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Digital Shadow Economy – Literature Review

Dan-Andrei COCA^{1*}, Andreea NISTOR²

Abstract

The virtual environment is a phenomenon that has grown exponentially in recent years, changing the way the economy evolves. Through e-commerce, social media platforms, online stores, or websites, financial resources are rolled both legally and illegally. Thus, some transactions are not accounted for or taxed, and also the concept of the digital shadow economy, defined as economic shadow activities conducted in electronic space, with no physical contact is increasingly present today. This paper aims to review and systematically analyze, through bibliometric analysis, using the Web of Science scientific platform and the VOSviewer software, the notion of digital shadow economy, determining the current state of knowledge in the field. Also, a comparative research was performed between digital shadow economy and the traditional shadow economy. The main findings reveal that digital shadow economy has a novelty character that refers to an economy based on digitized services and products, which escapes the official estimates of the GDP and the main research tendencies concern the conceptualization of the term and its main activity channels, aspects that distinguish it from traditional shadow economy. Furthermore, a thematic cluster, containing links to the digital shadow economy term can be noticed to be around cybercrimes.

Keywords: *Digital shadow economy, digital shadow trade, electronic transactions, illegal e-business, illegal e-traders, shadow economy.*

1. Introduction

Through the digitization and elimination of all geographical, social or cultural barriers and through a variety of services and products, currently available, online business has grown exponentially. With the help of information technology and the internet, the way to promote business opportunities has increased considerably, but at the same time, the possibility of illegal activities has increased. A path for illegal profits is also represented by online commercial transactions, which are usually guided by identity authentication, but also by the shadow digital economy, this being a current and common problem in economic activities, but also in cybernetics.

Within the digital economy, a series of criminal activities have been identified at the level of businesses, which have shaped a digital shadow economy. Dynamics and technological evolution have made it difficult to pursue this type of

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economy, so that some interpretations of this concept can be identified in the literature, depending on the nature and purpose of the research. The concept of digital shadow economy recognized as underground digital economy describes a series of crimes that are committed through technology of a certain magnitude, which can be repeated worldwide (Yip et al., 2012). Therefore, digital underground economy is characterized as an online transaction, which is performed as a crime on the Internet, being determined by financial gains (Herley & Florencio, 2010).

The costs of the digital economy are not known exactly, but according to Europol (2011), globally, the losses are extremely high, reaching 750 billion euros per year. Thus, many countries are sounding the alarm about how the digital shadow economy could be reduced in such a way as to prevent violations of privacy, but also the dynamism of individuals or legal entities in obtaining income from the digital environment.

2. Aims of research

The main objective of the study is to determine the state of the art of knowledge regarding the shadow digital economy, to highlight research trends from a critical perspective, thus revealing topics and areas that need further investigation and to differentiate the traditional shadow economy from the shadow digital economy.

3. Research Methods

Using bibliometric analysis, using the VOSviewer software tool, based on the bibliometric data exported from the Web of Science platform (WoS), the general research tendencies in the sector of digital shadow economy were revealed, but also the main body of work which revolves around the studied phenomenon.

The keywords used for identifying research on digital shadow economy on the WoS platform, were: digital shadow economy, shadow e-business, illegal e-trade, illegal e-business, digital shadow trade, by topic, all databases, all years.

In addition to that, research articles on digital shadow or underground economy were identified on the WoS platform by searching by topic the databases, as well as on Google Scholar search engine. Afterwards, a systematic critical literature review was performed on the publications retrieved.

4. Findings

The search on the WoS platform generated 73 publications that are mainly from the last three years (32), the first one dating from 1995. The main WoS categories are Economics, Management and Business (38). Out of the 2581 number of identified terms, 54 meet the requirement of at least 8 occurrences, and based on the calculated VOSviewer relevance score, the 60% most relevant ones (32) are those presented in Figure 1, below:

Fig. 1: Co-occurrence network of words when searching digital shadow economy by topic.
Source: own generation in VOSviewer.

As shown in Figure 1, the 32 most relevant terms used in researches on digital shadow economy, can be grouped in 4 thematic clusters, having as main relevant terms, the following: (1) information, (2) economy, (3) digital shadow economy and (4) methodology.

4.1. Digital shadow economy – current state of knowledge

In this section, based on the research articles retrieved from the WoS platform when searching by topic digital shadow economy and Google Scholar search engine, a systematic critical literature review was performed.

As an effect of the society's development, traditional commerce changed into e-commerce and more and more people prefer to shop on online platforms rather than physical establishments (Gasparyniene & Remeikiene, 2016).

Factors as globalization and digitalization have consistently modified the manner in which people are working and communicating, producing changes even in the purchasing decisions, as technology is being used on a daily basis (Gasparyniene et al., 2018).

Studies on the digital shadow economy do not show multilateralism in literature, so the purpose of this paper is to systematize and analyze this phenomenon, which is growing according to Higgins (2007). The concept of digital shadow economy has hardly received an exact definition, so it is the attitude of consumers that makes the difference between what is the official and informal economies (Hill, 2007; Williams et al., 2010). This concept has the possibility to develop a series of measures, meant to control and manage properly this phenomenon (Camarero et al., 2014; Taylor, 2012).

Digital shadow economy was defined as incorporating illegal sales of goods/services online, through illegal actions, which violate several rules, to obtain material benefits (Remeikiene et al., 2018). According to the authors, as main

characteristics of digital shadow economy it can be mentioned: electronic space for conducting activities, less control measures as compared to traditional shadow activities, undefined geographical location, communication in e-space, no physical contact, usage of e-payments, cryptocurrencies. Thus, it can be stated that such activities are very opaque and well hidden from the authorities.

Another definition of the shadow digital economy is represented by illegal physical or online actions, which are not declared at the time of reporting, but which generate profit. (Gaspariene et al., 2016, p. 507).

Some studies found that the digital shadow economy is often reduced to studies of e-fraud and cyber activities, but also to the motivation of consumers to take part in such activities (Gaspariene & Remeikienė, 2015, p. 402).

According to recent research in the field (Abramowicz et al., 2011; Gaspariene & Remeikienė, 2016; Gaspariene et al., 2016; Remeikienė et al., 2018) it is undebatable that the digital economy has a non-observed component, but considering the novelty of the concept, measuring its size is a challenging activity and it can be stated that estimation methods have not been developed up until this moment. As applied to the traditional shadow economy the hardest step is to isolate a series of indicators and variables able to quantify its size.

The number of illegal activities that occur online is increasing each year, thus an interest from both public and private sector to manage and develop means to prevent and control them (Gaspariene et al., 2016; Gaspariene et al., 2017). The scientific resources (Williams & Nadin 2012; Schneider & Williams, 2015) reveal the most used variables used when estimating shadow economy: direct and indirect taxation, tax rate, exports, labor force rate, GNP, GDP, expenditures and tax return.

In our opinion, a proper financial and economic profiling of the digital shadow economy should take into consideration the following: legal form, industry, risk data, owners' data, sanctions and adverse media (as Internet is everywhere).

4.2. Definitions regarding digital shadow economy

The evolution of technologies has led to several definitions and concepts regarding the types of activities involved in what means digital shadow economy, but a common definition of this concept has not yet been established (Yu et al., 2015). Therefore, the activity of this concept includes a series of terms, meant to highlight the nature of the concept of the digital shadow economy, but also to emphasize the role of this concept as a main supplier to the consumer (Akintoye & Araoye, 2011). In Table no. 1 we presented a series of definitions proposed by various authors, in order to understand the differences and similarities between the digital economy and the digital shadow economy.

Table 1. Defining the concepts of *digital economy* and *shadow economy* in specialty literature

Digital economy	Shadow economy
A transformation of all economic sectors through digitalization (Brynjolfsson & Kahin, 2000)	An activity that can be developed independently of the state control and accounting system (Nechaev & Mihailushkin, 2011)
A complex structure seen as a way to achieve something tangible and less as a concept, which focuses on digital technologies (Elmasry et al., 2016)	A complex process that endangers socio-economic relations, operating illegal activities (Williams & Nadin, 2012)
It has three main components: e-infrastructure, e-business, and e-commerce (Mesenbourg, 2001)	Income from economic activities that neglect taxation and government regulations (Schneider & Williams, 2013)
An economy based on digitized services and products, whether it is online sales, education, or information services (Margherio et al., 1999)	A hidden economy focused on the production of legal or illegal goods and services, which is not officially estimated in GDP. (Smith, 1994)
An era of network intelligence, which combines knowledge, intelligence, and creativity to create new products and services (Tapscott, 1996)	An emigration from the established way of working, being a decision adopted against the official norms regarding economic activity (Cassel & Caspers, 1984)

Source: gathered data

The terms that highlight the notion of digital shadow economy suggests online trading, aimed at profit. In other words, this term shows a violation of legal regulations in the online environment, aimed at making a profit (Ahmad, 2008). Also, the undeclared digital economy is the one that puts access to what tax evasion means, the undeclared digital economy underlines a series of regulations regarding the reporting of commercial activities, and this includes online operations (Feige & Urban, 2008).

The consumer is an important agent, better highlighted by the concept of "digital black marketing" as opposed to traditional shadow economy, so in this regard, online trading is emphasized of fraudulent data, a series of products considered illegal and in general, highlights the concept of "cybercrime" by exploiting network technology (Yip et al., 2012). This cybercrime is characterized as a type of underground economy, which, through the development and distribution of tools for criminal behaviour, becomes industrialized (Mello, 2013). At the same time, this type of crime also targets advanced actions in the technological environment, using a series of personalized programs such as malware, attacks, bot networks, designed to threaten consumers in the public or private sector (Vlachos et al., 2011). Usually, the resources that come into the possession of digital shadow economy practitioners are those that include access to networks, space on a computer hard drive, access to financial resources, data, and even intellectual capital.

4.3. *Cybercrime and Digital Shadow Economy*

Cybercrime is usually related to everything that involves the illegal activities of suppliers of products or services, so they generate financial resources from the digital shadow economy, but this concept should not be limited to money obtained illegally (Vlachoset al., 2011). In other words, this concept deprives consumers of obtaining certain products in a legal, declared, and accounted way (Blackledge & Coyle, 2010). These illegal activities are found in the literature under the name of e-fraud. This term is perceived as the illegal use of similar digital products and services. (Taylor, 2012). The digital economy is viewed from the perspective of a credit card transaction attestation, which was stolen through online mounting (Thomas & Martin, 2006).

The interest in the digital shadow economy started a few years ago when this concept became a goal of scientific research. Among the most well-known types of cybercrime are those that represent identity theft, often committed with the help of social networks, fraud applications, malware, which are used for antivirus scans on a particular device, but also for detecting users (Mello, 2013). The consumer seen from the perspective of the main agent is the one who engages in dysfunctional behavior, performing electronic piracy, which is the way to obtain financial resources illegally, through the Internet, but at the same time, in the opinion of the online consumer, he acts dishonestly, violating several contractual conditions to obtain dishonest profit (Amasiatu & Shah, 2014). Most cases involving electronic fraud focus on consumers purchasing different items, whether they are clothing, gadgets or other devices at much lower prices.

Dysfunctional behavior in the electronic environment is guided by actions, meant to violate certain rules of conduct accepted by society (Harris & Reynolds, 2003). If the traditional shadow economy covers only certain geographical areas or regions, in the digital shadow economy the geographical boundaries are exceeded because this concept includes a variety of online platforms and websites (Levi & Williams, 2013) from which benefits can be obtained, both through social networks and through electronic auctions (Assimakopoulos & Toska, 2011; Hafezieh, 2011; Vlachos & Minou, 2011).

5. Discussions

After analyzing in VOSviewer software tool the network of links for the digital shadow economy term we found the term being linked with other 18 terms, as follows: (1) concept, phenomenon, definition, consumer, channel; (2) data, internet, information, number, order, attack, security, user; (3) economy, country, person; (4) methodology, indicator.

Thus, through deductive analysis, it can be highlighted that digital shadow economy is a concept that was scarcely researched in the literature. Due to this, the main research tendency is around the definition and conceptualisation of the term, as well as around its main activity channels.

Furthermore, a thematic cluster, containing links to the digital shadow

economy term can be noticed to be around cybercrimes (terms as: data, internet, information, number, order, attack, security, user).

The digital economy has some characteristics, which lead to changes in the fiscal principles of traditional economic activities characterized by electronic communication and electronic transactions carried out by participants in the digital market. Thus, e-commerce is based on sales, regardless of products and services, whether material or immaterial. In the digital shadow economy, consumers have the most important role in terms of demand because they act as generators, and it often happens that they do not realize the type of action they are exercising, if it is about the activity of a legal or illegal nature in the online environment, nor of the magnitude that the obtained results can generate. In this regard, many countries are struggling to find solutions and measures to prevent this type of economy.

6. Conclusions

Digital shadow economy is a relatively new concept that developed in symbiosis with the technological advancements and the spread of Internet and of e-business and e-trade activities.

As opposed to traditional shadow economy, the concept refers to economic shadow activities conducted in electronic space with no physical contact, characterised by usage of e-payments and cryptocurrencies that escape the official estimates of GDP.

Through bibliometric analysis, it can be stated that the main research tendency with regard to the digital shadow economy increased in the recent years and concerns mainly the definition and conceptualisation of the term, as well as its main activity channels.

The digital shadow economy is an ensemble, which contains a fusion of the classic with the criminal digital and can be defined as representing an economy based on digitized services and products, which escapes the official estimates of GDP.

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