONS AND COMPONENTS OF INFORMATION ECONOMY AS A NOVEL ECONOMY: A SYSTEMATIC REVIEW

*DIMENSÕES E COMPONENTES DA ECONOMIA DA INFORMAÇÃO COMO UMA NOVA ECONOMIA UMA  
REVISÃO SISTEMÁTICA*

*DIMENSIONES Y COMPONENTES DE LA ECONOMÍA DE LA INFORMACIÓN COMO ECONOMÍA NOVEDOSA:  
UNA REVISIÓN SISTEMÁTICA*

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### Abstract

**Objective of the Study:** Despite the critical role and impact of the information economy in the modern world, the dimensions and components of this multi-faceted concept remain understudied and unknown. The complexity and vagueness of information economy and its dimensions has made it challenging, especially for developing countries, to create value and wealth from the appropriate usage of information. This study aims to identify the dimensions and components of the information economy at the micro and macro level.

**Methodology/Approach:** A systematic review guided by PRISMA recommendations was carried out in which 20 papers that met the inclusion criteria were analyzed. ScienceDirect, Google Scholar, Embase, PubMed, Emerald, Scopus, Web of Science and Econlit databases were searched to find relevant English documents.

**Originality/Relevance:** This study conceptualizes and determines the dimensions and components of information economy through a systematic review of the literature.

**Main Results:** The analysis determined eight themes (i.e., dimensions) for the information economy, including human capital, economic factors, governing laws and regulations, political factors, information and communication technology, cultural factors, stakeholders, and information. These themes had a total of 15 sub-themes and 60 codes.

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**Theoretical/Methodological Contribution:** This study conceptualizes information economy by identifying and defining its various dimensions and components. The results can be used to develop information economy strategies at the managerial level, especially in developing countries.

**Keywords:** Information economy. Dimensions and components. Novel economy.

### Resumo

**Objetivo do Estudo:** Apesar do papel crítico e do impacto da economia da informação no mundo moderno, as dimensões e os componentes desse conceito multifacetado permanecem pouco estudados e desconhecidos. A complexidade e imprecisão da economia da informação e suas dimensões tornaram desafiador, especialmente os países em desenvolvimento, criar valor e riqueza a partir do uso adequado da informação. Este estudo visa identificar as dimensões e componentes da economia da informação no nível micro e macro.

**Metodologia/Abordagem:** foi realizada uma revisão sistemática guiada pelas recomendações do PRISMA na qual foram analisados 20 artigos que atenderam aos critérios de inclusão. As bases de dados ScienceDirect, Google Scholar, Embase, PubMed, Emerald, Scopus, Web of Science e Econlit foram pesquisadas para encontrar documentos relevantes em inglês.

**Originalidade/Relevância:** Este estudo conceitua e determina as dimensões e componentes da economia da informação por meio da revisão sistemática da literatura.

**Principais resultados:** A análise resultou na determinação de oito temas (ou seja, dimensões) para a economia da informação, incluindo capital humano, fatores econômicos, leis e regulamentos governamentais, fatores políticos, tecnologia da informação e comunicação, fatores culturais, partes interessadas e informação. Esses temas tiveram um total de 15 subtemas e 60 códigos.

**Contribuição Teórico/Metodológica:** Este estudo contribui para a conceituação da economia da informação, identificando e definindo suas diversas dimensões e componentes. Os resultados podem ser usados para desenvolver estratégias de economia da informação no nível gerencial, especialmente em países em desenvolvimento.

**Palavras-chave:** Economia da Informação. Dimensões e componentes. Economia do romance.

### Resumen

**Objetivo del estudio:** A pesar del papel crítico y el impacto de la economía de la información en el mundo moderno, las dimensiones y los componentes de este concepto multifacético siguen siendo poco estudiados y desconocidos. La complejidad y vaguedad de la economía de la información y sus dimensiones han hecho que sea un desafío, especialmente para los países en desarrollo, crear valor y riqueza a partir del uso apropiado de la información. Este estudio tiene como objetivo identificar las dimensiones y componentes de la economía de la información a nivel micro y macro.

**Metodología/Enfoque:** se realizó una revisión sistemática guiada por las recomendaciones PRISMA en la que se analizaron 20 artículos que cumplieron con los criterios de inclusión. Se realizaron búsquedas en las bases de datos ScienceDirect, Google Scholar, Embase, PubMed, Emerald, Scopus, Web of Science y Econlit para encontrar documentos en inglés relevantes.

**Originalidad/Relevancia:** Este estudio conceptualiza y determina las dimensiones y componentes de la economía de la información a través de la revisión sistemática de la literatura.

**Resultados principales:** El análisis resultó en la determinación de ocho temas (es decir, dimensiones) para la economía de la información, incluidos el capital humano, los factores económicos, las leyes y reglamentos vigentes, los factores políticos, la tecnología de la información y la comunicación, los factores culturales, las partes interesadas y la información. Estos temas tenían un total de 15 subtemas y 60 códigos.

**Aporte Teórico/Metodológico:** Este estudio contribuye a conceptualizar la economía de la información al identificar y definir sus diversas dimensiones y componentes. Los resultados pueden utilizarse para desarrollar estrategias de economía de la información a nivel gerencial, especialmente en los países en desarrollo.

**Palabras clave:** Economía de la información. Dimensiones y componentes. Economía novedosa.

## 1 Introduction

The use of appropriate and timely information promotes production, efficiency, competitiveness, usefulness, and diversity in innovation. The use of information in organizations and businesses has been considered a key factor in competitive advantage and effective development (Engelbrecht, 2015). The unique characteristics of information include intangibility, inherent independence, increased value through data integration, extensibility, rapid transferability, easy production and reproduction, and infinite group usability, among others (Asongu & Andrés, 2019).

Organizations, businesses, and governments can use the information to produce value and wealth. Information can be stored and presented via various printed and digital resources such as books, journals, and databases (Johnson, Watkinson, & Mabe, 2018). According to the Science, Technical, Medical Association (STM), the information publication market had a value of about \$10 billion in 2017, of which the US had the highest share (41%), while the share of the rest of the world was 6%. The share of the digital-book market was about \$3.3 billion in 2016. The volume of the information market, including books, journals, technical information, databases, and medical software, were estimated at \$27.5 billion in 2018. In 2017, the revenues of journals were 38.5%, and the revenues from the sales of books were about 12% of the total global income. Based on the estimates, for each pound of budget spent annually on public libraries, 4.40 pounds of economic benefit is gained in the UK (Johnson et al., 2018).

The information economy is a concept that refers to analyzing the processes of information production, information distribution, information dissemination, and information consumption, as well as the expenditures and revenues created in this way (Niyato, Lu, Wang, Kim, & Han, 2016). Some experts believe that information economy is a novel concept and a new branch of economics, while others consider it an evolutionary concept following the industrial economy (Fox, 2018). Several alternatives and synonym terms, such as knowledge economy, information and communication technology economy, the Internet economy, and digital economy, have been used in past studies for the information economy. Because of the variations in the definition of the information economy, there has been no common understanding of and framework for applying the term information economy in the literature (Asongu & Andrés, 2019).

Some potential benefits of information economy, compared to the economy of other goods, is the ease of sharing, low expiration date (Asongu & Andrés, 2019), reducing the monopolization power, optimal allocation of resources, increasing the accuracy of decision-making, and enhancing social efficiency, among others. The information economy has been considered a major component of a knowledge-based community (Niyato et al., 2016).

Some industrialized countries use information economy to overcome some of their global financial crises, for instance, by producing and selling information resources (Billon, Lera-Lopez, & Marco, 2016). The US Information Economy Reports indicates that information economy-related

activities have contributed to a high level of GDP in developed countries. These reports indicate that information economic activities have had a rising trend in recent years, yet more than 80% of the revenues in this domain is limited to a few developed countries (Raghfar, Shahabadi, & Alizadeh, 2018). The Organization for Economic Co-operation and Development (OECD) reported the share of GDP in 2017 to be about \$80 trillion in information economy, the highest amount of which belongs to the US, Japan, and Germany, respectively. The 2030 predictions suggest that countries newly involved in the domain of information economy industry, such as China, India, Russia, and Brazil, will show remarkable growth (Woodward, 2016).

While many developed countries obtain a significant market share of information economy to strengthen their ability to compete in the modern world (Pressman, 2013), information economy has a small role in the economic development of developing countries. Policymakers in many developing countries have little understanding of the information economy and have not taken an active role. Developing countries face challenges regarding using the information to enter the global market to increase their competitive power on a global scale (Mohaghegh, 2016).

Even though the information economy can be used to provide value and wealth worldwide (Billon et al., 2016; Engelbrecht, 2015), there is still a lack of understanding of what information economy is as a multi-dimensional concept and what are its various dimensions and components (Engelbrecht, 2015; Billon et al., 2016). Many previous studies have investigated various aspects of information economy, such as the impact of information technology on economic development (De La Paz-Marín et al., 2015), theoretical issues in information economy (Dyani & Pirmand, 2001; Mohseni, 2001), the economy of science (Zinali, 2018), defining information economy (Vafopulous, 2012), predicting the future of information economy (Slaughter, 1996), knowledge economy (Adler, 2001; Engelbrecht, 2015), private information economy (Alireza Bolhari & Mosavigahromi, 2015) and market of information economy (Rinaldi et al., 2013).

While most existing literature emphasized the significance of information economy, none of them has conceptualized what information economy really is and the dimensions and components of this concept (Rinaldi et al., 2013). The current study was carried out to fill in this gap to identify the dimensions and components of the information economy. Findings can help policymakers better understand what information economy and its dimensions are and how they can be used in current or future information economic activities.

## 2 Literature review

### 2.1 Approach to dimensions and components of the information economy

The gradual transition from a commodity economy to an information economy began in the 1960s. The historical course of global economic thought has gone through four different types of capital so far, including economic capital, human capital, social capital and information capital. Though all four

types of capital had the power of mobility and movements, due to the nature of the information the speed of information capital flows is higher compared to other types of capital. The higher flows of information capital are due to the development of information and communication technology. All of these types of capital require information as the key element to create added value, ultimate demand and competitiveness. The main features of the information market include non-competitiveness, non-limitation and lack of scarcity. During the last decade, it has been tried to analyze the issue of the information economy and its features as a new and modern economy analyzing the science economy, knowledge economy, and information community separately. These concepts have sometimes been synonymous with the concepts of knowledge economy, ICT economy, Internet economy, and digital economy, but over time, each field professionally covers a specific field. (Babazade & M, 2016; Baseri & Kia, 2011).

### 3 Methodology

This systematic review examined the studies relevant to the information economy to identify its components and dimensions. The five-stage manual of the University of York was adopted to conduct this study (Colquhoun et al., 2014). This manual includes a set of systematic and precise guidelines for designing, implementing, and reporting the results of systematic reviews. The stages of this manual are as follows: formulating the research question, identifying the relevant studies, study selection criterion, data extraction, collating and reporting the findings. (Arksey & O'Malley, 2005).

#### 3.1 Formulating the research question

The first stage deals with formulating the research question for decision-making in the next stages. This study sought to answer the following question:

What are the dimensions and components of the concept of information economy?

#### 3.2 Identifying the relevant studies

A systematic review method was used for data collection and analysis in the second stage. Using different combinations of the related words, an extensive search strategy was designed to identify relevant papers based on the research objective. An example of a search strategy in the Scopus database is as follows:

TITEL-ABS-KEY ("information economy\*" OR "economy\* of information" OR "economy\* of knowledge\*" OR "knowledge\* economy\*" OR "digital economy\*" OR "economy\* of digital" OR "information Market\*" OR "Market\* of information")

The search was conducted in English databases available to the researchers, including The ScienceDirect, Google Scholar, Embase, PubMed, Emerald, Scopus, Web of Science, and Econlit. Table 1 includes the number of documents found in each database.

**Table 1**

*The number of documents found in each database*

<b>TOTAL</b>	
SINCE DIRECT	<b>120</b>
WEB OF SCINCE	<b>220</b>
SCOPUS	<b>700</b>
EMERALD	<b>335</b>
ECONLIT	<b>370</b>
EMBASE	<b>29</b>
PUBMED	<b>66</b>
GOOGLE SCHOLER	<b>1450</b>
<b>TOTAL</b>	<b>3290</b>

**Source:** Data collected from databases.

### *3.3 Study selection criterion*

In the third stage, the inclusion criterion was specified for retrieving the relevant articles. It should be noted that the inclusion and exclusion criteria were not precisely predetermined due to the nature of the topic; instead, they were modified and revised continuously and in several steps during the process of search and upon familiarity with the literature. The only initial inclusion criterion was access to the full text of the article. Therefore, those with no full-text access were eliminated. No article type or time limit were applied. Two researchers screened the documents in three stages (based on their title, abstract, and full text), and a third researcher resolved cases of disagreement.

### *3.4 Data extraction*

In the fourth stage, the researchers extracted the data by taking the following steps: after providing a list of the eligible documents, a data extraction form was developed in Excel and used to collect relevant information. The form included two parts: bibliographical information (title, author, year of publication, place of study, etc.) and thematic concepts (dimensions and components of economy, influential factors including facilitators and inhibitors, examples of each factor, etc.). This form was modified and completed in different stages as the researchers became more familiar with the studies in one or more pilot rounds. In the fifth step, qualitative content analysis was used to analyze the papers' content. Braun and Clarke's thematic analysis method was adopted to interpret and thermalize the qualitative data of the articles. The key concepts were categorized using this method, and the main

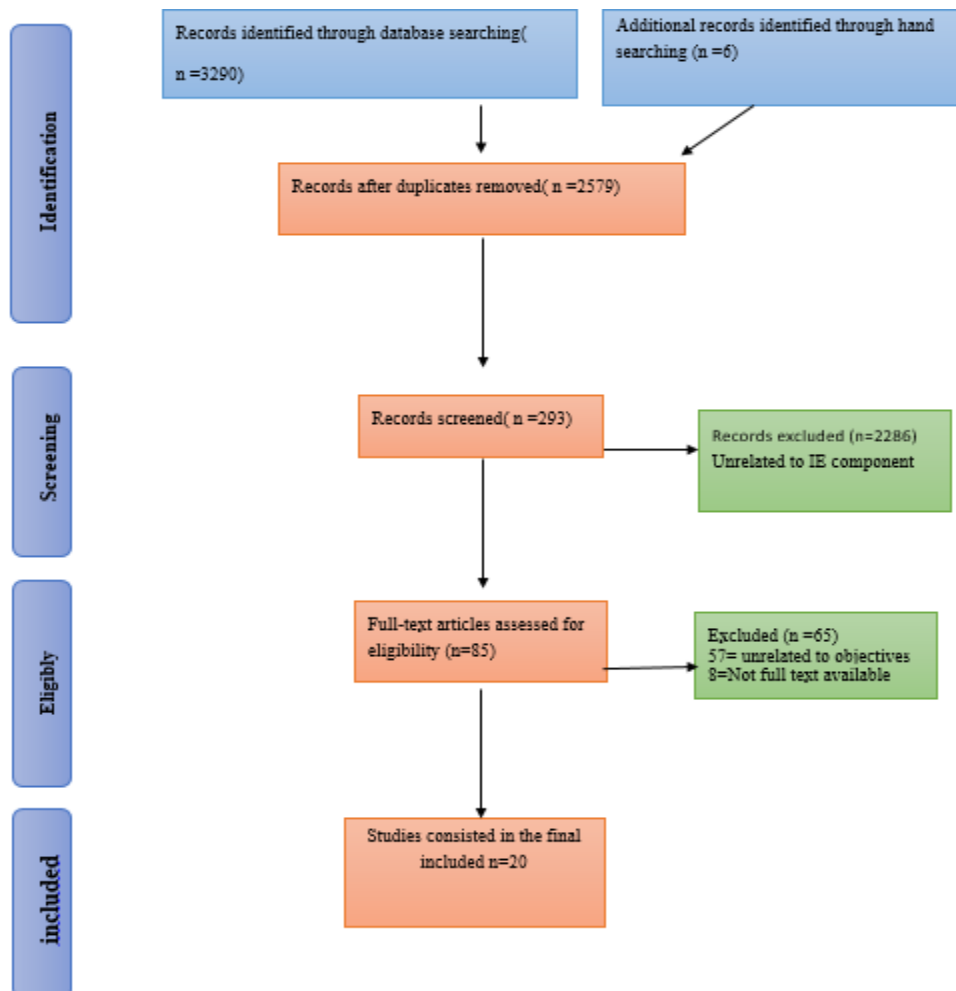


topics were identified, following the fifth stage of the study’s methodology (Pawson, 2002). Two completely independent researchers performed this stage.

Figure 1 presents a flowchart of the document selection process. In the first phase, 3290 documents were retrieved. Bibliographical information of the initial documents retrieved was transferred to EndNote X8 Reference Management Software. Next, 711 duplicates were identified and removed. Then, by reviewing the titles of the 2579 remaining documents, 2286 were eliminated due to being irrelevant to the study objectives. After that, by evaluating the abstracts of the 293 remaining documents, 65 documents were also eliminated due to being irrelevant to the study objectives, full-text unavailability, or lack of clarity in the methodology. Finally, the full texts of 85 documents were evaluated, among which 20 were ultimately included in the systematic review. All phases of document selection were conducted individually by two members of the research team, and a third researcher evaluated discrepancies. The content of 20 included documents was then thematically analyzed.

**Figure 1**

*PRISMA chart of process of article selection in the systematic review stage*



Source: Adapted from Moher *et al.*, 2015.

The research team discussed the collected data and categorized them based on thematic overlaps and hierarchical relationships. First, the codes (minor concepts) and then the sub-themes were extracted. Subsequently, the relevant sub-themes were combined to form broader themes. The extracted concepts were examined by two individuals other than the research team. The themes and sub-themes were labelled based on the meanings identified in the examined documents. The researchers prioritized the themes and sub-themes based on their degree of importance and frequency in the analyzed documents.

#### 4 Results

The thematic analysis of the retrieved documents revealed eight themes for information economy: human capital, economic factors, governing laws and regulations, political factors, information and communication technology, cultural factors, stakeholders, and information. These themes had a total of 15 sub-themes and 60 codes.

**Table 2**

*Dimensions and components of information economics*

Dimensions and components	Number of references	Relative frequency percentage
Information and communication technology	19	95%
Governing laws and regulations	16	80%
Cultural factors	15	75%
Human capital	13	65%
Economic factors	13	65%
Information	11	55%
Political factors	7	35%
Stakeholders	3	15%

**Source:** From authors' authority

Table 2 indicates the relative frequency percentages for each dimension. Due to overlaps between concepts and repetitions of concepts in the literature, we used the frequency percentage formula. It was calculated by dividing the number of references related to each component by the total number of references included in the review (N=20), multiplied by 100 (Delavar, 2003). The information and communication technology dimension received the highest relative frequency percentage, and stakeholders received the lowest relative frequency percentage.



#### *4.1 Information and communication technology (ICT)*

The success in achieving information economy goals depends on the level of access to information and communication technologies (Asongu & Andrés, 2019; Baseri & Kia, 2011; Billon et al., 2016; Zhang, 2019). The two sub-themes of ICT are large-scale policymaking and education (Table3).

#### *4.2 Large-scale policymaking*

Large-scale policymaking is a sub-theme identified for information and communication technology, which refers to facilitating public access to technology and optimizing the quality of the produced information (Baseri & Kia, 2011; Billon et al., 2016; Yaghoobi, 2014). This sub-theme comprises five codes: the government's large-scale policymaking for developing technological infrastructure (Billon et al., 2016; Mohaghegh, 2016), equalizing access to technology (Billon et al., 2016; Yaghoobi, 2014), optimizing the quality of information goods and services (Babazade & M, 2016; Baseri & Kia, 2011), lack of finance concentration in particular regions (Asongu & Andrés, 2019; Carayannis Elias, Ferreira João, Jalali, & Ferreira Fernando, 2018), and facilitating knowledge analysis and information production by developing information and communication technology (Baseri & Kia, 2011; Yaghoobi, 2014) (Table3).

#### *4.3 Education*

Education is a sub-theme identified for information and communication technology. It refers to teaching technology to advance the growth of the information economy (Asongu & Andrés, 2019; Carayannis Elias et al., 2018). Five codes were identified for this sub-theme: reducing the educational gap and facilitating access to educational materials to learn technology (Asongu & Andrés, 2019; Popova, Medyakova, & Martemyanova, 2018), equalizing access to technology (Billon et al., 2016; Zhang, 2019), promoting digital literacy (Asongu & Andrés, 2019; Popova et al., 2018), and creating novel scientific infrastructure (Baseri & Kia, 2011; Emadzadeh & Shahnazi, 2008) (Table3).

**Table 3**

*Sub-themes and codes of theme “information and communication technology”*

Theme	Sub-theme	Code	Selected references
Information and communication technology	Large-scale policymaking	Governmental policies about information and communication technology development	Billon <i>et al.</i> , 2016 Yaghoobi, 2014 Baser and Kia, 2011 Emadzad, and Shahnazi, 2008
		Large-scale policymaking to equalize access to information and communication technology in different geographical areas	
		Policymaking to optimize the quality of information goods and services via technology	
		Large-scale policymaking against finance concentration in special regions pertaining to information technology	
		Facilitating information production by developing information and communication technology	
	Education	Reducing educational gaps in learning technology skills	Asongu, Simplicie and Andrés, Antonio, 2019 Carayannis Elias, <i>et al</i> , 2018 Popova, Ekaterina, <i>et al</i> , 2018
		Promoting digital literacy	Zhang, 2019 Billon <i>et al.</i> , 2016 Popova, Ekaterina, <i>et al</i> , 2018 Emadzad, and Shahnazi, 2008,
		Equalizing access to technology	Zhang, 2019 Billon <i>et al.</i> , 2017
		Facilitating access to educational materials to learn technology	Asongu, Simplicie and Andrés, Antonio, 2019 Popova, Ekaterina, <i>et al</i> , 2018
		Creating novel scientific infrastructure	Asongu, Simplicie and Andrés, Antonio, 2019 De La Paz-Marín, <i>et al</i> , 2015 Baser and Kia, 2011 Emadzad, and Shahnazi, 2008

**Source:** From authors’ authority.

#### 4.4 Governing laws and regulations

Governing laws and regulations were another important dimension of the information economy. Laws and regulations can affect various aspects of economy, including information economy (Alvarez Leon, 2016; De La Paz-Marín, Gutiérrez, & Hervás-Martínez, 2015). This theme had two sub-themes of supporting laws and regulations (Billon *et al.*, 2016; Emadzad & Shahnazi, 2008) and intellectual property laws (Asongu & Andrés, 2019; Baseri & Kia, 2011; Zhang, 2019), comprising 6 codes (Table 4).

#### 4.5 Supportive laws and programs

These programs refer to laws enacted and supported by the government to support the growth of information economy. They can include essential items such as democracy, corruption control, free trade development, and supporting the laws of the information market. Of course, these laws need sanction for implementation (Asongu & Andrés, 2019; De La Paz-Marín et al., 2015). This sub-theme consists of five codes: quality of the governing rules (Billon et al., 2016; Emadzad & Shahnazi, 2008), the existence of democracy (Billon et al., 2016; De La Paz-Marín et al., 2015) and lack of discrimination (Baseri & Kia, 2011; Emadzad & Shahnazi, 2008) corruption control (De La Paz-Marín et al., 2015; Emadzadeh & Shahnazi, 2008), and free trade development (Baseri & Kia, 2011) and growth in the information economy market (Asongu & Andrés, 2019; Baseri & Kia, 2011) (Table 4).

#### 4.6 Intellectual property right

Intellectual property was another sub-theme identified for the theme of governing laws and regulations. It is, in fact, an essential tool for all goods, including information, and significantly contributes to the market rules (Alvarez Leon, 2016; Zhang, 2019). This major sub-theme comprises one code supporting intellectual property rights (Alvarez Leon, 2016; Yaghoobi, 2014; Zhang, 2019), which warrants severe supervisory measures in the information economy market (Table 4).

**Table 4**

*Sub-themes and codes of the theme “laws and regulations governing.”*

Theme	Sub-theme	Code	Selected references
Governing laws and regulations	Supportive laws and programs	Promoting the quality of regulations governing the information economy market	Asongu, Simplice and Andrés, Antonio, 2019 Billon <i>et al.</i> , 2016 De La Paz-Marín, <i>et al</i> , 2015
		Existence of democracy and lack of discrimination in the information economy market	Baser and Kia, 2011 Emadzad and Shahnazi, 2008,
		Controlling corruption in the information economy market	
		Free trade development and growth in the information economy market	Baser and Kia, 2011 Engelbrecht, 2015
	Regulations supporting the market of information goods and services	Asongu, Simplice and Andrés, Antonio, 2019 Baser and Kia, 2011 Arefeh, M, 2013	
Intellectual property right	Supporting intellectual property right	Asongu, Simplice and Andrés, Antonio, 2019 Zhang, 2019 Alvarez and Luis, 2016 Yaghoobi, 2014 Baser and Kia, 2011	

**Source:** From authors' authority.

#### 4.7 Cultural factors

Cultural factors were another theme identified in this study. Cultural contexts, social structures, and the norms of society affect the information economy. Culture influences people’s thinking and performance, for instance, when they use technologies (Billon et al., 2016). Inventions, innovation, and creativity are significant factors for knowledge and information products that merit attention in the context of culture (MohammadAfshar, Hoque, & Alam, 2018). This theme comprises the sub-theme of culture and social structures governing society (Asongu & Andrés, 2019; Ba & Nault, 2017) and four codes (Table5).

#### 4.8 Culture, social structures governing the society

This refers to the beliefs and attitudes of people of different social ranks concerning understanding the concept of information economy (Engelbrecht, 2015). This sub-theme consists of four codes (policymakers’ (Billon et al., 2016; Engelbrecht, 2015) and individuals’ attitudes (Billon et al., 2016; MohammadAfshar et al., 2018) and views about information economy (Ba & Nault, 2017), level of acceptance and use of information and communication technology by individuals (Billon et al., 2016; Engelbrecht, 2015), development of a culture of creativity and innovation in society (Billon et al., 2016), and an emphasis on promoting a culture of economic information usage (Asongu & Andrés, 2019; Billon et al., 2016) (Table5).

**Table 5**

*Sub-themes and codes of theme “cultural factors”*

Theme	Sub-theme	Code	Selected reference
Cultural factors	Culture social structures govern the society	Policymakers’ and individuals’ attitudes and views about the information economy and its necessity	Billon, <i>et al.</i> , 2016 Engelbrecht, 2015 Sulin, and Barrie, 2017
		Level of acceptance and use of information and communication technology by individuals	Billon <i>et al.</i> , 2016 Engelbrecht, 2015 MohammadAfshar, et al, 2018
		Development of a culture of creativity and innovation in society to generate knowledge and information	Billon et al., 2016 Asongu, Simplicie and Andrés, Antonio, 2019
		Promoting a culture of economic information usage	Niyato <i>et al.</i> , 2016 Asongu, Simplicie and Andrés, Antonio, 2019 Alvarez and Luis, 2016

**Source:** From authors’ authority.

#### 4.9 Human capital

Human capital was another key theme for the concept of information economy. Human capital in the information economy refers to a wide range of people, including policymakers and human forces, who produce information and knowledge (Niyato et al., 2016). This theme comprises three sub-themes of people's cognition, skills and experiences, comprising 14 codes (Table 6).

#### 4.10 Cognition

Cognition was a sub-theme identified for human capital. It refers to mental processes regarding the concepts of information economy (Ba & Nault, 2017; Engelbrecht, 2015). Cognition consists of four codes of recognizing and understanding. The concepts related to information economy, its importance and necessity, recognizing the information goods (Engelbrecht, 2015) and items market (Ba & Nault, 2017), and recognizing the importance of creativity (Arefeh, 2016; Ba & Nault, 2017) and innovation to produce knowledge and information (Asongu & Andrés, 2019). The reviewed documents stressed the promotion of these factors (Table 6).

#### 4.11 Attitude

Attitude refers to people's, such as policymakers', views of the importance of information economy (Bolhari. & Mosavi Jahromi, 2016). Attitude consists of three sub-themes of attitude towards the importance of indigenous knowledge and information (Asongu & Andrés, 2019; Billon et al., 2016), people's educational levels (Asongu & Andrés, 2019; Billon et al., 2016), and the intellectual capital as a factor for information production (Asongu & Andrés, 2019; Niyato et al., 2016).

#### 4.12 Skills and experiences

The production and commercialization of knowledge and information require a set of skills and experiences (Alvarez Leon, 2016; Baseri & Kia, 2011). This sub-theme had seven codes: educational skills (Asongu & Andrés, 2019), communication skills between experts and policymakers (Asongu & Andrés, 2019; Emadzad & Shahnazi, 2008), the skill of using information and communication technology (Billon et al., 2016; MohammadAfshar et al., 2018), personal experiences (Billon et al., 2016), digital literacy skills, technical skills, (Billon et al., 2016; Emadzad & Shahnazi, 2008) and continuous education as human capital for knowledge and information production and commercialization, which should constantly be promoted (Emadzad & Shahnazi, 2008; MohammadAfshar et al., 2018) (Table 6).

**Table 6**

*Sub-themes and codes of theme “human capital”*

Theme	Sub-theme	Code	Selected reference
Human capital	Cognition	Promoting the cognition of concepts related to information economy	Engelbrecht, 2015 Sulin, and Barrie, 2017 Arefeh, M, 2013 Niyato, <i>et al</i> , 2016
		Increasing understanding and perception of the importance and necessity of information economy	
		Increasing understanding and perception of the information goods and items market	
		Promoting cognition of creativity and innovation to generate knowledge and information	Asongu, Simplicie and Andrés, Antonio, 2019 Engelbrecht, 2015 De La Paz-Marín, <i>et al</i> , 2015 Popova, Ekaterina, <i>et al</i> , 2018
	Attitude	Promoting attitude towards the importance of local knowledge and information	Asongu, Simplicie and Andrés, Antonio, 2019 Ogundeinde and Ejohwomu., 2016
		Promoting policymakers’ attitude to facilitate educational conditions for information generation	Asongu, Simplicie and Andrés, Antonio, 2019 Billon, <i>et al</i> , 2016
		Promoting attitudes towards intellectual capital to generate information	Asongu, Simplicie and Andrés, Antonio, 2019 Niyato <i>et al.</i> , 2016 Popova, Ekaterina, <i>et al</i> , 2018
	Skills and experiences	Increasing educational skills pertaining to knowledge and information generation and commercialization	Asongu, Simplicie and Andrés, Antonio, 2019 Popova, Ekaterina, <i>et al</i> , 2018 Emadzad, and Shahnazi, 2008,
		Increasing communication skills between experts and policymakers for knowledge and information generation and commercialization	Emadzad, and Shahnazi, 2008, Asongu, Simplicie and Andrés, Antonio, 2019
		Increasing the skill of using information and communication technology for information generation and commercialization	Billon, <i>et al</i> , 2016 De La Paz-Marín, <i>et al</i> , 2015 Mohammad Afshar. 2018
		Paying attention to personal experiences pertaining to knowledge and information generation and commercialization	Billon <i>et al.</i> , 2016
		Increasing digital literacy skills for knowledge and information generation and commercialization	Billon, <i>et al</i> , 2016 De La Paz-Marín, <i>et al</i> , 2015
		Increasing technical skills for knowledge and information generation and commercialization	Billon, <i>et al</i> , 2016 De La Paz-Marín, <i>et al</i> , 2015 Mohammad Afshar, <i>et al</i> , 2018
		Continuous education pertaining to knowledge and information generation and commercialization	Asongu, Simplicie and Andrés, Antonio, 2019 Billon, <i>et al</i> , 2016 Ogundeinde and Ejohwomu., 2016

**Source:** From authors’ authority.

#### *4.12 Economic factors*

There is a direct relationship between information economy and economic growth, such that an increase in capital raises knowledge and information production as a product (Asongu & Andrés, 2019; Niyato et al., 2016). This theme comprised three sub-themes: policymaking, infrastructure, and administrative and executive processes, with 7 codes (Table7).

#### *4.13 Policymaking*

This theme refers to large-scale policymaking for promoting the effectiveness of information economy to produce information and knowledge (Asongu & Andrés, 2019; Ba & Nault, 2017). Policymaking had three codes of large-scale information economy policies, policymaking to increase the effectiveness of information economy factors, and systematic budget planning to facilitate information production (Asongu & Andrés, 2019; MohammadAfshar et al., 2018)(Table7).

#### *4.14 Infrastructure*

Infrastructure refers to providing preliminary facilities or items needed for implementing a concept or project (Asongu & Andrés, 2019; Billon et al., 2016), which may include practical and subjective concepts. This sub-theme comprised two codes of facilitating the investment process for information production and optimization structurally and non-structurally and increasing the cost-benefit of the information market(Asongu & Andrés, 2019; Billon et al., 2016; MohammadAfshar et al., 2018) (Table7).

#### *4.15 Administrative-executive processes*

This was another sub-theme identified for economic factors. These processes are associated with information economy growth and help its optimization. They can include a wide range, from increasing incentives and stimulants to maintaining balance in pricing in the market (Asongu & Andrés, 2019; Billon et al., 2016; MohammadAfshar et al., 2018). This sub-theme consisted of four codes of increasing financial incentives for information production, facilitating the stimulants of information economy growth, controlling inflation and stabilizing the information market for market growth, and maintaining balance in information item pricing (Asongu & Andrés, 2019; Baseri & Kia, 2011)(Table7).



**Table7**

*Sub-themes and codes of theme “economic factors”*

Theme	Sub-theme	Code	Select reference
Economic factors	Policymaking	Paying more attention to large-scale information economy policies	Asongu, Simplicé and Andrés, Antonio, 2019 Mohammad Afshar, <i>et al</i> , 2018
		Policymaking to increase the effectiveness of economic factors of information (qualitative and quantitative information optimization)	
		Existence of systematic budget planning to facilitate information generation	Sulin and Barrie, 2017
	Infrastructure	Facilitating the investment process for information generation and optimization structurally and non-structurally	Asongu, Simplicé and Andrés, Antonio, 2019 Niyato <i>et al.</i> , 2016
		Increasing the cost-effectiveness of the information market	
	Administrative-executive processes	Increasing financial incentives for information generation	Asongu, Simplicé and Andrés, Antonio, 2019 Niyato, <i>et al</i> , 2016 Billon, <i>et al</i> , 2016
Facilitating the stimulants of information economy growth			
Controlling inflation and stabilizing the information market for market growth			
	Maintaining balance in information item pricing		

**Source:** From authors’ authority.

#### 4.16 Information

Another theme identified upon the review of the texts was information. Knowing economic behaviors and habits is a major information economy factor in information marketing. Knowledge and information are the main factors in the growth, wealth, and employment in all domains (Mohaghegh, 2016; Niyato et al., 2016). Based on the results, the information theme comprises four sub-themes of information production, distribution networks, dissemination, and market, with 10 codes. (Table8).

#### 4.17 Information production

Information production is a sub-theme identified for the theme of information. It refers to any activity to promote information and information items (Carayannis Elias et al., 2018; Popova et al., 2018). Information production comprises four codes of quantitative and qualitative increase(Popova et al., 2018), the amount of capital needed for information production, the produced information being

public and accessible, and the existing information infrastructure(Alvarez & Luis, 2016; Popova et al., 2018) (Table8).

#### *4.18 Information distribution networks*

Another sub-theme for information was information distribution networks. We mean a platform through which the produced information and information goods enter the distribution channels by information distribution networks. There is a constant emphasis on the quality of infrastructure distribution infrastructure (Alvarez Leon, 2016; Niyato et al., 2016). Infrastructure distribution networks comprise two codes of the ease of distribution of the produced information (Arefeh, 2016; Niyato et al., 2016) and the quality of information distribution infrastructure(Alvarez Leon, 2016) (Table 8).

#### *4.19 Information marketing*

Another sub-theme for information was information marketing. Information marketing refers to a process whereby the produced information and information goods enter the market to be sold. In information marketing, the emphasis falls on examining the market status and needs assessment for the information and information items market (Fox, 2018; Niyato et al., 2016). Information marketing consists of two codes, examining the market status and needs assessment of the information and information item market (Arefeh, 2016; Emadzad & Shahnazi, 2008)(Table 8).

#### *4.20 Information dissemination*

Information dissemination was another sub-theme identified for information. Information dissemination means a process whereby the produced information is disseminated. Here, there is an emphasis on the ease of access to information and access to the produced information and information goods (Alvarez Leon, 2016; Niyato et al., 2016). Information dissemination consists of two codes, ease of information dissemination and ease of access to information (Carayannis Elias et al., 2018; Niyato et al., 2016) (Table 8).

**Table 8**

*Sub-themes and codes of theme “informational factors”*

Theme	Sub-theme	Code	Selected references
Information	Information generation	Increasing the quality and quantity of information generation The generated information is public and accessible Amount of capital needed for information generation Existing information infrastructure	Carayannis Elias, <i>et al</i> , 2018 Arefeh, M, 2013 Niyato <i>et al.</i> , 2016 De La Paz-Marín, <i>et al</i> , 2015 Popova, Ekaterina, <i>et al</i> , 2018 Alvarez and Luis, 2016 Emadzad and Shahnazi, 2008
	Distribution networks	Ease of distribution of the generated information Quality of information distribution infrastructure	
	Information marketing	Examining the status of the information and information item market Needs Assessment of the information and information item market	
	Information dissemination	Ease of information dissemination Ease of access to information	

**Source:** From authors’ authority.

#### 4.21 Political factors

Another theme identified upon the review of texts was political factors. The reviewed texts stress that attention should be paid to large-scale policies without distinction and adherence to financial and social justice (Asongu & Andrés, 2019; Carayannis Elias et al., 2018). These concepts can be viewed in the theme of political factors. The findings identified a sub-theme (stability despite dynamism) and two codes (Table 9).

#### 4.22 Stability despite the dynamism

Based on the literature review, political stability is a significant factor in information economy. Political factors should be constant (i.e., should not change with conditions and individuals) while being dynamic (i.e. have sufficient flexibility with changes in technology) (Engelbrecht, 2015; Zhang, 2019). For this sub-theme, two codes were identified: political stability governing the society and the dynamism and effectiveness of the policies governing the society to create an environment conducive to information economy growth (Engelbrecht, 2015; MohammadAfshar et al., 2018; Zhang, 2019) (Table 9).

**Table 9**

*Sub-themes and codes of theme “political factors”*

Theme	Sub-theme	Code	Selected references
Political factors	Stability despite dynamism	Increasing the political stability of the society to create an environment conducive to information economy growth  The dynamism and effectiveness of the policies governing the society to create an environment conducive to information economy growth	Asongu, Simplicie and Andrés, Antonio, 2019 Engelbrecht, 2015 MohammadAfshar, <i>et al</i> , 2018 Baser and Kia, 2011

**Source:** From authors’ authority.

#### 4.23 Stakeholders

Another significant theme for the concept of information economy was stakeholders. Stakeholders are factors affecting the information economy and should be identified, but this identification is not always easy. Stakeholders include various information producers, supplies, retailers, and consumers (Niyato et al., 2016). For this theme, two sub-themes of producers and consumers of information by four codes were identified (Table10).

#### 4.24 Information producers

Information producers are real or legal entities that produce and supply information and information goods and services (Niyato et al., 2016; Yaghoobi, 2014). The sub-theme of information producers includes two codes of information goods and service producers and suppliers (governments, institutions, individuals, and other stakeholders) (Carayannis Elias et al., 2018; Yaghoobi, 2014)(Table 10).

#### 4.25 Information consumers

Information producers are real or legal entities that consume or retail information goods and services (Carayannis Elias et al., 2018; Niyato et al., 2016). The sub-theme of information consumers includes two codes of information goods and services consumers and retailers (governments, institutions, and other stakeholders)(Carayannis Elias et al., 2018; Niyato et al., 2016; Yaghoobi, 2014).

**Table10**

*Sub-themes and codes of “stakeholders of the information economy”*

Theme	Sub-theme	Code	Selected references
Stakeholders	Information producers	Producers of information goods and services, including governments, institutions, individuals, and other stakeholders Suppliers of information goods and services, including governments, institutions, individuals, and other stakeholders	Carayannis Elias, et al, 2018 Niyato, et al, 2016 Yaghoobi, 2014
	Information consumers	Consumers of information goods and services, including governments, institutions, individuals, and other stakeholders Retailers of information goods and services, including institutions, individuals, and other stakeholders	

Source: From authors’ authority.

## 5 Discussion

The results of this review revealed eight dimensions for the information economy. The most important dimension was information and communication technology, followed by governing laws and regulations, cultural factors, human and economic factors, information, political factors, and stakeholders.

Most studies examined one or more themes by emphasizing the practical aspects of the information economy, and there was no comprehensive view entailing all the factors affecting the information economy. Investigations into the practical factors were dispersed, and there was no study to comprehensively present all the relevant components and dimensions in a systematic and categorized manner. The majority of studies have examined information technology and the laws and regulations governing them and their effects on information (Billon et al., 2016; Bolhari. & Mosavi Jahromi, 2016; Nadezhda, Nagovitsyna, Lapteva, Shchinova, & Koikova, 2018)economy. Some studies have also focused on economic, human factors, information, stakeholders, and cultural factors separately, along with other themes (Asongu & Andrés, 2019; Eltemasi, 2015; Emadzadeh & Shahnazi, 2008).

The most critical theme highlighted in most studies were information and communication technology. Different studies stressed the effect of information and communication technology as a factor influencing the growth of the information economy and facilitating processes. Studies have also recommended reinforcing technological infrastructure, provision of education, and skills acquisition as factors facilitating competition in developing countries (Vafopoulos, 2012; Zinali, 2018). The pivotal and undeniable role of technology for facilitating information production, collection, and dissemination cycle has always been stressed (Billon et al., 2016; Raghfar et al., 2018; Zinali, 2018), and its role is prominent in the information market to reduce the digital gap(Billon et al., 2016). The literature

discussed essential points pertaining to technology; however, little attention has been paid to the key role of policymaking in different technology domains.

Meanwhile, policymaking can be the bedrock for forming factors associated with information and communication technology. This is in line with the results obtained from Billon et al.'s study. (Billon et al., 2016).

The studies mentioned political instability, chaos, ineffective governance, inflation, and unemployment as negative signals in the information market. The quality of the governing institution, including dynamism, quality of laws and regulations, degree of corruption control, attention to intellectual property rights, and governmental effectiveness, were also stressed. Political stability, democracy, and press freedom were the other highlighted factors (Asongu & Andrés, 2019; De La Paz-Marín et al., 2015; Mohaghegh, 2016). Some studies have also noted high-quality laws and regulations, GDP, governmental revenues and expenditures, and the role of the government in facilitating the information economy (Mohaghegh, 2016). Among information economy themes, the governing laws and regulations ranked second in importance and have been greatly emphasized in the reviewed studies directly or indirectly (Asongu & Andrés, 2019; De La Paz-Marín et al., 2015; Mohaghegh, 2016). This theme plays a major role in the information economy and is recommended to keep in mind constantly. The majority of the studies emphasize all the sub-themes and codes of this theme, indicating its prominent role in information economy. Studies by Mohaghegh, Asongu, and Andrés also testify to this. (Mohaghegh, 2016; (Asongu & Andrés, 2019; De La Paz-Marín et al., 2015; Mohaghegh, 2016)

Despite the salient role of cultural factors in the information economy and the great emphasis on their significance in the literature, little attention has been paid to all its components, which are dispersedly examined in different articles (De La Paz-Marín et al., 2015; Mohaghegh, 2016). Meanwhile, attention to all the sub-theme and codes of this wide-ranging theme (e.g., promoting the culture of economic information usage) can open up an economic view of information, from higher-level policymakers to information producers and users. (Ba & Nault, 2017; Engelbrecht, 2015) A few studies also considered cultural factors and human capital as a unified concept (Gladilin, Dotdueva, Klimovskikh, Labovskaya, & Sharunova, 2017; Vigani & Olper, 2013); however, attention to their sub-themes and codes indicated that these two denote separate, albeit closely related, themes.

Some studies have focused on identifying human capital as a major factor in this domain. There was a constant emphasis on the mutual relationship between knowledge (as the driving force for innovation and creativity) and the prosperity of information economy (Ba & Nault, 2017; Engelbrecht, 2015). Some studies had also mentioned indigenous knowledge, intellectual capital, and intellectual property rights as factors affecting the growth of information economy and noted innovation, education, and technology as the most basic cultural foundations (Hayriye, 1999; Popova et al., 2018). The studies rarely discussed cognition and attitude (Asongu & Andrés, 2019), which form the basis of human capital or have implicitly and sparsely mentioned them without any particular emphasis. People's understanding

and attitude play a major role in the commencement and continuation of the movement towards the desired objectives. In one study, the intellectual property right was introduced along with human capital (Titova, Kostyukova, Boboshko, & Drachena, 2019); nevertheless, since intellectual property rights should be enacted and followed by the governing institutions, based on most studies, it belongs to the theme of governing laws and regulations despite its relationship with human capital (Hayriye, 1999; Popova et al., 2018).

As for economic factors, studies have highlighted economic prosperity, inflation, financial development, and government expenditures as components with positive or negative impacts on the growth of information economy. (Engelbrecht, 2015; Niyato et al., 2016). Some studies have also emphasized economic infrastructure (Patricia Ordóñez de, Lytras, Visvizi, & Zhang, 2019), while others highlighted the effective role of economic factors and correct investment in information economy for future progress (Asongu & Andrés, 2019; Baseri & Kia, 2011; Billon et al., 2016; Carayannis Elias et al., 2018; Engelbrecht, 2015; Niyato et al., 2016). The studies mentioned the fundamental role of large-scale policymaking to increase information and knowledge production optimization, the existence of systematic planning, and increasing cost-effectiveness as major factors in the market of the information economy. This issue has also been emphasized in studies such as Asongu, Baseri, Billon, Carayannis, Engelbrecht and Niyato. (Asongu & Andrés, 2019; Baseri & Kia, 2011; Billon et al., 2016; Carayannis Elias et al., 2018; Engelbrecht, 2015; Niyato et al., 2016).

Some studies have also examined the production, distribution and dissemination chain; information organization and retrieval (examples for the theme of information and stakeholders) together as a unified theme affecting the information economy. Few studies have discussed the details of the theme of information, and most of them pointed only to the generalities (Asongu & Andrés, 2019; Baseri & Kia, 2011; Billon et al., 2016; Carayannis Elias et al., 2018; Engelbrecht, 2015; Niyato et al., 2016). Nevertheless, information has a close tie to its sub-themes and codes, neglecting which would reduce the quality of information presented to the information market. Alvarez and his colleague mentioned this in their study. (Alvarez Leon, 2016; Yaghoobi, 2014; Zhang, 2019) In a few studies, the themes of information and stakeholders were regarded as a unified theme; (Asongu & Andrés, 2019; Baseri & Kia, 2011; Billon et al., 2016; Carayannis Elias et al., 2018; Engelbrecht, 2015; Niyato et al., 2016) however, despite the strong correlation between them, the researchers concluded that these were separate themes based on their sub-themes, codes, and the studied documents.

Some studies noted the importance of politics as a significant theme in an information economy. (Engelbrecht, 2015). This can be a fundamental theme for the information economy and affect other themes. This is in line with the results obtained. This is in line with the results obtained from Engelbrecht et al.'s study. (Engelbrecht, 2015).

Stakeholders was another important theme that had been neglected or just touched in the studies together with information (Niyato et al., 2016; Yaghoobi, 2014). Stakeholders are a major foundation



of information economy and should be highlighted throughout the information cycle, from production to consumption. As information producers or consumers, stakeholders play a key role in information economy. The produced information and information goods, and all the related items, will finally be delivered to the stakeholders who decide about the quality of the produced information and information goods, their purchase, or use. This is in line with the results obtained from Carayannis Elias et al.'s study. (Carayannis Elias et al., 2018)

In general, in the literature review, the researchers encountered implicitly, sparsely, or briefly noted cases. Still, we attempted to extract as many themes and codes as possible from the documents and categorize them appropriately. There is overlap and interrelation among the themes and codes of information economy, and some cases could be assigned to more than one theme. This interrelation causes ambiguities for the researchers, who then decided to distinguish the themes, sub-themes, and codes based on their repetitions in the majority of texts, to enhance transparency. A systematic classification in this domain reduces the ambiguities of the nature of the information economy, which is a major contemporary economic issue; it also facilitates small- and large-scale decision-making by planners, policymakers, and researchers. This seems to be the first study to determine the components and dimensions of information economy by a comprehensive literature review.

## 6 Conclusion

This research aimed to clarify the dimensions and components of this type of economy as a prominent world economy, which seems to have been successful and yielded favorable results. The study revealed eight themes for information economy: human capital, economic factors, governing laws and regulations, political factors, information and communication technology, cultural factors, stakeholders, and information. Several sub-themes were also identified for each theme to improve our knowledge about the information economy.

Identified themes and components of the information economy can help managers, policymakers, and other individuals make better and more efficient decision-making in this highly competitive field worldwide. Using the themes and subthemes identified in this study can help implement programs to improve the market and economic information.

While most studies on the information economy are conducted in developing countries, it is necessary to carry out similar studies in developed countries. This would help them evaluate their current status, identify best practices and challenges, and develop better policies and plans for benefiting from the information economy. Moreover, conducting qualitative studies to evaluate affective factors in the information economy through interviews with experts, policymakers and stakeholders in different countries is critical.

### 6.1 Limitations

One limitation of this study was the lack of access to relevant literature. We attempted to mitigate this limitation by expanding the search strategy to incorporate more resources.

### Authors' contributions

Contribution	Surname, Initials	Surname, Initials	Surname, Initials	Surname, Initials
Contextualization	Panahi,S		-	-
Methodology	Nemati-Anaraki, A	Kouhsari, A	-	-
Software	-	-	-	-
Validation	Panahi,S	Nemati-Anaraki, A	Kouhsari, A	Alipour,V
Formal analysis	Panahi,S	Alipour,V	Abdolahi,L	-
Investigation	Panahi,S	Abdolahi,L	-	-
Resources	Panahi,S	Abdolahi,L	-	-
Data curation	Panahi,S	Abdolahi,L	Nemati-Anaraki, A	-
Original	Panahi,S	Alipour,V	Kouhsari, A	-
Revision and editing	Panahi,S	Nemati-Anaraki, A	-	-
Viewing	Kouhsari, A	Alipour,V	-	-
Supervision	Panahi,S	-	-	-
Project management	Panahi,S	-	-	-
Obtaining funding	Panahi,S	Abdolahi,L	-	-

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