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THE IMPLICATIONS OF DISTRIBUTED LEDGERS TECHNOLOGY TRANSFER OUTSIDE THE FINANCIAL SECTOR

Research background. Decentralized virtual currency schemes launched to the market with the advent of Bitcoin brought with them block chain –the new technology that have provided their users with previously unavailable opportunities. They are derived from innovatory informatics solutions underlying such schemes. The crucial part of the mentioned systems is software, that with the application of different cryptographic techniques enables users forming decentralised network to create a distributed ledger. This ledger presents a singular repository of transactions or account balances. Being a kind of shared database it allows the network participants to store information relating to executed transactions or account balances of a given digital assets as well as to carry out various transactions. The described solution ensures integrity and trust between otherwise unrelated parties, providing required security without the engagement of any central counterparty. Furthermore, it offers numerous benefits, especially those concerning execution time and cost-effectiveness of performed transactions.

Although it is usually considered as another technologically advanced version of a transaction system, the better way to understand the phenomenon is to think of it as a protocol, akin to those that underpin the Internet. “It’s the first native digital medium for value, just as the Internet was the first native digital medium for information” [1]. The block chain is an open, global infrastructure upon which other applications can be built. It allows people to bypass traditional intermediaries in their dealings with each other, thereby speeding up transactions processing and simultaneously reducing their cost [2, p. 15]. It has broad implications for the way of transacting over electronic network.

At present the technology underlying the mentioned schemes is being transferred from virtual currency schemes to various segments of financial market. Institutions forming the market infrastructure explore the distributed ledgers potential, aiming at using it to boost the effectiveness of their operations. A significant part of them considers the implementation of various transfer and recordkeeping solutions based on the distributed ledger technology. For example, 80% of banks declared to initiate such projects by 2017 [3, p. 14]. Consequently,

the distributed ledger technology starts to penetrate various segments of financial market. But besides IT and financial sector, the other ones are not currently involved in the work on the use of the distributed ledgers in their activities on a larger scale. The block chain's potential is not, however, limited to their possible financial applications. Thus, the distributed ledger technology should be expected to enter next business areas in more or less distant future.

Purpose of the research and used methods. The paper characterizes the development of virtual currency market as well as the technology underlying it, which forms the ground for further considerations. Then it appraises the advisability of direct transferring innovatory informatics solutions derived from virtual currency schemes to other business areas. The main aim of the research is to identify benefits of the distributed ledger technology implementation in business activities outside financial market and indicate the consequences of the technology applications for business models in various sectors.

The paper presents the results of in-depth analysis of the mentioned issues based on available sources. Due to the lack of reliable quantitative data it has mainly qualitative character.

Findings. Bitcoin was a pioneer on the virtual currencies' market and still remains its leader. It may change as this market is developing dynamically and multi-faceted. The current list of altcoins – alternate crypto currencies – contains over 730 items [4], which proves the dynamic growth of the market. The creation of virtual currency schemes with in-built transfer mechanism is, however, only one of many possible applications of the block chain technology. The most significant alternatives include asset registries, application stacks and asset-centric technologies.

Asset registries, like Mastercoin, use public ledgers to record assets other than virtual coins being the ground of the system's functioning. Application stacks, in turn, concentrate on becoming platforms for the development and execution of complete application on the top of decentralized networks and may be described as decentralized versions of so called "cloud services». Asset-centric technologies, such as Ripple, focus on the exchange of digital representation of existing assets (e.g. currencies or securities) based on a shared, but non-public ledger[5, pp. 6-10].

Specifics of the above solutions foster their use in certain areas (like asset-centric technologies forming the basis for the creation of instant payment systems in the banking sector) and makes them useless in other ones. But ignoring these limitations, the greatest potential seems to lie in so called smart contracts. They were introduced to the market with the release of Ethereum – a virtual currency, which in a short period of time has become the main rival of Bitcoin and is steadily gaining in importance. The software underlying this virtual currency scheme – which might be classified as application stack – provides a variety of additional functionalities, including the possibility to create online markets and programmable transactions (referred to as smart contracts). Such contracts can be

defined as programs that create encoding for different conditions and outcomes. They effectively translate contractual terms (like payment conditions) into computational material, which makes them self-enforcing and self-executing. They also provide payment automation for miscellaneous transactions. In practice, smart contracts may have a variety of uses.

Owing to unlimited possible modifications of the analyzed technology, distributed ledgers as well as smart contracts (that grew on the basis of block chain) are suitable for various digital-assets that hold value and may facilitate those assets' transfers. Nevertheless, the characteristics of the technology being crucial in "traditional" virtual currency schemes (like accessibility of the ledger copies to anybody all over the world or users' anonymity) are often not relevant to other areas of business activities. Consequently, particular business entities or their groups using the technology for their own purposes cannot copy directly solutions derived from virtual currency schemes, but they have to adapt the technology to their own needs.

Financial institutions have paved the wave for transferring the technology into new fields and thus, they have taken on themselves the majority of financial burden related to the process. Other sectors should consider going along this way. The technology allowing virtual currency schemes to function, being the fast, secure and accurate recordkeeping as well as transfer system, forms the ground for a revolutionary change in processing variety of transactions in many sectors.

Existing studies have not evaluated the effectiveness of implemented solutions based on block chain, especially from technical perspective [6, pp. 21-22, 23–24]. Nevertheless, the analysis of existing and currently developed applications based on the technology leads to the expectations of benefits similar to those derived in virtual currency schemes:

- creating integrate networks of otherwise unrelated participants able to carry out various operations efficiently and securely;
- execution of various transactions without the engagement of intermediaries or central counter-parties;
- cost-effectiveness;
- real-time processing of various operations 24/7/365;
- potential global scale of performed activities;
- automatic recording of operations from different locations combined with secure and cost-effective data storing solutions.

Specific benefits being the consequences of transferring the analyzed technology to particular fields will depend on the area where the technology is applied. For example, conceivable trading platforms based on block chain may be integrally combined with efficient automated payment system (not requiring separate payment instructions for purchase transactions). They may also enable sellers to arrange micro- or even "ultra small" payments, allowing them to trade on

the Internet very low-cost goods or services, which would be otherwise infeasible [7, pp. 350-351].

As the distributed ledger technology eliminates intermediate links in processing transactions it has the potential to modify the rules of various entities' operations and change or even revolutionize the way in which they interact with one another. This may lead to the creation of new business models or, at least, radically modify the networked ones providing them with a whole set of useful tools, especially those based on the idea of smart contracts. Thus, the technology implementation may lead to reshaping the market infrastructure and transactional systems.

The actual impact of distributed ledger technology on various sectors of the economy will depend on the way of embracing the technology by market participants. The foresight regarding forthcoming changes is really hard as future technology applications may substantially differ from those currently existing or being developed. Nevertheless, the analyzed technology has undoubtedly an enormous potential to improve the effectiveness of individual business entities as well as the whole sectors. Furthermore, it corresponds with changes in the economy, reflecting predominant economic tendencies – globalization, virtualization, networking, active users' participation and striving for cost reduction [8, p. 375]. It appears to be an excellent ground for mastering the market.

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МЕТОДОЛОГІЧНІ ПІДХОДИ ТА ПРАКТИКА СКЛАДАННЯ ПЛАТІЖНОГО БАЛАНСУ

Статистична наука досліджує не тільки внутрішні операції та розрахунки, що здійснюються інституційними одиницями, але й зовнішньоекономічні, пов'язані із зовнішньою торгівлею та рухом капіталів і які опосередковуються валютними відносинами. Всі ці операції та розрахунки відображаються в балансовому рахунку міжнародних операцій, який є платіжним балансом країни. Платіжний баланс характеризує, з одного боку, економічний стан країни та її валютно-фінансові відноси з усім іншим світом, а з іншого – ефективність світогосподарських зв'язків та участь цієї країни у міжнародному розподілі праці. Тобто стан платіжного балансу залежить від стану національної валюти та її стабільності.

Необхідність розробки платіжного балансу виникла ще на ранніх етапах розвитку капіталізму, коли багатство країни ототожнювалося з кількістю золота і тому кожна країна намагалася запобігти його вивезенню, що потребувало здійснення обліку зовнішньоекономічних операцій. Особливо гостро це питання поставало під час економічних криз, коли виникала потреба не тільки зберегти золоті запаси, але й відновити платіжну рівновагу. Тому з розвитком світогосподарських зв'язків, міжнародних платіжних систем відбувалася еволюція не тільки збирання статистичних даних та їх аналізу, але й методології складання платіжних балансів, їх удосконалення та практичного використання.

Кращі методики складання платіжного балансу були розроблені в Англії та США. Так, фахівцями Міністерства торгівлі США у 1923 році було