

Janton-Drozdowska, Michal Elzbieta; Mikolajewicz-Wozniak, Alicja

**Working Paper**

## The introduction of the distributed ledger technology in banking system as an alternative for Single European Payment Area solutions

Institute of Economic Research Working Papers, No. 80/2017

**Provided in Cooperation with:**

Institute of Economic Research (IER), Toruń (Poland)

*Suggested Citation:* Janton-Drozdowska, Michal Elzbieta; Mikolajewicz-Wozniak, Alicja (2017) : The introduction of the distributed ledger technology in banking system as an alternative for Single European Payment Area solutions, Institute of Economic Research Working Papers, No. 80/2017, Institute of Economic Research (IER), Toruń

This Version is available at:

<https://hdl.handle.net/10419/219903>

**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.*



<https://creativecommons.org/licenses/by/3.0/>



Institute of Economic Research Working Papers

No. 80/2017

**The introduction of the distributed ledger  
technology in banking system as an alternative for  
Single European Payment Area solutions**

**Elżbieta Jantóń-Drozdowska, Alicja Mikołajewicz-  
Woźniak**

**Article prepared and submitted for:**

**9<sup>th</sup> International Conference on Applied Economics  
Contemporary Issues in Economy, Institute of Economic  
Research, Polish Economic Society Branch in Toruń,  
Faculty of Economic Sciences and Management, Nicolaus  
Copernicus University, Toruń, Poland, 22-23 June 2017**

**Toruń, Poland 2017**

© Copyright: Creative Commons Attribution 3.0 License

**Elżbieta Jantón-Drozdowska, Alicja Mikołajewicz-  
Woźniak**

[janton@amu.edu.pl](mailto:janton@amu.edu.pl); [awozniak@amu.edu.pl](mailto:awozniak@amu.edu.pl)

Adam Mickiewicz University in Poznań, Faculty of Law and  
Administration, ul. Św. Marcin 90, Poznań, Poland

**The introduction of the distributed ledger technology in  
banking system as an alternative for Single European  
Payment Area solutions**

**JEL Classification:** *F36; G15; G21*

**Keywords:** *SEPA; blockchain; distributed ledger technology; virtual  
currencies; financial integration*

**Abstract**

**Research background:** The year 2016 ended the period of migration from national payment services to the SEPA instruments and it has become apparent that some problems remained unresolved. Overcoming them requires finding suitable technological solutions. The potential of distributed ledger technology (DLT) is currently explored by financial

sector and its implementation may affect the SEPA schemes in a variety of dimensions.

**Purpose of the article:** The aim of the article is to determine the potential impact of the DLT transfer to banking sector on the future SEPA's functioning. The paper presents SEPA's assumptions and the project's current status as well as DLT's concept. It describes the technology transfer implications for banking industry and compares currently operating SEPA schemes with those based on DLT. It also indicates opportunities and threats being the consequence of the new technology implementation and their significance for SEPA.

**Methodology/methods:** In the article the qualitative analysis is supplemented by the quantitative one. While characterizing the functioning of the main pillars of the SEPA Schemes the elements of descriptive statistics are used. The final conclusions are based on the comparative analysis of SEPA schemes and developed DLT applications.

**Findings & Value added:** The existing problems might be solved by supplementing currently operating SEPA payment schemes with the applications based on DLT. The developed systems shall provide required real-time processing and a global reach as well as extend the SEPA schemes' functionalities with the ability to transfer other currencies. The technology implementation shall result not only in new financial products but first of all – in creating new business models. Consequently, we shall expect the modification of currently operating SEPA schemes, based rather on their supplement than total replacement in a short time horizon.

## **Introduction**

Since the establishment of the Economic and Monetary Union, the Eurosystem has aimed to create a single market for financial services. In order to implement the idea various measures have been introduced, including the Single European Payment Area (SEPA). The year 2016 ended the period of migration from national payment services to the SEPA instruments and it has become apparent that some problems remained unresolved. Overcoming them requires finding suitable technological solutions. The potential of distributed ledger technology (DLT) is currently explored by financial sector and its implementation may affect the SEPA schemes in a variety of dimensions.

The aim of the article is to determine the potential impact of the DLT transfer to banking sector on the future SEPA's functioning. The starting point for further considerations is the presentations of the SEPA's assumptions and the project's current status. The following characterization of the distributed ledgers concept combined with the description of the technology implications for banking industry provides grounds for comparison of currently operating SEPA schemes with DLT-based solutions. It also allows to identify occurring opportunities and emerging threats being the consequence of the technology implementation and indicate their significance for SEPA.

## **Methodology**

The article presents the results the Authors in-depth analysis of the currently operating SEPA Schemes as well as developed DLT-based solutions tailored for banking industry.

The qualitative analysis has been supplemented by the quantitative one. The newest *Payments statistics* published by the EBC, presenting comparable information separately for each EU member country, have been the ground for compiling the information regarding the share of non-SEPA transactions in total value of transferred funds inside and outside the Eurozone. The findings are presented in the article in the form of graphs.

As analyzing future consequences of assumed DLT transfer from virtual currency schemes to banking sector cannot be based on quantitative data, the Authors have decided to use the comparative analysis of SEPA schemes and developed DLT applications. This has led to accomplish the article's aim, giving grounds for the formulation of final conclusions.

## **The creation of the Single Payment Area and the main SEPA schemes**

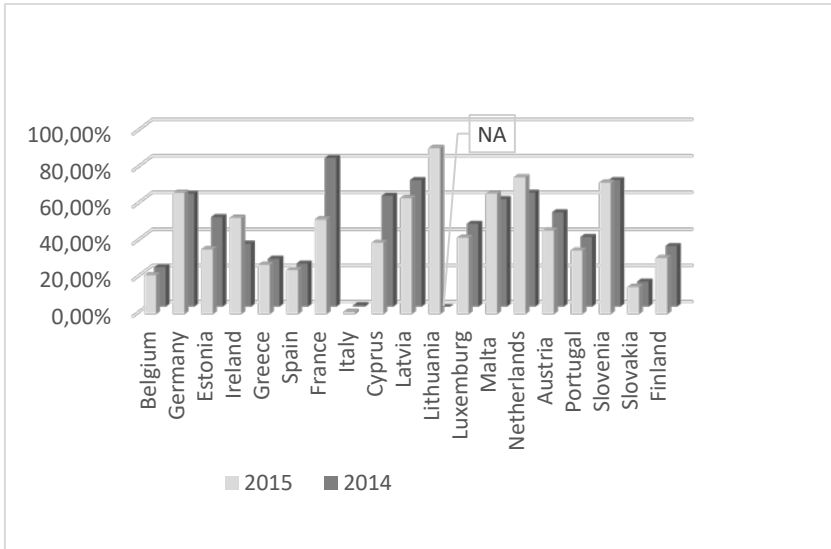
In 2002, the EU Authorities launched the Single European Payment Area (SEPA) process, consisting of a series of initiatives aimed at the introduction of common instruments, standards and infrastructures for retail payments in euro. The main objective was to allow users to make payments in euro throughout Europe from a

single bank account, using a single set of payment instruments, as easily and securely as in the national environment (Kokkola, 2010, pp. 187-188). SEPA was also to encourage a shift from cash to electronic payments. As empirical evidence suggests that migration to electronic payment instruments might stimulate the real economy (Silva *et al.*, 2016, p. 406), it was assumed that standardization of transaction and their electronic processing might bring substantial benefits for various stakeholders.

The SEPA Credit Transfer (SCT) Scheme and The SEPA Direct Debit (SDD) Core and Business to Business Schemes are the crucial parts of the project. The former enables payment service providers to offer a core and basic credit transfer service for either single or bulk payments, the latter serves as basis for processing direct debits in the private and business customer sectors.

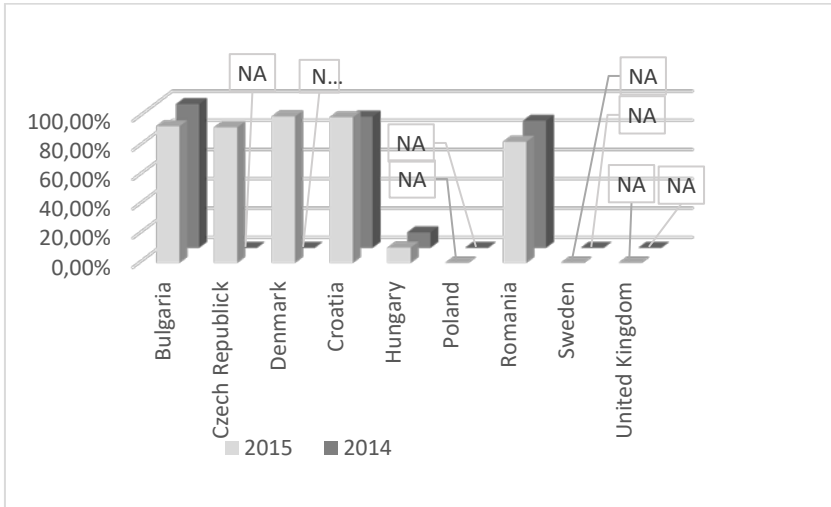
The migration from national payment services to the SEPA instruments ended in 2016. Despite this a significant part of executed transfers in the EU is categorized as non-SEPA. This refers also to countries with the single currency in use. For the whole euro-area more than a half of all transfers (taking into account their value – not the number of transactions) were the non-SEPA ones – in 2014 as well as in 2015. Direct debits more often met the requirements of SEPA. In the Eurozone, only one third of direct debits executed in 2014 and one fifth of those completed in 2015 were described as non-SEPA.

**Graph 1.** The share of non-SEPA credit transfers in the value of all credit transfers – the Eurozone



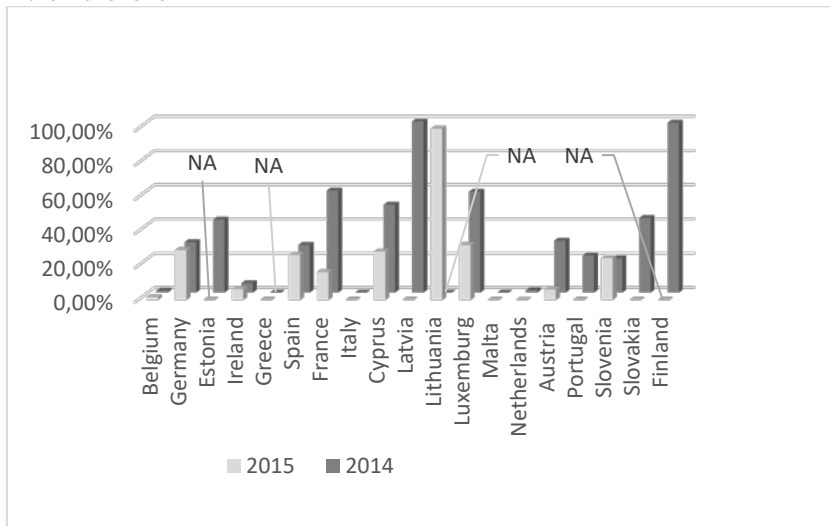
Source: own calculation based on European Central Bank (2016), *Payments statistics*.

**Graph 2.** The share of non-SEPA credit transfers in the value of all credit transfers – the EU countries with national currencies



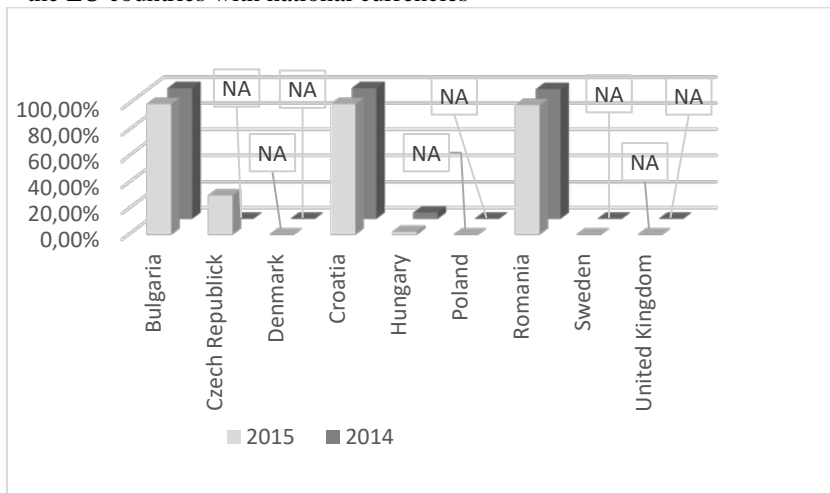
Source: own calculation based on European Central Bank (2016), *Payments statistics*.

**Graph 3.** The share of non-SEPA direct debits in the value of direct debits – the Eurozone



Source: own calculation based on European Central Bank (2016), *Payments statistics*.

**Graph 4.** The share of non-SEPA direct debits in the value of direct debits – the EU countries with national currencies



Source: own calculation based on European Central Bank (2016), *Payments statistics*.



It can be assumed that the cause of these state of affairs are funds transferred outside the SEPA, transfers in other currencies and transfers being so called instant payments. As expectations for immediate payments are growing, the SCT scheme seems to be insufficient “remedy” to retail payments market in EU, especially in the context of the market integration. Therefore, the SEPA Credit Transfer Instant (SCT Inst) Scheme is being launched to the market. It is going to enter into effect in November 2017. Nonetheless, the SCT and SDD Schemes still have the opportunity for further growth based on new participants. Those schemes’ participation criteria express some aspirations to expand the geographical scope of the SEPA beyond the EU and the EEA (European Economic Area).

### **DLT applications tailored for financial industry**

Execution of real-time payments as well as expanding geographical scope of SEPA requires the creation of adequate financial infrastructure. Number of national currencies in EU countries as well as SEPA’s potential partners shall prompt the extension of the SEPA schemes’ functionalities with the ability to transfer other currencies. A possible solution to all indicated problems is the development of payment schemes based on distributed ledgers – the technology derived from virtual currency schemes that were launched to the market with the advent of Bitcoin.

In a distributed ledger system, multiple copies of the central ledger are maintained across the established network by a large number of private entities. Transactions are validating with technologies derived from cryptography, allowing a consensus to be achieved across network members regarding validity of the ledger (He *et al.*, 2016, p. 18). For some the key to understanding this phenomenon is to think of it as a protocol, akin to those that underpin the Internet. It is an open, global infrastructure upon which other technologies and applications can be built. Thus, it allows people to bypass traditional intermediaries in their dealings with each other, thereby reducing costs of transactions and speeding up their processing (Underwood, 2016, p. 15). It has broad implications for the way of transacting over electronic network.

Technologies classified as asset-centric are potentially the most interesting category for the transaction banking and payments domain. They concentrate on the exchange of digital representation of existing assets – e.g. fiat currencies – using the non-public version of a shared ledger. The network participants use the system to issue digital assets, used next as the base of executed transfers. Direct links created between system users allow payment service providers, forming the nodes of such network, to transact with trusted partners on an exclusive basis without an exposure to activities of third parties (Euro Banking Association, 2016, pp. 4, 9-10).

Existing studies have not analysed the effectiveness of developed solutions, especially from technical perspective (Yli-Huumo *et al.*, 2016, pp. 21-22, 23-24). Nevertheless, the technology is expected to lead to the emergence of innovative payment solutions. Their introduction would provide various benefits among which the most important are:

- transfers in multiple currencies with the use of a single transaction system;
- global reach;
- real-time payments;
- 24/7/365 processing;
- cost-effectiveness;
- automatic recording of transaction from different locations combined with secure and cost-effective data storing solutions.

According to World Economic Forum's analysis, new financial services infrastructure built on distributed ledgers "will redraw processes and call into question orthodoxies that are foundational to today's business models". It will be one of the technologies that form the foundation of next-generation financial services infrastructure (World Economic Forum, 2016a, p. 18). So far, information technology has contributed significantly to the evolution of financial markets, without, however, revolutionising the way in which financial institutions interact with one another. DLT may change this bringing about revolution in the sector (Pinna & Ruttenberg, 2016, p. 2)

## **DLT solutions competing with SEPA systems**

DLT-based applications shall prove to be more competitive compared to the systems currently ensuring the functioning of SEPA. The summary of basic characteristics of both systems is shown in the table below.

**Table 1.** Comparison of currently operating SEPA schemes and developed DLT-based solutions

<b>Systems characteristics</b>	<b>SEPA schemes</b>	<b>DLT-based solutions</b>
<b>payment instruments</b>	credit transfers direct debits	credit transfer at initial stage of systems functioning, other instruments introduced in the next phase
<b>currency</b>	euro	<u>at least the main currencies</u>
<b>geographical scope</b>	European countries being SEPA members	<u>global</u>
<b>clearing and settlement</b>	dependent on payment instrument, usually delayed for one day	<u>instant payments</u>
<b>processing</b>	differing, dependent on the system's type	24/7/365

Source: own work

The solutions based on distributed ledgers will provide the possibility of transferring various currencies on a global scale and make instant payments become a standard. There are grounds for presuming that the ultimate costs of DLT transfers will not be higher than the SEPA ones. On the other hand, the potential savings related to the new technology implementation should not be overestimated. Estimates as those made by analysts at Santander InnoVentures specifying that by 2022 the technology could save banks more \$20 billion annually as a result of savings in settlement, cross-border payment and regulatory costs (Fanning & Centers, 2016, p. 56; World Economic Forum, 2016b, p. 8) seems to be unreliable. They are also made in isolation from the technology set up and transitions costs.

There are, however, other areas, where DLT-based applications could prove their superiority over currently operating SEPA schemes. The expected shift to instant payment execution offers an opportunity for new processes and technologies. And decentralized payment networks are considered as one of main alternatives that can feasibly provide real-time services (Mai, 2015, p. 1, 11).

In fact, systems based on distributed ledger technologies should not be regarded as conflicting with the main idea underlying the Single European Payment Area and solutions that have arisen on the ground. Due to their multi-currency option, they could ultimately contribute to further financial integration in the EU, where several national currencies besides euro are in use and the common payment system for only one currency seems to be insufficient. They might also realize the idea of extending SEPA's geographical scope.

At the moment, EBC recognizes the technology as not mature enough for use in central banks market infrastructure, precluding their settlement services operation in a DLT environment. Instead they consider central banks interoperation with DLT-based settlement services offered by external entities (Mersch, 2016).

Finding satisfactory technical solutions does not, however, guarantee smooth functioning of the single payment market. Payment habits are slow to change, and payment market still differs across Europe. The successful introduction of SEPA does not automatically translate into convergence of actual payment behaviour in EU countries (Martikainen *et al.*, 2015, p. 81). Nonetheless, systems based on distributed ledger technologies could significantly support the convergence process as they are reflection of the present trends: globalization, virtualization, networking, active users' participation and striving for cost reduction. Thus, they have a good chance of general acceptance (Mikołajewicz-Woźniak, Scheibe, 2015, p. 375).

## **Conclusions**

With the establishment of the Economic and Monetary Union, it was clear that streamlining of complicated processes would be essential to making cross-border payments faster and more cost-effective. The Eurosystem has been working to put in place a harmonized financial infrastructure facilitating the task. The creation

of the Single European Payment Area has been one of this infrastructure's pillars. The migration from national services to the SEPA instruments, completed in 2016, has provided the achievement of the main project's objectives, but stopping at this stage would mean leaving many problems unresolved and resigning from further expanding the SEPA's geographical scope.

The mentioned problems might be solved by supplementing currently operating SEPA payment schemes with those based on the distributed ledger technology derived from virtual currency schemes that were launched to the market with the advent of Bitcoin. The developed systems shall provide required real-time processing and a global reach as well as may extend the SEPA schemes' functionalities with the ability to transfer other currencies. It might be crucial for EU countries using national currencies and potential new partners from various parts of the world. In such a scenario, a regional integration would be replaced with the global one.

The anticipated benefits of the distributed ledger technology implementation in various sector of financial market motivate market participants, infrastructure providers and central banks to explore the technology. It shall result not only in new financial products but first of all – in creating new business models. Thus, the technology implementation will lead to reshaping the market infrastructure and transactional systems. It may also form the basis or further development of the SEPA Credit Transfer Instant Scheme. Consequently, we shall expect the modification of currently operating SEPA schemes, based rather on their supplement than total replacement in a short time horizon.

The distributed ledger technology has undoubtedly an enormous potential to improve the effectiveness of individual institutions as well as the whole financial market, but it is not yet completely mature. Furthermore, critical operational, legal and governance issues are still not enough clarified. Depending on their governance distributed ledgers-based solutions will remove existing shortcomings of SEPA systems, solving various issues relating to financial integration in the EU, or induce a re-fragmentation of the market. This is therefore a great challenge for institutions involved in realization of the SEPA project.

## **References**

Euro Banking Association. (2015). *Cryptotechnologies, a major IT innovation and catalyst for change: 4 categories, 4 applications and 4 scenarios. An exploration for transaction banking and payment professionals*, EBA Working Group on Electronic and Alternative Payments. Retrieved from [https://www.abe-eba.eu/downloads/knowledge-and-research/EBA\\_20150511\\_EBA\\_Cryptotechnologies\\_a\\_major\\_IT\\_innovation\\_v1\\_0.pdf](https://www.abe-eba.eu/downloads/knowledge-and-research/EBA_20150511_EBA_Cryptotechnologies_a_major_IT_innovation_v1_0.pdf) (2.01.2017).

European Central Bank. (2016b). *Payments statistics*. Retrieved from <http://sdw.ecb.europa.eu/reports.do?node=1000004051> (15.12.2016).

Fanning, K. Centers, D.P. (2016). Blockchain and its coming impact on financial services. *The Journal of Corporate Accounting & Finance*, 27 (5). DOI: <http://dx.doi.org/10.1002/jcaf.22179>.

He, D. Habermeier, K. Leckow, R. Haksar, V. Almeida, Y. Kashima, M. Kyriakos-Saad, N. Oura, H. Saadi Sedik, T. Stetsenko, N. Verdugo-Yepes, C. (2016). Virtual currencies and beyond. Initial considerations. *IMF Staff Discussion Note*, 7. Retrieved from <https://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf> (20.12.2016).

Kokkola, T. (Ed.) (2010). *The Payment System. Payments, securities and derivatives, and the role of the Eurosystem*. European Central Bank. Retrieved from <https://www.ecb.europa.eu/pub/pdf/other/paymentsystem201009en.pdf> (2.01.2017).

Mai H. (2015). Instant revolution of payments? *Deutsche Bank Research*. Retrieved from [https://www.dbresearch.com/PROD/DBR\\_INTERNET\\_EN-PROD/PROD0000000000378543.PDF](https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000378543.PDF) (27.12.2016).

Martikainen, E. Schmiedel, H., Takalo, T. (2016). Convergence of European payments. *Journal of Banking & Finance*, 50. DOI: <http://dx.doi.org/10.1016/j.jbankfin.2014.09.021>.

Mersch, Y. (2016), *Distributed ledger technology: role and relevance of the ECB*. Retrieved from <https://www.ecb.europa.eu/press/key/date/2016/html/sp161206.en.html> (23.12.2016).

Mikołajewicz-Woźniak, A. Scheibe, A. (2015). Virtual currency schemes – the future of financial services. *Foresight*, 17 (4). DOI: <http://dx.doi.org/10.1108/FS-04-2014-0021>.

Pinna, A. Ruttenberg, W. (2016). Distributed ledger technologies in securities post trading. *EBC Occasional Paper 172*. Retrieved from <https://www.ecb.europa.eu/pub/pdf/scpops/ecbop172.en.pdf> (23.12.2016).

Silva, V.G. Ramalho, E.A. Vieira, C.R. (2016). The impact of SEPA in credit transfer payments: Evidence from the euro area. *Research in*

*International Business and Finance*, 38. DOI: <http://dx.doi.org/10.1016/j.ribaf.2016.04.013>.

Underwood, S. (2016). Blockchain beyond bitcoin. *Communications of the ACM*, 59 (11). DOI: <http://dx.doi.org/10.1145/2994581>.

World Economic Forum. (2016a). The future of financial infrastructure. An ambitious look at how blockchain can reshape financial services. *Future financial services series*. Retrieved from [http://www3.weforum.org/docs/WEF\\_The\\_future\\_of\\_financial\\_infrastructure.pdf](http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf) (12.01.2017).

World Economic Forum. (2016b). *Top 10 technologies of 2016*. Retrieved from [http://www3.weforum.org/docs/GAC16\\_Top10\\_Emerging\\_Technologies\\_2016\\_report.pdf](http://www3.weforum.org/docs/GAC16_Top10_Emerging_Technologies_2016_report.pdf) (12.01.2017).

Yli-Huumo, J. Ko, D. Choi, S. Park, S. Smolander, K. (2016). Where is current research on blockchain Technology?—A systematic review. *PLoS ONE* 11(10). DOI: <http://dx.doi.org/10.1371/journal.pone.0163477>.