

Orrensalo, Thao; Nikou, Shahrokh

Conference Paper

Digital Source Adoption and Information-Seeking Behaviours of Entrepreneurs: A Systematic Literature Review

23rd Biennial Conference of the International Telecommunications Society (ITS): "Digital societies and industrial transformations: Policies, markets, and technologies in a post-Covid world", Online Conference / Gothenburg, Sweden, 21st-23rd June, 2021

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Orrensalo, Thao; Nikou, Shahrokh (2021) : Digital Source Adoption and Information-Seeking Behaviours of Entrepreneurs: A Systematic Literature Review, 23rd Biennial Conference of the International Telecommunications Society (ITS): "Digital societies and industrial transformations: Policies, markets, and technologies in a post-Covid world", Online Conference / Gothenburg, Sweden, 21st-23rd June, 2021, International Telecommunications Society (ITS), Calgary

This Version is available at:

<https://hdl.handle.net/10419/238044>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Digital Source Adoption and Information-Seeking Behaviours of Entrepreneurs: A Systematic Literature Review

Thao Orrensalo¹ [[0000-0003-4592-4736](#)], Shahrokh Nikou² [[0000-0002-0029-5852](#)]

Abstract:

Digitalisation and its impact on businesses – including access to information through digital sources – have been rapidly recognised from different research disciplines. Digitalisation helps entrepreneurs to gather and manage information, to create intensive resources, to reduce transaction costs, and to gain rapid access to the flow of information. A growing demand and use of digital information sources, especially in the midst of the COVID-19 pandemic, indicate a need for further investigation of the effect of digitalisation on changing and transforming entrepreneurs' information-seeking behaviours (ISBs), opportunities, and challenges. Furthermore, the concept of critical –21st-century skills has been found to be crucial to the effectiveness of digital transformation in the entrepreneurship field. From this perspective, this paper carries out a systematic literature review on the research conducted on digitalisation and entrepreneurs' information-seeking behaviours. Through this systematic literature review, this paper seeks answers to two objectives: (i) to review previous studies on digitalisation and ISBs within the entrepreneurship literature and on understanding the relation between these two concepts, and (ii) to assess the role of critical –21st-century skills on entrepreneurs' decision regarding information source selection. The review was conducted in three main phases: planning the review, conducting the review, and reporting the review. In the first step, we defined the inclusion and exclusion criteria. With the specific search terms, the selection included academic English publications for the period 1990–2020. Based on the criteria, three main databases – Web of Science, Scopus, and Ebsco – were searched, and in total 745 publications were retrieved. After removing duplicate and irrelevant articles, the final dataset included 39 articles. We then reviewed the articles and classified them into five main themes for further analysis. The themes were (i) entrepreneurs' information sources/services, (ii) entrepreneurs' –21st-century skills, (iii) entrepreneurs' access to information, (iv) entrepreneurs' environmental scanning, and (v) the ICT adoption behaviours of entrepreneurs. A future research agenda is also provided.

Keywords:

21st-century skills, digitalisation, Entrepreneurship, Information source selection, Information-seeking behaviour, Systematic literature review

1. Introduction

Digital transformation has affected entrepreneurship in many realms. Digitalisation and its importance in the field of business operations have been acknowledged in different disciplines, including information systems (Du et al., 2018), innovation (Nambisan et al., 2018), management and business (Berger et al., 2015), policy (Nambisan et al., 2019), and strategy (Autio et al., 2018). In terms of information access, digitalisation creates a vast amount of information resources, which

¹ **Corresponding author: Thao Orrensalo:** Information Studies, Åbo Akademi University
Fänriksgatan 3B, 20500, Turku, Finland. email: thao.orrensalo@abo.fi

² Shahrokh Nikou, Information Studies, Åbo Akademi University, Fänriksgatan 3B, 20500, Turku, Finland and Stockholm University, Stockholm, Sweden. Email: shahrokh.nikou@abo.fi

consequently reduces transaction costs and disseminates information at an international scale, thus boosting the rapid flow of information. According to Omiunu (2019), digitalisation helps entrepreneurs, and their businesses improve their capabilities for gathering and managing business-related information. As such, more than ever, online (digital) platforms have become the main channel through which entrepreneurs can seek, share, and exchange business information and knowledge. In addition, the restrictions imposed because of the COVID-19 pandemic have forced entrepreneurs to accelerate their digital strategies to protect their operations and employees, and to serve customers facing social and mobility restrictions during the lockdown. Therefore, digital transformation and digital information sources are no longer merely a source of cost efficiencies but also play a vital role in the entrepreneurial way of approaching information for their businesses.

Now, literature is adding much needed new insights and knowledge on how to harness the benefits of digitalisation and successfully deliver high-value outcomes for new venture creation, development, and survival. There is still limited research on entrepreneurial behaviours and entrepreneurial actions in relation to the adoption of digital information sources, particularly with reference to collecting and processing entrepreneurial information throughout. In this regard, only a few academic contributions have tackled the topic of information-seeking behaviours (ISBs) regarding digital information source adoption in entrepreneurship research (e.g., Moghavvemi et al., 2016). Moreover, as the availability and accessibility of information have been increased and enhanced through digital platforms and services, the ability to find a legitimate source of information and to find accurate information is critical to organizational and individual success in the digital age. The concept of literacy (digital and information literacy) embedded in 21st-century skills is relevant to the digital information source adoption process by entrepreneurs in the last decades but has only been loosely analysed in regard to entrepreneurs' ISBs in the digital context (Steyn, 2018). Therefore, this research aims to conduct a systematic literature review on entrepreneurs' ISBs, with a specific focus on the role that literacy plays in entrepreneurs' selection of digital information sources. Taking these cues, we formulated the following research questions:

- RQ1. What is the impact of digitalisation on entrepreneurs' information-seeking behaviours?
- RQ2. How does information and digital literacy influence entrepreneurs' selection of digital information sources?

To answer these research questions, we conducted a systematic literature review (SLR). We selected this method for three main reasons: (i) this method is effective for the collection of all relevant publications and documents that fit our predefined inclusion criteria for the specific questions stated above; (ii) it allows us to follow an objective, transparent, and systematic procedure for the entire research process, thereby helping to minimize the occurrence of bias during searching, identification, analysis, and summary of studies, as well as ensure future replicability; and (iii) outcomes and conclusion derived from this method are reliable, so decision makers and practitioners can act with confidence in accordance with the findings (Mengist et al., 2020). The SLR helped us to create a stand-alone review article of the literature for a specific proposed topic (Okoli, 2015). Through this method, we aim to enhance our understanding of the existing scientific knowledge and research endeavours and identify any gaps regarding specific issues, which will further develop the knowledge base for the topic.

This paper is structured as follows. Section 2 provides an overview of the core concepts, including entrepreneurs, entrepreneurs' ISB towards digital information sources, and the concept of literacy. In Section 3, the research methodology is explained. The descriptive, as well as narrative, results and discussion on the findings are summarized in Section 4. Section 5 discusses the results and provides a future research agenda. Finally, Section 6 concludes the research by outlining the theoretical and managerial insights obtained.

2. Relevant concepts

2.1 Entrepreneurship and Entrepreneurial Activities

Since the 1980s, entrepreneurship has emerged as a topic of growing interest among management scholars and social scientists. The concept of entrepreneurship emphasises the value creation and innovation that entrepreneurial activities bring to economics and society. The seminal work of Schumpeter (1934) established this concept with purposeful innovations that an entrepreneur implements a “new combination” to address the old obsolete industries and replace them with a creative and more effective solution. Later, Kirzner (1997) identified entrepreneurs as those who use their knowledge and information to help themselves make economic profits from market ignorance. Taking this path, Abdulwahab and Al-Damen (2015) defined an entrepreneur as an individual whose action develops something new – from the conception of ideas to the creation of a business. Entrepreneurs initiate, organize, manage, and control the work of a business unit, including the production and provision of goods and services, whether that business operates as a manufacturer, trade, or service.

Moreover, scholars further defined this concept based on the nature of entrepreneurs. For example, Brockhaus (1980) referred to entrepreneurs as risk-takers who realise the difference between demand and supply, or who see an opportunity to buy at a low price and sell at a high price. Sharma (2016) further expanded the idea that an entrepreneur is not necessarily a business owner or a capitalist, but rather a person who seeks out incongruity in the market, recognises it as an opportunity, and thus responds to it and makes a commercial gain. According to Savoie (2009), entrepreneurs are simply people who form and run a business organisation and perform entrepreneurial activities. An entrepreneur takes a financial risk in terms of owning and leading a business (Filion, 2011). They process, design, launch, and run a new business, which is initially intended as a small business (Yetisen et al., 2015). In its simplest form, entrepreneurs can be described as freelancer persons (de Vries et al., 2020). At first, they are unlikely to earn enough to pay themselves a wage or salary. Their income comes from exercising their profession or business on their own account and/or at their own risk. In this regard, this paper defines entrepreneurs as those who – alone or together with others – take a risk to operate in a business, with the main objective being to create value for themselves and others and to gain profit; this paper also considers they are fully responsible for making appropriate decisions using different resources.

According to Ferreira et al. (2015), the most common themes in entrepreneurship to date concern the creation and development of entrepreneurship, i.e. the entrepreneurial process, environmental and external determinants of entrepreneurship, and value creation and performance. Much research has also focused on the characteristics of entrepreneurial success, such as psychological, cognitive, and individual characteristics; entrepreneurial resources; entrepreneurial networks; high-tech entrepreneurship; corporate venturing; and business competition (e.g. Vandenbroucke, 2016; Yamakawa et al., 2015; Zheng et al., 2020). Likewise, owing to the rapid enhancement of ICT, recent research has shifted attention to the impact of digitalisation on entrepreneurs along with the development of new concepts, e.g. digital entrepreneurs and digital entrepreneurial ecosystems (Sahut et al., 2019). Among these, information is a critical source for entrepreneurs’ success (Nikou et al., 2020; Orrensalo and Nikou, 2020), especially in terms of discovering entrepreneurial opportunities as well as overcoming pressures, adapting to market changes, and developing their enterprises in the business world (Eze et al., 2018; Shane, 2000).

2.2 Entrepreneurship and Digitalisation

The role and the impact of digitalisation and digital transformation on entrepreneurs’ ISBs are current topics which arose through technological advances like the internet and information and

communications technology (ICT). Digital technologies are external enablers and facilitators of the entrepreneurial process (von Briel et al., 2018). Such technologies have impacted entrepreneurship in various disciplines, i.e. innovation, industry competition, and networking patterns. According to Fossen and Sorgner (2021), digitalisation helps entrepreneurs to reduce various entry barriers, and individuals with digital skills are likely to be more efficient when opening their business. More importantly, some authors have indicated that by adopting digitalisation (i.e. digital information sources), entrepreneurs may optimise their advantages in achieving business goals (Guan et al., 2017; Jaska and Werenowska, 2018; Sahut et al., 2019).

Given the recent technological advancement, entrepreneurs are confronted with a great availability and accessibility of information through multiple digital platforms and services. The development of the internet has fuelled a transition from traditional information sources to digital ones. Online searches are conducted in real time, thus allowing users to search and obtain results almost immediately. According to Omiunu (2019), digitalisation helps entrepreneurs strengthen their ability to gather and manage information. It also creates a vast amount of information resources, thereby reducing information-access costs, disseminating information at an international scale, and promoting a rapid flow of information. Within the digitalisation context, digital information sources encourage entrepreneurs to seek out relevant information for their businesses (Nikou et al., 2020). The expansion of digital information sources provides entrepreneurs with more accessible and convenient ways of reaching information at any time, and from anywhere.

For entrepreneurs, the shift to digitalisation is critically beneficial for operating their business, especially when business is on a small scale (Song et al., 2006). Entrepreneurs face many challenges owing to a lack of resources in human, financial, and non-monetary capital (experience, knowledge, know-how, internal databases, networks, etc.) (Lang et al., 1997; Liao et al., 2008). Often, entrepreneurs need to proactively respond to the changes and threats of the market environment while continuously learning and innovating, to assure their position and the growth of their businesses (Ahmad et al., 2020; Savarese et al., 2016). Quick and easy access to information is critical for entrepreneurs to be able to identify trends, visualise bottlenecks, focus on the most pressing issues, and instantaneously obtain the insight they need to make informed business decisions (Song et al., 2006). In addition to that, they also have many administrative tasks that require a constant updating of information, such as governmental policy like taxation, regulation, and business registration procedures; – particularly for newly established entrepreneurs. Taking into consideration of those unique characteristics and aspects of digitalisation and how they shape changes in the ISBs of entrepreneurs, it is important that entrepreneurs and entrepreneurship researchers are aware of the impact of digitalisation on ISBs and its effects on entrepreneurship.

2.3 Information-Seeking Behaviour Towards Digital Information Sources

Information-seeking behaviour is a process in which an individual searches for information and aims to utilise it to complete their assigned task. Research on ISB broadly refers to studies concerned with determining user information needs, searching behaviours, and subsequent use of information (Bouthillier, 2002; Shoham et al., 2006). Often, the term ‘information-seeking behaviour’ involves a set of actions like fulfilling information needs, seeking information, evaluating, and selecting information sources, and finally, using the information. In other words, ISB refers to how an individual seeks and makes use of information, the channels (s)he uses to retrieve information, and the factors that inhibit or encourage information use (Choo, 2005). It explores a set of actions, emotions, and attitudes that a person performs to obtain the information (Case, 2012). According to Wilson (2000), ISB arises as a consequence of a need perceived by the information user, who in order to satisfy it, makes demands upon formal or informal information

sources or services. A person engages in ISB when identifying his or her own needs for information, searching for such information, and using or transferring the information.

Entrepreneurs always need business information in order to guide their strategy and operations and evaluate their activities. This might take the form of market information, financial information, technological information, or legal information. The information needs of entrepreneurs may evolve over time based on the stage of the entrepreneurial lifecycle. For instance, the needs of enterprises before start-up, or during the opening phase, will differ from the needs of those who are in the growth and expansion phase or the needs of businesses that are in danger of imminent exit or collapse (Kassim, 2010; Savarese et al., 2016). All these business circumstances affect entrepreneurs' need for information and the urgency of that need. When faced with an information need, entrepreneurs retrieve business information from different sources, using different media and digital tools and applications (Jansen et al., 2010). Most of the time, entrepreneurs face a shortage of resources, especially human resources, thereby they have to deal with the information need by themselves.

Furthermore, in recent decades, digital information sources have dramatically changed how entrepreneurs find answers to their business needs and gather information. Digital information sources are online sources of information, including e-libraries, electronic reference publications, search engines, and digital collections of data (Bhattacharya, 2007). They are stored in digital formats and retrieved over distributed networks. Compared to traditional printed information sources, which limit access through time and space, digital information sources are always available for users regardless of geographical and time differences. Moreover, they simultaneously allow multiple users access while also supporting sophisticated search operators (Ganaie and Rather, 2015). Digital information sources benefit entrepreneurs with their accessibility, low cost, speed of distribution and production, and dissemination of information service, and if required, the chosen source can also notify its users about newly available or updated information. As part of the development of technology and digitalisation, digital information sources are now widely developed and adopted as a new type of information provider. According to Samthiyavalli and Usharani (2012), businesses procure essential information such as details about new research or legal issues, which can be found through web-based sources. They also consider the internet and search engines to be the most powerful source of information and knowledge. As such, to be successful in searching, accessing, and finding the appropriate information, one can argue that entrepreneurs' literacy skills and abilities play a central role. Therefore, in the following section, we aim to link ISBs with critical –21st-century skills.

2.4. 21st-Century Skills

In the –21st-century world of technological revolution, entrepreneurs need to be ready to acquire different knowledge and skill sets to function effectively and cope successfully with continuous social, economic, and technological changes (Boyles, 2012). In the –21st-century, cognitive competence is a core element for entrepreneurial intention and success owing to its direct relation to the ability of entrepreneurs to recognise opportunities (Haase and Franco, 2011; Shane, 2000). This cognitive competence may be viewed as how entrepreneurs obtain and process information to solve their problems. This search skill is their competitive advantage in the opportunity recognition process (DeTienne and Chandler, 2004). Information literacy (IL) and digital literacy (DL) belong to this cognitive skill set. They refer to the ability to think and reason logically in an effort to solve complex, open-ended problems – a skill set that contributes directly to the ability to conduct searches actively and successfully (Boyles, 2012). As a result of technology development, the concept of literacy is expanding towards digital materials and tools (Rayna and Striukova, 2021).

Traditionally, IL referred to an ability to read and write. However, in the digital age, IL refers to a set of skills and knowledge that enable users to efficiently locate and use information tools, as well as information sources, to solve an information need (Ciftci and Knautz, 2016; Nikou et al., 2019). In the digital age, IL also covers critical thinking and the capability to efficiently search, identify, and evaluate web-based data (Ng, 2012). IL allows information seekers to interpret and make knowledgeable judgments about an information source regarding its accessibility and quality (Kim and Sin, 2011). Nikou et al. (2018) endorsed the importance of IL and stated that in the digital age, an individual that lacks information competences would effectively be an ‘illiterate’ person. Many scholars have pointed out the link between IL and the intention to use digital information sources (e.g. Kim and Sin, 2011; Kirui and Kemei, 2014; Nikou et al., 2020).

The explosion of digital information is linked to DL. If IL is a broad concept that generalises an individual’s ability to handle information, DL refers to the ability to handle information by making use of technologies. Gilster (1997) defined DL as the ability to understand and use information in multiple formats from a wide range of sources when it is assessed via a computer. Other researchers have also highlighted the importance of viewing digital literacy as vital skills in the digital age, rather than merely the skills necessary to interact with ICT. The critical aspects of DL indicate the need for information seekers to adopt a highly analytical approach when accessing, using, and creating information through digital information sources (Chan et al., 2017; Hilton, 2013). Leaning (2019) viewed DL as an umbrella term that includes the different forms of literacy – such as computer literacy, internet literacy, and media literacy – that an individual needs to function effectively in digitally rich societies.

In this paper, IL and DL are used as a subset of critical –21st-century skills. This deliberate choice is made as the authors believe such literacy skills share the common purpose of enabling entrepreneurs to develop the skills they need to deal with task-related research in the ISB area and to cope with the new ways in which technologies make information available. In addition, in an information-based society, literacy skills refer to a set of competences related to the ability to understand information and – more importantly – to evaluate and integrate information in multiple formats that the technology can deliver. Therefore, it is essential that entrepreneurs master such literacy skills to be successful in their businesses; to help advance entrepreneurs’ ability in general regarding opportunity recognition, creativity, and innovation; and to support entrepreneurs’ flexibility to positively adapt to any environment and situation (Pérez-Escoda et al., 2019).

3. Methodology

The main objective of this review paper is to investigate entrepreneurs’ ISBs in the digital realm and assess the role of critical –21st-century skills on entrepreneurs’ ISBs. To address this objective, we performed a SLR. This review was conducted with reference to selected databases, along with a set of predefined inclusion and exclusion criteria for selecting publications for the review process as well as a rigorous approach to the selection process. Our approach is described below.

3.1 Inclusion/Exclusion Criteria

According to Mallett et al. (2012), inclusion and exclusion criteria in any SLR provide the basis for the assessor to make valid and reliable findings, as the research questions represent a point of focus throughout the entire review process. We conducted a longitudinal analysis of publications that included four main domains – entrepreneurship, digitalisation, critical –21st-century skills (DL and IL), and ISBs – over the period 1990–2020. The results were restricted to articles published in

English, and academic papers, i.e. peer-reviewed articles, conference proceedings, books, book series, and book chapters.

3.2 Search Strategy

The following search strategy was employed for searches of titles, abstracts, and keywords. We formulated it based on the four main streams of keyword strings, which are the core elements of this research (see Table 1).

Table 1. Key terms used in this research

Focus	Streams
Entrepreneurs	("entrepreneu*" OR "entrepreneurship" OR "SME*" OR "micro-enterprise*" OR "startup*")
Digitalisation	AND ("digital technolog*" OR "digitalization" OR "digital transformation")
Information seeking behaviours	AND ("information behavio*" OR "information-seeking behavio*" OR "digital information source*" OR "information source*" OR "information need*" OR "information service*" OR "information practice*" OR "information search")
21st-century skills	AND ("information literac*" OR "digital literac*" OR "digital competenc*" OR "digital skill*" OR "ict literac*" OR "ict skill*")

3.3 Data Collection

The publications were collected from three main databases: Web of Science (WoS), Scopus, and EBSCO. These databases allow the user to access publications in a variety of fields. Moreover, they allow the use of complex search strings and filters, which makes it easy to apply complex eligibility criteria. Many international publishers and journals index their contributions via these databases. Therefore, the aforementioned three databases were considered to be the most appropriate for conducting SLR (Kraus et al., 2020).

3.4 Data Source

The initial search result revealed 745 articles. Moreover, from external searching, four more articles were found to be significant and relevant to the research objectives. After combining all search results from the different databases, 28 duplicates were removed. Next, the selection criteria were applied. Only articles published in English and peer-reviewed academic publications were accepted, which reduced the sample to 697 articles, after 24 additional articles were excluded.

Next, the records were screened. The articles had to be relevant to entrepreneurs' ISBs in the digital age, and cover their necessary skills, information access, and information sources and services, and their relation to entrepreneurial performance. By screening the title and abstract of each article, we further compared their relevance to the objectives of this research. Consequently, 615 articles that did not adhere to the inclusion criteria were removed. In the next step, 82 articles were deemed relevant, and we obtained the full-text article for quality assessment. We skimmed and read through the full text of 82 articles and further evaluated the quality and eligibility of the studies. By performing this step, we excluded another 42 articles mainly owing to their inconsistencies and relevance to the focus of this research and other issues such as inconsistency with the search terms. Our final sample totalled 39 studies. The final list of related publications was downloaded for further analysis. The articles used for further investigation comprised 5.2% of the original articles

in the databases. The literature selection process is described in Figure 1, which depicts the PRISMA diagram. This diagram describes the identification, screening, eligibility, and inclusion criteria of the reports that fell within the scope of this review.

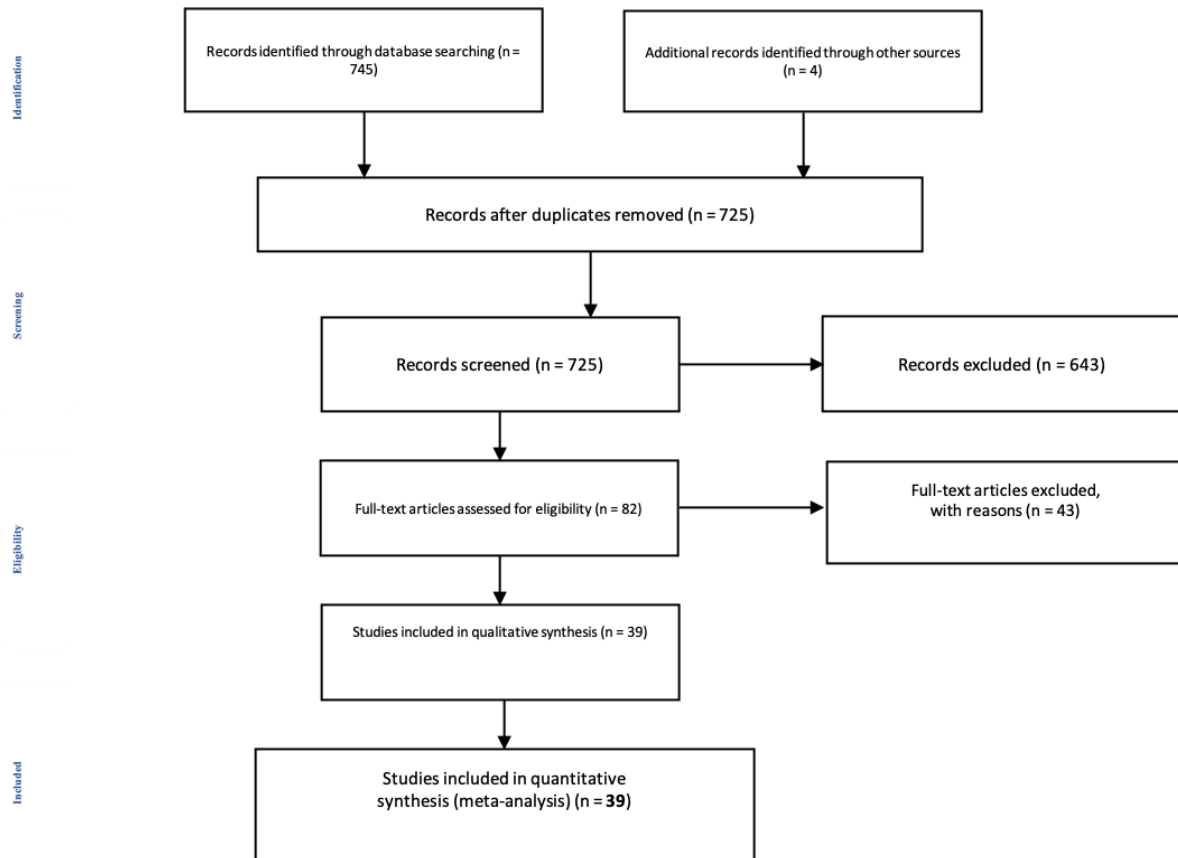


Figure 1. PRISMA flow diagram.

4. Results

In this section, we first report and elaborate on the descriptive results and then provide the results of the content analysis. In the descriptive results, sub-sections present and analyse the following issues: publications over time, type of publications, publications by research methodology, and the regional scope of publications. In the content analysis, we will present the dominant themes, which reflect the research trend over the period studied.

4.1 Descriptive Results

Year of Publication

The distribution of papers over time shows that academic interest for the subject has grown over time, reaching the greatest output in the period 2016–2020. However, during these four years, the number of articles has been fluctuating, and most of the articles were published in 2017 and 2018. In the past two years, however, the research domain seems to have experienced a slight downturn in publications. Remarkably, while other articles were found to be evenly distributed throughout the period, literacy – with a focus on information and digital literacy – has emerged as one of the main topics in articles reporting on digital adoption in relation to entrepreneurs' ISBs, with the peak of articles being published from 2018 to 2020.

Type of Publication

With regard to the type of publication, most of the articles were journal articles, accounting for almost 79% of the selected sample. Meanwhile, only eight articles were conference proceedings and two were book chapters. Among the journal outlets, the journal *Small Business Economics* was the most popular.

Research Methodology

Regarding the research design employed in the selected articles, 51% of the studies used quantitative methodology (e.g. questionnaires and descriptive method) to examine the research objectives. Qualitative methodology (i.e. interviews or case studies) was the second most popular method – utilised by 31% of the studies. Meanwhile, four articles (10%) employed both qualitative and quantitative methods to enhance the quality of their research. A small portion of studies (8%) comprised national reports, i.e. reports on the developments in e-government or discussions in which the authors described how libraries can support the provision of information and help potential entrepreneurs access such information.

Geographical Distribution

In terms of where the research was conducted, Finland holds the leading role in this research with four publications, followed by the UK, Canada, China, and Malaysia with three publications per country. Most of the research was undertaken in Europe – with 16 publications and the participation of ten countries (i.e. the Netherlands, Finland, the UK, Italy, Slovak Republic, Czech Republic, Poland, Portugal, Turkey, and France). Asia is the next influential continent with 13 publications distributed across nine countries: China, Thailand, Malaysia, Indonesia, Israel, Iran, Taiwan, Sri Lanka, and Singapore. Five articles were published in North America and Africa; however, most of the articles originating from North America were published in Canada.

4.2 Content Analysis

Based on the main topic of each selected article, the articles were further categorised into five themes, from largest to smallest, as follows: (1) entrepreneurs' information sources/services (13 articles); (2) entrepreneurs' level of literacy (nine articles); (3) entrepreneurs' information access (seven articles); (4) entrepreneurs' environmental scanning (six articles); and (5) entrepreneurs' adoption of ICT (four articles).

Entrepreneurs' Information Sources/Services

The first theme focused on the information sources and services offered to entrepreneurs, i.e. e-governmental services, e-libraries, and web portals (e.g. Jansen et al., 2010; Kassim, 2010; Soham et al., 2006; Song et al., 2006). Song et al. (2006) explained this phenomenon through the development of information systems and infrastructures, which have moved towards internet/net-centric environments, and further pointed out that the nature of the small-scale and scarce resources of entrepreneurs makes it necessary for them to use the available sources and the portals offered by the government. Research also shows the governmental initiatives around the world in integrating digitalisation into their public services for entrepreneurs (Guan et al., 2017; Sagarik et al., 2018). However, unsatisfied responses from the entrepreneurs regarding e-governmental services have appeared frequently among the selected articles owing to inappropriate information

architecture (Bouthillier, 2002) and entrepreneurs' lack of essential skills (Guan et al., 2017). The majority of the articles were published in the period 2010–2020.

Entrepreneurs' –21st-Century Skills

The second theme focused on the role of literacy of entrepreneurs in regard to their adaptation to digitalisation; for example, information literacy, digital literacy, financial skills, and technological skills were the main focus of the articles. This theme emerged in the 2000s with most publications appearing in 2020. This theme has become increasingly important in the past five years, reflecting scholars' awareness and interest towards recognising the essential role of literacy for entrepreneurs and entrepreneurial activities. Critical –21st-century skills have left a positive influence on their entrepreneurial intention, performance, and efficient access and use of information, along with their lifelong learning experiences. Digitalisation has transformed information display and knowledge sharing between individuals via websites and other social media sources; thus, digital skills have become crucial for entrepreneurs to effectively conduct information seeking in the digital age. Ahmad et al. (2020) also confirmed that information and digital literacy represent a driving force for entrepreneurs to properly function in the current modern society, emphasising their effect in fostering business performance. Financial literacy was also often discussed; however, the role of financial literacy was stated to be significant for the financial performance of the business rather than information access and acquisition.

Entrepreneurs' Access to Information

The third theme concerned the significance of information access for entrepreneurs as a key factor for the high growth of new ventures. Information access has long rooted its importance in regard to entrepreneurial activities. Accordingly, Tuomisalo (2019) argued that ISB results in entrepreneurs' proactiveness in opportunity recognition. Other scholars – like Dulle et al. (2017), Kubata and Simek (2016), Molnar and Bernat (2007), and Savarese et al. (2016) – have also highlighted the impact of information access on entrepreneurial development and growth. Hafeez et al. (2019) further discussed the virtual community of practice (VCoP) as an open space for entrepreneurs to share, exchange, get support, and learn essential information and knowledge for their business.

Entrepreneurs' Environmental Scanning

The fourth theme emphasised the relation between environmental scanning to entrepreneurs' ISB utilising information sources to acquire external information. This theme seems to diminish in importance over the last few years since the most frequently published year was 2011, but after that year, no further publication was found in this search. Environmental scanning was linked to the ISB of the organisations, referring to the acquisition and use of information concerning events, trends, and relationships in an organisation's external environment, the knowledge of which would assist management in planning the organisation's future course of action (Auster and Choo, 1994). Haase and France (2011) and Zhang et al. (2010) explored the effect of digitalisation on entrepreneurs' environmental scanning, while Jorosi (2008) looked at the less frequently used internet-based information sources. The reason behind this difference could be explained by the gap in technology advancement and the popularity of this source among two sample populations, considering the year of publications of these articles.

Entrepreneurs' Adoption of ICT

Finally, in the past five years, scholars have paid attention to the development of ICT and how entrepreneurs' adoption of ICT is influenced by their ISB, which is the final theme for further analysis of this paper. Eze et al. (2018) indicated that the technology context, uncertainty driven, compatibility, replacement of legacy technology, relative advantages, lack of technical know-how, and perceived affordability influence SME managers' information behaviour. Among them, two articles (Jaska and Werenowska, 2018; Zaremohzzabieh et al., 2016) investigated the shift that the internet brings to rural areas, especially regarding how it assists small business owners (e.g. farmers and rural youth entrepreneurs) in retrieving information.

5. Discussion

Digital disruption and entrepreneurs' adoption of digital technologies began and evolved long before the worldwide spread of the COVID-19 pandemic. Based on our systematic review of the current literature, involving 39 academic articles, we observed the role of digitalisation in entrepreneurs' ISBs. The rapid development of technology, and particularly the internet, has accelerated a shift in focus towards ISBs in relation to digital information sources. Digitalisation has equipped entrepreneurs with different sources for information, efficient search engines, web portals, virtual communities of practice, e-libraries, social media, and especially the proactive stance of government in continuously digitalising their public services for entrepreneurs (Guan et al., 2017; Hafeez et al., 2019; Jansen et al., 2010; Kassim, 2010). This digital phenomenon is happening across the globe, from developed countries to developing countries, and is expanding from urban areas to rural areas (Guan et al., 2017; Jaska and Werenowska, 2018; Zaremohzzabieh et al., 2016). Access to digital information sources has benefited entrepreneurs in their business activities and growth, such as in the realms of environment scanning (Haase and France, 2011), opportunity recognition (Tuomisalo, 2019), business performance (Ahmad et al., 2020), and business development (Kubata and Simek, 2016) and further fosters their personal long-term learning process (Dulle et al., 2017). Information is the driving factor in making business decisions. Sufficient information allows entrepreneurs to understand their environment and thus be aware of, and better integrate, their internal and external sources for planning and facilitating their business vision, strategies, and implementations. With the advancement of digitalisation, entrepreneurs become increasingly comfortable about reaching and processing essential information for their business, and importantly, more confident in their decisions about the challenges they face in business environments.

Furthermore, this SLR adds to the body of knowledge by demonstrating how scholarly attention to the importance of critical –21st-century skills has shifted in recent years to literacy skills, particularly the roles that information and digital literacy play in entrepreneurs' use of digital information sources. The ready availability of information and digital literacy is crucial to entrepreneurs. A handful of studies have highlighted this influence, e.g. by empowering literacy skills that assist user access to, and use of, information (Ahmad et al., 2020; Bolek et al., 2018; Jasiewicz et al., 2018), along with the effect of such literacy skills on entrepreneurial intention (Oggero et al., 2020), opportunity recognition, and exploitative innovation (Sayyad Abdi et al., 2016). On the one hand, results from the sample articles also indicate that entrepreneurs feel confident about performing information searches on the internet when they perceive themselves to have good self-efficacy regarding information and digital literacy. Notably, –21st-century skills provide female entrepreneurs with greater opportunities and enhance their equal participation in the market (Oggero et al., 2020; Omiunu, 2019). On the other hand, authors also expressed their concern about entrepreneurs' lack of skills in ISBs and information retrieval. These barriers to skills

development reinforce the obstacles faced before users can extensively adopt digital technologies and digital information sources. Most entrepreneurs nowadays can access digital information sources, but a lack of critical –21st-century skills will lead to ineffectiveness and inefficiency in using these sources.

Our review showed that the topic of digitalisation and entrepreneurs' ISBs has received a sustained interest in the current literature. However, it is still in its infancy in terms of information studies as well as entrepreneurship studies. In fact, this important area has a limited number of contributions, and is often understudied, even though both practice and policy continue to advance rapidly. Digital disruption in the information-seeking process is not new, but the COVID-19 pandemic has led to a dramatic surge in the use of digital technologies owing to the social distancing norms and nationwide lockdowns. The lockdowns across countries have accelerated the use of digital information sources, resulting in significant changes in usage habits and behaviour. Although the COVID-19 pandemic is gradually passing, we can still see the continuity of its impact on digital adoption in the post-pandemic scenario. This phenomenon inevitably indicates several concerns that should be further addressed. First, future research could extend current efforts to delve into the impact of digital information sources for entrepreneurs and their entrepreneurial journey. Entrepreneurs will evolve their information needs and the nature of these needs (e.g. emergency, transparency, comprehensiveness) over time; thus, researchers shall examine how, and to what extent, information service providers can contribute to the development of entrepreneurship and efficiently assist their work. Second, current studies have only viewed entrepreneurs' ISBs as an auxiliary activity complementing the other business operations, thereby indicating a potential research path with a focus on diverse dimensions of behaviours and analysing its patterns regarding the success of entrepreneurship.

Further research could also be carried out to investigate integration of the effective and efficient access, acquisition, and management of information from digital information sources as a part of users' digitalisation strategies. While adopting these digital sources of information, it will be important to study its dark side, including questions about information quality and information overload, as well as security and ethical issues. Researchers should also seek to learn more about entrepreneurs' ISBs – namely, assessing their performance, its influence on the decision-making process, and the effectiveness of the sources. Another suggestion for future studies refers to the opportunities and possible challenges faced not only by entrepreneurs but also information service providers. Furthermore, researchers should also deepen their knowledge about the role of business characteristics (industry, location, age of operation, budget, etc.) and entrepreneurs' characteristics in their adoption of digital information sources. Notably in this study was the significance of –21st-century skills in entrepreneurs' use of digital technologies generally – and digital information sources in particular. Research into the implementation of entrepreneurial training and education should determine the impact of literacy on entrepreneurs, especially in their self-efficacy in accessing and using digital information sources. Researchers should also gather supplementary knowledge from the perspectives of their educational target – the entrepreneurs – which will enable them to design suitable programmes that fit the needs and expectations of entrepreneurs.

6. Concluding Remarks

With this SLR paper, we made three main contributions to the academic research and practice of entrepreneurship study. First, the importance of ISBs in relation to digital information sources as a prerequisite for entrepreneurship is demonstrated by our key contribution. Second, we also examine how the concept of critical –21st-century skills has been pointed out in previous literature. By highlighting such insights, we provide new knowledge for managers and policymakers to

develop policies, programmes, and strategies to support the development of entrepreneurs. Third, in this paper we identify the main themes and topics addressed by previous studies and show how they are interconnected. As such, the key contribution of this paper is the extraction of several themes that could guide future conceptual and empirical studies and research agendas in this area. Moreover, the discussion about the role of critical –21st-century skills in the adoption of technologies and digital information sources further showed that the swift development of technologies leads to demand for entrepreneurs to continuously learn and enhance their skills and competences so they can quickly adapt and efficiently exploit the benefits offered by digitalisation. To compete in a changing environment, entrepreneurs need to succeed in consolidating their operations and technologies. However, digitalisation merely provides the tools to help entrepreneurs access and use information with ease; how successful this process is, and how effective the information-seeking behaviour is, will depend heavily on the skills of the individuals involved.

Despite the care taken in conducting this research, there still remain some limitations. Firstly, though we have made extensive efforts in designing and implementing our systematic literature review, it is still possible that we may have failed to capture all relevant articles relating to this topic. Secondly, we acknowledge our subjectivity in our analysis and classification of the sample articles. Because our focus on those studies was to examine the role of critical –21st-century skills in relation to digital and information literacy, other dimensions of this concept are not represented. Finally, in order to broaden the scope of the research, we recommend performing additional searches using different databases and possibly including studies published in languages other than English.

Acknowledgements

The first author would like to thank the Liikesivistysrahasto for their generous financial support and help.

References

- Abdulwahab, M., & Al-Damen, R. (2015). The impact of entrepreneurs' characteristics on small business success at medical instruments supplies organizations in Jordan. *International Journal of Business and Social Science*, 6(8), 164-175.
- Ahmad, F., Widen, G., & Huvila, I. (2020). The impact of workplace information literacy on organizational innovation: An empirical study. *International Journal of Information Management*, 51, 102041. DOI: <https://doi.org/10.1016/j.ijinfomgt.2019.102041>
- Auster, E., & Choo, C.W. (1994). How senior managers acquire and use information in environmental scanning. *Information Processing & Management*, 30(5), 607-618.
- Autio, E., Nambisan, S., Thomas, L., Wright, M. (2018). Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategy Entrepreneurship Journal*, 12, pp. 72-95.
- Berger, R., Silberberger, A., Herstein, R., & Barnes, B. R. (2015). Analyzing business-to-business relationships in an Arab context. *Journal of World Business*, 50, 454–464.
- Bhattacharya, U. (2007). Digital information resources and digital information Literacy: a symbiotic approach. *5th Convention Planner* (2007), 351-357. Gauhati University, Guwahati. URL: <http://hdl.handle.net/1944/1359>.
- Bouthillier, F. (2003). Access to information for small business managers: Examination of some strategies and values. *Canadian Journal of Information and Library Science-Revue Canadienne Des Sciences De L Information Et De Bibliothéconomie*, 27(3), 5-23.

- Boyles, T. (2012). 21st century knowledge, skills, and abilities and entrepreneurial competencies: A model for undergraduate entrepreneurship education. *Journal of Entrepreneurship Education*, 15 (2012), 41-55.
- Brockhaus, R.H. (1980). Risk taking propensity of entrepreneurs. *Academy of Management Journal*, 23(3), 509-520.
- Case, O.D. (2012). *Looking for information: A survey of research on information seeking, needs and behavior*, 3rd edition. UK: Emerald.
- Chan, B.S., Churchill, D., & Chiu, T.K. (2017). Digital literacy learning in higher education through digital storytelling approach. *Journal of International Education Research (JIER)*, 13(1), 1–16.
- Choo, W.C. (2005). *The knowing organization: How organizations use information to construct meaning, create knowledge, and make decisions*. Oxford University Press. DOI: <https://doi.org/10.1093/acprof:oso/9780195176780.001.0001>.
- Ciftci, T., & Knautz, K. (2016). Information Facebook users. In: *Facets of Facebooks: Use and Users* (eds Knautz, K., & Baran K. S.), 115-14. Germany: De Gruyter.
- De Vries, N., Liebrechts, W., & van Stel, A. (2020). Explaining entrepreneurial performance of solo self-employed from a motivational perspective. *Small Bus Econ* 55(2), 447–460.
- DeTienne, D.R., & Chandler, G.N. (2004). Opportunity identification and its role in the entrepreneurial classroom: A pedagogical approach and empirical test. *Academy of Management Learning and Education*, 3(3), 242-257.
- Du, W., Pan, S. L., Zhou, N., & Ouyang, T. (2018). From a marketplace of electronics to a digital entrepreneurial ecosystem (DEE): The emergence of a meta-organization in Zhongguancun. China, *Information Systems Journal*, 28, pp. 1158–1175.
- Dulle, F., Gichohi, P. & Onyancha, O. (2017). Capacity building modules for public libraries to support small-scale business enterprises in Meru County, Kenya. *South African Journal of Library and Information Science*, 83(1), 49-58.
- Eze, S.C., Olatunji, S., Chinedu-Eze, V.C., & Bello, A.O. (2018). Key success factors influencing SME managers' information behaviour on emerging ICT (EICT) adoption decision-making in UK SMEs. *The Bottom Line*, 31(3/4), 250-275.
- Ferreira, M.P., Reis, N.R., & Miranda, R. (2015). Thirty years of entrepreneurship research published in top journals: analysis of citations, co-citations and themes. *Journal of Global Entrepreneurship Research*, 5(1), 1-22.
- Filion, L.J. (2011). Defining the entrepreneur. In: *World Encyclopedia of Entrepreneurship* (eds Dana, L.P.), 41-52. Cheltenham, UK and Northampton, MA, USA, Edward Elgar.
- Fossen, M.F., & Sorgner, A. (2021). Digitalization of work and entry into entrepreneurship. *Journal of Business Research*, 125, 548–563. DOI: <https://doi.org/10.1016/j.jbusres.2019.09.019>.
- Ganaie, S., & Rather, M. (2015). Diversity of Information Sources in the Digital Age: An Overview. *Journal of Advancements in Library Sciences*, 2(2), 54 – 61.
- Gilster, P. (1997). *Digital literacy*. New York: John Wiley.
- Guan, L., Zhao, H., Xu, P., Xie, L., & Zhang, W. (2017). Problems and suggestions of rural information service platform construction in china. *Proceedings of the 2017 2nd International Conference on Automation, Mechanical and Electrical Engineering (Amee 2017)*, 87, 259-262. DOI: <https://doi.org/10.2991/amee-17.2017.53>.
- Haase, H., & Franco, M. (2011). Information sources for environmental scanning: Do industry and firm size matter? *Management Decision*, 49(10) 1642-1657.
- Hafeez, K., Alghatas, F. M., Foroudi, P., Nguyen, B. & Gupta, S. Knowledge sharing by entrepreneurs in a virtual community of practice (VCoP). *Information technology & people (West Linn, Or.)*, 32(2), 405-429.
- Hilton, J.T. (2013). Digital critical dialogue: A process for implementing transformative discussion practices within online courses in higher education. *Journal of Online Learning & Teaching*, 9(4), 602–614.
- Jansen, J., Wijngaert, L., & Pieterse, W. Channel choice and source choice of entrepreneurs in a public organizational context: The dutch case. In: *Egov 2010* (eds M. A. Wimmer et al.), 144–155, LNCS 6228. DOI: https://doi.org/10.1007/978-3-642-14799-9_13.
- Jaska, E., & Werenowska, A. (2018). The availability and use of media information sources in rural areas. *Rural Development and Entrepreneurship Production and Co-Operation in Agriculture*, 47, 115-122. DOI: 10.22616/ESRD.2018.013.

- Jorosi, B.N. (2008). Environmental Scanning in Botswana's SMEs: A Study of the Manufacturing Industry. *Libri (København)*, 58(4), 224-233.
- Kassim, N.A. (2010). Information needs of Malaysian bumiputera would-be entrepreneurs. *Malaysian Journal of Library & Information Science*, 15(2), 57-69.
- Kim, K. & Sin, S.J. (2011). Selecting quality sources: bridging the gap between the perception and use of information sources. *Journal of Information Science*, 37(2), 178-188.
- Kirui, E., & Kemei, P. (2014). Usability of e-Government services in developing countries. *International Journal of Computer Trends and Technology (IJCTT)*, 15(3), 102-107.
- Kirzner, I.M. (1997). Entrepreneurial discovery and the competitive market process: an Austrian approach. *Journal of Economic Literature*, 35(1), 60-85.
- Kraus, S., Breier, M., & Dasí-Rodríguez, S. (2020). The art of crafting a systematic literature review in entrepreneurship research. *International Entrepreneurship and Management Journal*, 16(3), 1023–1042.
- Kubata, K., & Simek, P. (2016). Identification of business informatics specifics in agricultural enterprises. *Agris on-Line Papers in Economics & Informatics*, 8(3), 69-76.
- Lang, J.R., Calantone, R.J., & Gudmondson, D. (1997). Small Firm Information Seeking as a Response to Environmental Threats and Opportunities. *Journal of Small Business Management*, 35(1), 11–23.
- Leaning, M (2019). An Approach to Digital Literacy through the Integration of Media and Information Literacy. *Media and Communication*, 7(2), 4–13.
- Liao, J., Welsch, H., & Moutray, C. (2008). Start-up resources and entrepreneurial discontinuance: The case of nascent entrepreneurs. *Journal of Small Business Strategy*, 19(2), 1.
- Mallett, R., Hagen-Zanker, J., Slater, R., Duvendack, M., (2012). The benefits and challenges of using systematic reviews in international development research. *Journal of Development Effectiveness*, 4(3), 445–455.
- Mengist, W., Soromessa, T., Legese, G. (2020). Method for conducting systematic literature review and meta-analysis for environmental science research. *Methods X*, 7, 100777. DOI: <https://doi.org/10.1016/j.mex.2019.100777>.
- Moghavvemi, S., Akma, N., & Standing, C. (2016). Entrepreneurs Adoption of Information System Innovation: The Impact of Individual Perception and Exogenous Factors on Entrepreneurs Behaviour. *Internet Research*, 26(5), pp. 1181-1208.
- Molnar, Z., & Bernat, P. (2007). Enhancing Competitiveness of Innovative SME Through Knowledge System Using Competitive Intelligence (Case: Business Cluster Omnipack). In: *Strategic Management and its Support by Information Systems Proceedings*, 7th International Conference on Strategic Management and Its Support by Information Systems, 59-68.
- Nambisan, S., Siegel, D., & Kenney, M. (2018). On open innovation, platforms, and entrepreneurship. *Strategic Entrepreneurship Journal*, 12(3), pp. 354–368.
- Nambisan, S., Wright, M., & M. Feldman (2019). The digital transformation of innovation and entrepreneurship: progress, challenges, and key themes. *Research Policy*, 48(8), 103773.
- Ng, W. (2012). Can we teach digital natives' digital literacy? *Computers & Education*, 59(3), 1065-1078.
- Nikou, S., Brännback, M. & Widén, G. (2018). The Impact of Multidimensionality of Literacy on the Use of Digital Technology: Digital Immigrants and Digital Natives. https://doi.org/10.1007/978-3-319-97931-1_10.
- Nikou, S., Brännback, M., & Widén, G. (2019). The impact of digitalization on literacy: digital immigrants vs. digital natives. In *Proceedings of the 27th European Conference on Information Systems (ECIS)*, Stockholm & Uppsala, Sweden, June 8-14, 2019.
- Nikou, S., Brännback, M.E., Orrensalo, T.P., & Widén, G. (2020). Social Media and Entrepreneurship: Exploring the Role of Digital Source Selection and Information Literacy. In: *Understanding Social Media and Entrepreneurship* (eds Schjoedt, L., Brännback, M., Carsrud, A.), 29-46. Springer, Cham.
- Okoli, C. (2015). A guide to conducting a standalone systematic literature review. *Communications of the Association for Information Systems*, 37, 43. DOI: <https://doi.org/10.17705/1CAIS.03743>
- Omiunu, G.O. (2019). E-literacy-adoption model and performance of women-owned SMEs in Southwestern Nigeria. *Journal of Global Entrepreneurship Research*, 9(26), pp. 1-19.

- Orrensalo, T. P., & Nikou, S. (2020). Trust and Respect in Entrepreneurial Information Seeking Behaviours. In *International Conference on Well-Being in the Information Society* (pp. 128-142). Springer, Cham.
- Pérez-Escoda, A., García-Ruiz, R., & Aguaded, I. (2019). Dimensions of digital literacy based on five models of development / Dimensiones de la alfabetización digital a partir de cinco modelos de desarrollo, *Cultura y Educación*, 31(2), 232-266.
- Rayna, T., & Striukova, L. (2021). Fostering skills for the 21st century: The role of Fab labs and makerspaces. *Technological Forecasting and Social Change*, 164, 120391. DOI: <https://doi.org/10.1016/j.techfore.2020.120391>.
- Sagarik, D., Chansukree, P., Cho, W., & Berman, E. (2018). E-government 4.0 in thailand: The role of central agencies. *Information Polity: The International Journal of Government & Democracy in the Information Age*, 23(3), 343-353.
- Sahut, J-M., Landoli, L., & Teulon, F. (2019). The age of digital entrepreneurship. *Small Business Economics*. Available at <https://doi.org/10.1007/s11187-019-00260-8>.
- Samthiyavalli, G., & Usharani, M. (2012). Use of Information Technology by Entrepreneurs – An Emprical Study. In: *Creativity, Innovation and Entrepreneurship* (eds Jerinabi, U., & Santhi, P.), 335-348. New Delhi: Allied Publishers.
- Savarese, M.F., Orsi, L., & Belussi, F. (2016). New venture high growth in high-tech environments. *European Planning Studies*, 24(11), 1937-1958.
- Savoiau, G. (2009). Enterprise, Entrepreneur and Entrepreneurship. The Main Semantic Chain in Contemporary Economics. *Limbaaj si context*, 2(1), 65.
- Schumpeter, J.A. (1934). *The theory of economic development*. Cambridge: Harvard University Press.
- Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organizational Science*, 11(4), 448–469.
- Sharma, S. (2016). *Entrepreneurship development*. Delhi: PHI Learning Private Limited.
- Shoham, S., Baruchson-Arbib, S., & Gouri-Oren, O. (2006). An exploratory study of Israeli start-up entrepreneur usage of the internet. *Journal of Information Science*, 32(1), 49-62.
- Song, X., Ding, Y. & Cao, R. (2006). Research on information service system for high-tech SMEs. <https://doi.org/10.1109/SOLI.2006.329078>.
- Steyn, R.A. (2018). Changing thoughts towards digital literacy interventions for South Africa entrepreneurs. *Reading & Writing. Journal of the Reading Association of South Africa*, 9(1), pp. 1-9.
- Tuomisalo, T. (2019). Emergence of an entrepreneurial opportunity: A case within a Finnish telecommunication international new venture. *J Int Entrep*, 17(3), 334–354.
- Vandenbroucke, E., Knockaert, M., & Ucbasaran, D. (2016). Outside Board Human Capital and Early-Stage High-Tech Firm Performance. *Entrepreneurship Theory and Practice*, 40(4), 759-779.
- Von Briel, F., Davidsson, P., & Recker, J.C. (2018). Digital technologies as external enablers of new venture creation in the IT hardware sector. *Entrepreneurship Theory and Practice*, 42 (1), 47-69.
- Wilson, T.D. (2000). Human information behavior. *Informing Science. Special Issue on Information Science Research*, 3, 49-56. <https://doi.org/10.28945/576>.
- Yamakawa, Y., Peng, M.W., & Deeds, D.L. (2015). Rising from the Ashes: Cognitive Determinants of Venture Growth after Entrepreneurial Failure. *Entrepreneurship Theory and Practice*, 39(2), 209-236.
- Yetisen, A., Volpatti, L., Coskun, A., Cho, S., Kamrani, E., Butt, H., Khademhos, A., Yun, S. (2015). Entrepreneurship. *Lab on a Chip Journal*, 15(18), 3638–3660.
- Zaremohzzabieh, Z., Samah, B. A., Muhammad, M., Omar, S. Z., Bolong, J., Hassan, S. B. H., et al. (2016). Information and communications technology acceptance by youth entrepreneurs in rural Malaysian communities: The mediating effects of attitude and entrepreneurial intention. *Information Technology for Development*, 22(4), 606-629.
- Zhang, X., Majid, S., & Foo, S. (2010). The Role of Information Literacy in Environmental Scanning as a Strategic Information System - A Study of Singapore SMEs. In: *Technological Convergence and Social Networks in Information Management* (eds Kurbanoglu, S., Al, U., Erdogan, L.P., Tonta, Y., & Uçak, N.), 96, 95-100. DOI: https://doi.org/10.1007/978-3-642-16032-5_9
- Zheng, C., Ahsan, M., & DeNoble, A.F. (2020). Entrepreneurial Networking During Early Stages of Opportunity Exploitation: Agency of Novice and Experienced New Venture Leaders. *Entrepreneurship Theory and Practice*, 44(4), 671-699.

APPENDIX 1 (Number of citation and FWCI index updated in April 2021).

Authors	Title	Journal/Publishing	Keywords	# Citation	FWCI
Nikou et al. (2020)	Social Media and Entrepreneurship: Exploring the Role of Digital Source Selection and Information Literacy.	In: Understanding Social Media and Entrepreneurship (eds Schjoedt, L., Brännback, M., Carsrud, A.)	Entrepreneurship, digital literacy, digital transformation, information literacy	2	-
Cao et al. (2019)	Research on embedded information service model of university library under the environment of innovation and entrepreneurship.	Advances in Social Science, Education and Humanities Research	Library, innovation and entrepreneurship service, China	0	-
Sagarik et al. (2018)	E-government 4.0 in Thailand: The role of central agencies.	Information Polity: The International Journal of Government & Democracy in the Information Age	Administrative reform, digital government e-government, Internet	24	2.23
Yuldinawati et al. (2018)	Exploring the Internet access of Indonesian SME entrepreneurs.	International Journal of Business	Developing countries, information access, Internet, entrepreneurship	10	0.93
Buwule and Mutula (2017)	Research support services to small and medium enterprises by university libraries in Uganda: An entrepreneurial and innovation strategy.	South African Journal of Information Management	Information services, library, university library	1	-
Guan et al. (2017)	Problems and suggestions of rural information service platform construction in China.	Proceedings of the 2017 2nd International Conference on Automation, Mechanical and Electrical Engineering	Information services, farmers, Internet, rural areas	0	-
Chen et al. (2016)	Effect of digital transformation on organizational performance of SMEs: Evidence from the Taiwanese textile industry's web portal.	Internet Research	SMEs, information distribution, information access, web portal	62	3.03
Jansen et al. (2010)	Channel choice and source choice of entrepreneurs in a public organizational context: The Dutch case.	In: EGOV 2010 (eds Wimmer, M.A. et al.)	Information sources, Information Channels, Internet channel, entrepreneurs	12	1.07

Kassim (2010)	Information needs of Malaysian Bumiputera would-be entrepreneurs.	Malaysian Journal of Library & Information Science	Business information, Information needs, Information sources. Bumiputera entrepreneurs, Malaysia	17	0.53
Song et al. (2006)	Research on information service system for high-tech SMEs.	International Conference on Service Operations and Logistics, and Informatics (Soli 2006)	High-tech SMEs, information services, e-services	0	-
Shoham et al. (2006)	An exploratory study of Israeli start-up entrepreneur usage of the Internet.	Journal of Information Science	Information sources, entrepreneurs, Israel	13	0.67
Bouthillier (2003)	Access to information for small business managers: Examination of some strategies and values.	Canadian Journal of Information & Library Sciences	Information access, library, entrepreneurs, SMEs, environmental scanning, Canada	30	0.45
Pieska (1993)	Value-added information-services for small and medium-sized enterprises.	Electronic Library	Information service, Finland, SMEs	0	-
Kulathunga et al. (2020)	How does technological and financial literacy influence SME performance: Mediating role of ERM practices.	Information	Technological literacy; financial literacy; SME performance; enterprise risk management (ERM) practices	6	1.84
Oggero et al. (2020)	Entrepreneurial spirits in women and men. The role of financial literacy and digital skills.	Small Business Economics	Digital literacy, entrepreneurial intention, financial literacy	10	1.71
Ahmad et al. (2020)	The impact of workplace information literacy on organizational innovation: An empirical study.	International Journal of Information Management	Information literacy, Innovation, CEO, SMEs	10	3.08
Omiunu (2019)	E-literacy-adoption model and performance of women-owned SMEs in Southwestern Nigeria.	Journal of Global Entrepreneurship	E-literacy-adoption, SMEs' Performance. Women entrepreneurs	9	-
Erdogan et al. (2019)	The relationship between lifelong learning trends, digital literacy levels and usage of web 2.0 tools with social entrepreneurship characteristics.	Croatian Journal of Education	Digital literacy; lifelong learning; social entrepreneurship; Web 2.0.	3	-

Bolek et al. (2018)	Information literacy of managers: models and factors.	Journal of Business Economics and Management	Digital literacy, information literacy, managers, lifelong learning, digital competencies, digital skills	5	0.38
Jasiewicz et al. (2018)	Complex and Multivariable: Methodology of Exploring Digital Literacy and Training Needs Within the Polish SME Sector.	Information Literacy in the Workplace	Digital literacy, Information literacy, SMEs	1	0.54
Sayyad Abdi et al. (2016)	Web designers and developers experiences of information literacy: A phenomenographic study	Library & Information Science Research	Web designers, developers, information literacy, web professionals	9	0.69
De Saulles (2007)	Information literacy amongst UK SMEs: an information policy gap.	Aslib Proceedings	Information strategy, Research, Internet, Small to medium-sized enterprises, United Kingdom, United States of America	53	1.24
Tuomisalo (2019)	Emergence of an entrepreneurial opportunity: A case within a Finnish telecommunication international new venture.	Journal of International Entrepreneurship	Opportunity recognition, information seeking behavior, multinational enterprises, new venture creation, entrepreneurial characteristics	4	0.33
Zamani and Mohammadi (2018)	Entrepreneurial learning as experienced by agricultural graduate entrepreneurs	High Education	Information sources, agricultural entrepreneurs, entrepreneurial journeys, online information sources	4	0.25
Dulle et al. (2017)	Capacity building modules for public libraries to support small-scale business enterprises in Meru County, Kenya.	South African Journal of Libraries and Information Science	Information skills, information access, entrepreneurial competences, entrepreneurial training/education	2	-
Kubata and Šimek (2016)	Identification of Business Informatics Specifics in Agricultural Enterprise.	AGRIS on-line Papers in Economics and Informatics	Business informatics, information, information systems, agriculture, farm	2	0.33
Savarese et al. (2016)	New venture high growth in high-tech environments.	European Planning Studies	Entrepreneurs, high-growth, Italy, high-tech environment, information sources access, key growth factors	11	0.64

Hafeez et al. (2019)	Knowledge sharing by entrepreneurs in a virtual community of practice.	Information Technology & People	Communities of practice, discourse analysis, virtual community, shared knowledge, knowledge-based community	28	3.93
Molnar and Bernat (2007)	Enhancing the competitiveness of SMEs through innovation (Case: business cluster omnipack).	Strategic Management and its Support by Information Systems Proceedings	ICT strategy, information access, entrepreneurship, SMEs, internationalization	0	-
Haase and Franco (2011)	Information sources for environmental scanning: do industry and firm size matter?	Management Decision	Environmental scanning, Information sources, Industry, Firm size, Portugal, Knowledge transfer, Information management	61	0.53
Othman and Hamedon (2011).	Environmental Scanning Practice of Enterprise 50: Small Medium Enterprise (E50 SMEs) in Malaysia.	Proceedings of the 5th European Conference on Information Management and Evaluation	Environmental scanning, information sources, small medium enterprise	5	-
Jorosi (2008)	Environmental scanning in Botswana's SMEs: A Study of the Manufacturing Industry.	LIBRI	Entrepreneurship, environmental scanning, information sources, CEOs, Sub- Saharan Africa	24	0.28
Raymond et al. (2001).	Technological scanning by small Canadian manufacturers.	Journal of Small Business Management	Technological scanning, entrepreneurs, information sources, information need, Canada	131	2.5
Auster and Choo (1994)	How Senior Managers Acquire and Use Information in Environmental Scanning.	Information Processing & Management	SMEs, managers, information scanning, publishing and telecommunications industry, information use	219	-
Zhang et al. (2010)	The role of information literacy in environmental scanning as a strategic information system - a study of Singapore SMEs.	Technological Convergence and Social Networks in Information Management	Information literacy, environmental scanning, strategic information, SME Singapore	8	0.44

Sahut et al. (2019)	The age of digital entrepreneurship.	Small Business Economics	Digital information, digital entrepreneurs, digital technologies	35	2.11
Eze et al. (2018)	Key success factors influencing SME managers' information behavior on emerging ICT (EICT) adoption decision-making in UK SMEs.	The Bottom Line	SMEs, Information behavior, emerging information and communication technology (EICT), Adoption decisions-making, SME managers, TOE framework	17	-
Jaska and Werenowska (2018)	The availability and use of media information sources in rural areas.	Economic Science for Rural - Development Conference Proceedings	Media information sources, farmer, rural areas, Internet	2	-
Zaremohzzabieh et al. (2016)	Information and Communications Technology Acceptance by Youth Entrepreneurs in Rural Malaysian Communities: The Mediating Effects of Attitude and Entrepreneurial Intention.	Information Technology for Development	Youth entrepreneurship, ICT acceptance, technology acceptance model (TAM), information access, Malaysia	17	0.46