The distributed ledger technology as a measure to minimize risks of poor-quality pharmaceuticals circulation

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Background. In the modern world, millions of people suffer from fake and poor-quality medical products entering the market. Violation of the rules of transportation of drugs makes them ineffective and even dangerous. The relationship between the various parts of the supply chain, production and regulation of drugs is too hard and has many problems. Distributed ledger technology is a distributed database, the properties of which allow us to track the entire path of medical products from the manufacturer to consumer, to improve the current model of the supply chain, to transform the pharmaceutical industry and prevent falsified drugs reach the market.

Objective. The aim of the article is to analyze the Distributed ledger technology as an innovative means of poor-quality pharmaceuticals prevention to reach the market as well as their forehanded detection.

Methods. Content analysis of web sites of companies developing Distributed ledger technology solutions had been performed. Five examples found with a google search engine by keywords "distributed ledger technology", "blockchain", "pharmaceuticals" and "supply chain" were examined. Analysis of relative scientific publications had been made. With the help of generalization and systematization methods, services provided by these companies were analyzed. The visual model of the supply chain was created with Microsoft Visio software.

Results.The analysis results contain a principle scheme of Distributed ledger technology implementation to achieve the objectives. The analysis of present-day pharmaceuticals supply chain structure and the distributed ledger technology capacities to improve pharmaceutical companies has been carried out and presented. Furthermore, the article allows getting acquainted with today's projects released to the market as well as the prognosis of the Distributed ledger technology potential in pharmaceutical industry enhancement in the future.

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21

22 Abstract

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24 products entering the market. Violation of the rules of transportation of drugs makes them
25 ineffective and even dangerous. The relationship between the various parts of the supply chain,
26 production and regulation of drugs is too hard and has many problems. Distributed ledger
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28 medical products from the manufacturer to consumer, to improve the current model of the supply
29 chain, to transform the pharmaceutical industry and prevent falsified drugs reach the market.

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42   **Results.** The analysis results contain a principle scheme of Distributed ledger technology
43   implementation to achieve the objectives. The analysis of present-day pharmaceuticals supply
44   chain structure and the distributed ledger technology capacities to improve pharmaceutical
45   companies has been carried out and presented. Furthermore, the article allows getting acquainted
46   with today's projects released to the market as well as the prognosis of the Distributed ledger
47   technology potential in pharmaceutical industry enhancement in the future.
48

Introduction

50   According to WHO statistics every tenth medical product in developing countries is non-
51   conforming or falsified, meanwhile, the global size of this illegal market amounts to
52   approximately \$30 bln[1]. The accident with the illegal release of falsified rabies vaccine was
53   revealed in China in July 2018. As a consequence, more than 250 000 vaccines for children were
54   released to the market[2]. It should be noted that the "Black" market of counterfeit products has
55   been forced out of official retail into illegal sales via the Internet with courier delivery to your
56   home. For example, in 2018, only 0.4 percent of counterfeit drugs were identified in the official
57   sales channels in the Russian Federation[3]. Counterfeit drugs are one of the most serious problems
58   in pharmacology nowadays, due to different side effects to human health and unpredictable
59   efficiency[45].
60

61   To prevent adverse reactions during pharmacotherapy, governments around the world are
62   tightening the requirements for tracking drugs and medical devices in order to slow down the
63   global flow of counterfeit products. In the United States in 2013, the Law on Quality and Safety
64   of Medicines (DQSA) was adopted, according to which until 2023 it is necessary to create an
65   electronic, compatible system for identifying and tracking certain prescription drugs[6]. Thereafter,
66   Euro Parliament Guidelines processed by Euro Commission to combat medical pharmaceuticals
67   falsification went into force in 2011. According to the standard regulations, some obligatory
68   elements of safety, e.g. a unique identification and safety control to prevent illegal disclosure
69   were implemented into practice by February 2019[7]. In the Russian Federation The Federal law
70   No. 425-FZ of 28 December 2017 on amendments to the Federal law on the circulation of
71   medicines was adopted. In accordance with it, the system of obligatory marking with
72   identification methods for all pharmaceuticals is to be implemented in medical means and
73   released into circulation all over the Russian Federation territory. It will be obligatory since the 1
74   of January 2020[8].
75

76   The Distributed ledger technology is one of the emerging solutions to track goods at all stages,
77   from the manufacturer to the consumer, it helps in the management of supply chains, solves the
78   problem of trust and confidentiality.
79

80   It was shown[9] that the business requirements for traceability systems are curbing illegal
81   practices; improving sustainability performance; increasing operational efficiency; enhancing
82   supply-chain coordination; and sensing market trends.

83

84   For example, in 2019 a study was made on drug supply chain management using Hyperledger
85   Fabric based on blockchain technology to handle secure drug supply chain records that were
86   tested in a smart hospital[4]. Another example is a study of the pharmacovigilance blockchain
87   system that supports information sharing along with the official drug distribution network[5].
88   Another paper presents a solution for pharmaceutical cold chain management using distributed
89   ledger technologies[10]. Also, blockchain was proposed to be used for the history of ownership
90   tracking in general[11]. All these examples show that area of distributed ledger technology is
91   highly relevant and studied by experts from different countries.

92

93   But not all of these initiatives result in commercially successful projects. Critical success factors
94   for the implementation of traceability systems were shown to be companies' capabilities;
95   collaboration; technology maturity; supply chain practices; leadership; and governance of the
96   traceability efforts[9].

97

98   The basic features of Distributed ledger technology are:
99   - information technology as a set of processes, methods of search, collection, storage, processing,
100   provision, dissemination of information, as well as methods of implementation of such processes
101   and methods based on the use of computer technology;
102   − information security.

103

104   These are two substantial digital areas. They include not only a peering network, a system of
105   database construction and operation but also cryptography as a sufficient element of the system.
106   In accordance with the current ISO international standards, its numerous algorithms guarantee
107   privacy, integrity, availability, authenticity, reliability, fault-tolerance and identifiability.

108

109   Blockchain is a promising way of implementing a distributed ledger. Itis a distributed database, a
110   sequence of attached and attaching block where every following block includes the value of the
111   hash function of the previous block as hash information. All peers of the peer-to-peer network
112   providing information exchange processes have the same sequence of blocks. A long chain
113   called a transaction log is the result of blocks' interconnection (Figure.1).

114

115   Transactions are connected into blocks, where each block contains nearly multiple transactions
116   that form a hash tree. Further, the block is transmitted to a Distributed ledger network where it is
117   checked by specified system participants to avoid mistakes and guarantee correctness.

118

119

120   This ability to define the origin of data while guaranteeing their invariability makes Distributed
121   ledger technology the most appropriate way to track medicine and medical products. The present
122   study aims to investigate the Distributed ledger technology as a tool to track the entire path of

123   medical products from the manufacturer to consumer. This work is intended for pharmaceutical
124   market professionals and the general public.
125

Materials & Methods

127   *The process of the research Distributed ledger technology as a measure to minimize risks of*
128   *poor-quality pharmaceuticals circulation.*
129

130   The research contains examples of companies that are developing Distributed ledger technology
131   solutions in the drug supply chain. We defined the research question and created a visual model
132   of the supply chain. The review has the following steps:
133   •   analysis of the current supply chain model
134   •   analysis of problems in the standard supply chain model
135   •   search and analysis of companies that provide Distributed ledger technology solutions in the
136   supply chain
137   •   data analysis and generalization of results
138

139   *Analysis of the current supply chain model*
140   We will use the search terms "pharmaceuticals" and "supply chain" when using the electronic
141   articles databases to systematically search literature, articles, and scientific publications for the
142   last 7 years (from 2012 to 2019). Articles and publications should discuss the introduction of
143   Distributed ledger technology into the supply chain, contain information about the advantages or
144   disadvantages of this technology and compare it with the current model; We will review
145   conference materials and reports that comply with the review criteria.
146   Our goal was to review the narrow segment of scientific and public domain knowledge in the
147   interconnection between the pharmaceuticals supply chain and Distributed ledger technology
148   solutions. Many successful projects do not have any grounding in research, hence our decision to
149   include the conventional web search engines, where people in general showcase their innovation,
150   often based on personal needs. While the literature typically reflects emerging applications and
151   new trends, the supply chain tracking solutions market gives a good indication of mature
152   applications and functionality. In this study, we discovered different types of solutions, and our
153   analysis was based on the goal to find common features between them.
154

155   The search was based on two main source types. The first source was online journal databases,
156   indexes, and reference lists. We searched for prototypes and work in progress using the search
157   terms 'supply chain', 'pharmaceuticals', and 'distributed ledger'. We constructed a search string
158   using only the conjunction 'AND' operator to fined relative information. The search was based on
159   the metadata — that is, title, abstract, and keywords. We targeted both original research papers
160   and review articles indexed by PubMed, Scopus, Web of Science and Google Scholar.
161

162   The second source was conventional web search engines. We searched these two source types—
163   namely, the online journal databases and online websites—independently of each other. We
164   searched the journal databases first, and then subsequently searched the related sites.
165

166   *Definition of a research question*

167 How the introduction of the Distributed ledger technology into the standard model of the supply
168 chain can prevent poor-quality pharmaceuticals circulation?
169
170
171 *Criteria for reviewing companies*
172 We will consider only big companies with a large experience in the field of pharmacy,
173 pharmacology and information systems.
174
175 *Types of results*
176 We will create a visual model of the supply chain. We will also create a table with the benefits of
177 implementing the Distributed ledger technology into the current model of the supply chain. Give
178 a text analysis and conclusion on the current decisions of various companies.
179
180 *Ethics and Dissemination*
181 As data collection was executed via published literature, ethical approval was not be required for
182 this review.
183

Results

185 Taking into account all the processes of research it's possible to state that a Distributed ledger
186 technology can help solve current problems in a supply chain due to its properties and
187 advantages. It guarantees traceability and transparency through all logistics of goods from a
188 producer to the delivery location of medicines. The technology will allow controlling the
189 progress of a product through serialization from the side of producers, distributors, and
190 repackers. It provides a stable decentralized database with the possibility to use smart contracts.
191 The database can be read and updated by all supply chain participants including wholesalers and
192 patients. The guaranty of total transparency of a medicines supply chain and impossibility to
193 change data in a Distributed ledger system restricts the possibility to commit fraud and raises
194 confidence in a product with patients. It helps to identify and eliminate compromised medicines
195 and can serve to the improvement of the period of validity and reduce waste created by expired
196 pharmaceutical products. In Table 1 the benefits of a Distributed ledger technology
197 implementation in a pharmaceutical product supply chain are stated.
198
199 In concern of relations between distributed ledger technology based systems with the
200 pharmaceuticals supply chain, multiple data entities may be distinguished. At the stage of
201 pharmaceutical production, information on the amount of inventories needed for the production
202 cycle can be stored in a system based on distributed ledger technology; requirements may be
203 formed for production by type and quantity of pharmaceutical products; the need for laboratory
204 animals and biological objects for quality control of pharmaceutical products may be also
205 determined. To display the results of production, a nomenclature, quantity and price of
206 pharmaceutical products may be formed. In relation to this nomenclature, applications for the
207 supply of medicines from contractors could be created. After dispatch from production, the
208 system marks the labeling and the customer of the batch of pharmaceutical products. Also in the

209   system can be reflected the results of the examination of samples of drugs and pharmaceutical
210   substances. These data will be further used to identify the commodity items of drugs in
211   circulation for the purpose of quality control.
212

213   At the stage of distribution (storage, transportation, wholesale, retail) in systems based on
214   distributed ledger technology, information on the identification of commodity items of drugs in
215   circulation for the purpose of quality control and protection against counterfeiting can be stored
216   in the first place. Additionally, information on registered medicinal products for use in public
217   procurement as a whole may be contained. In relation to this nomenclature, at the stages of
218   product distribution, applications for the supply of medicines from contractors can be created.
219   After sending from one participant in the supply chain to another, the system store the labeling
220   data, supplier and customer of a batch of pharmaceutical products. Also in the system can be
221   reflected the results of the examination of samples of drugs carried out by the manufacturer or
222   carried out as part of selective control at the stages of distribution. Separately, in a system based
223   on Distributed ledger technology, the storage temperature of a batch of drugs can be recorded to
224   ensure a cold chain. This information can be generated both manually, based on data from
225   thermometers, and automatically and using sensors working on the principle of the internet of
226   things technology.[1012]
227

228   As part of the dispense and medical application in the systems based on distributed ledger
229   technology, electronic prescriptions and recipes are added to the information available to
230   participants in the distribution chain. Information on the labeling of drugs can be stored in the
231   context of drug recipients both in anonymized and in personified form and depending on the
232   tasks solved using the information system. Also, information about drug indications,
233   contraindications, side effects, interactions with other drugs, and other information contained in
234   package inserts can be added to the set of information describing the drug as a package stored on
235   a shelf. Distributed ledger technology may also allow recording information about identified
236   adverse reactions from the use of a drug as part of the pharmacovigilance system.
237

238   All these data entities are to be stored according to distributed ledger technology principles
239   irreversibly, to provide a guaranty of information continuity, accessibility, and integrity.
240   Distributed ledger represents the source of transaction information that can be shared among all
241   users in a distributed network of devices. By using distributed ledger technology, every
242   transaction performed within the network is recorded and stored, thereby eliminating the
243   dependency on third parties such as payment processors. The distributed ledger technology uses
244   properties such as data integrity, non-repudiation, and authentication to solve the authentication
245   issue. These principles were shown in detailed studies [131415].
246

Discussion

248   As the medicines move up through the supply chain, logistics companies are to adhere to the

249 guidelines of medicines handling during transportation and storage. Regulations may include
250 maintaining the temperature and humidity range within certain limits. Environmental conditions
251 of a supply chain can directly influence the quality and effectiveness of a medicine. For example,
252 the system of a "cold chain" is implemented for temperature-sensitive pharmaceutical products
253 such as a vaccine to guarantee high quality of immunobiological medical preparations, their
254 secure and effective usage[16]. Thus, it's necessary to control all supply chain properly. However,
255 taking into account the fact that every participant of the supply chain (a producer, a logistic
256 company, shops, and drugstores) maintain one's database, that causes problems in tracking and
257 identification of medical products. Due to its transparency, invariability and distributing nature
258 the Distributed ledger technology provides the mechanism, that allows guaranteeing compliance
259 with rules of logistics and transportation in a supply chain. Also, so-called smart contacts,
260 computer algorithms whose aim is to sign and maintain self-executing contact for in a
261 Distributed ledger technology environment can be used. They activate automatically under
262 certain conditions by notification of process participants in a supply chain[17]. Suppose that a case
263 of temperature failure in the process of transportation was revealed. Due to the Distributed ledger
264 technology the consumer can see the very moment of this failure. The process of an information
265 collection concerning compliance with temperature conditions also can be automated with the
266 use of a sensor working on the principle of the Internet of things and automatically sending
267 information concerning the history of the storage temperature and the tracking system connected
268 with distributed information exchange environment based on Distributed ledger technology.
269
270 The return of medicines is possible in the process of their turnover. It becomes possible in case
271 of the surplus stock in the process of wholesale trade and it was necessary to return medicines
272 unsold to the pharmaceutical companies. Although the share of returned medicines is low in
273 comparison with sales (2-3% of all sales[18]). The sales volume of pharmaceuticals in the USA in
274 2016 reached $ 450 bln[19]. According to the estimation given trade turnover of 2-3% from the
275 total volume counts $ 9-12bln. Instead of salvaging of returned lots of medicines that are of high
276 quality and effective, pharmaceutical companies prefer reselling them. However, before having a
277 chance to resell these goods being sold before, pharmaceutical companies make a legal
278 commitment to guarantee the authenticity and quality of these products. The existing algorithm
279 of work can be improved by implementing serial number accounting of medicines in a
280 Distributed ledger technology system that serves as a decentralized and distributed ledger.
281 Wholesalers and clients have an opportunity to check the authenticity of the package of
282 medicines while getting connected with the Distributed ledger technology. As the medicines
283 move along the supply chain, all transactions are written into the Distributed ledger technology
284 thus there is a guaranty actualization of a distributed displacement register and its impossibility
285 to be changed. It allows all participants to trace medicals at all stages of the life cycle.
286 Eventually, it is impossible to ensure the pharmaceuticals are still good after they are in the hand
287 of first-hand users, so the return of medicines from this stage of lifecycle should not be
288 considered.

290 The typical business model of a supply chain includes a number of participants such as the owner
291 of a brand, manufacturer of dosage form, the wholesale trader, the retailer, the consumer and the
292 regulator. All parties handle the same pharmaceutical and gain the same purpose to carry out
293 effective therapy having low costs. Nevertheless, if two companies make mutual transactions
294 going along with money exchange, the absence of sufficient trust causes the process cooperation
295 held in accordance with the Procure-to-pay model and implementation of traditional tools[20].
296 Procure to Pay -is a multi-channel process connecting a client with one or numerous service
297 providers or suppliers of goods and helps to conduct identification as well as authentication of
298 parties in interest, raise an invoice, payment calculation, and others. Companies use such a long
299 term and inefficient process to ensure that all data fit as there is no mutual trust. They need real
300 evidence to account and enter goods, e.g. keeping both paper copies of the same transaction by a
301 supplier and a client. Despite a buying order for a client and sales order for a supplier are the
302 same document, they are kept safe in different logs, both sides are to assure in the coincidence of
303 the terms listed before in both documents. Thus, the existing process of data exchange is
304 inefficient and expensive. In such a long product life cycle the dataflow is often fragmented and
305 financial costs are relatively high even if logistics were effective. The Distributed ledger
306 technology will allow forming a new model of networking in the sort of trust-free model, all
307 participants will be able to guarantee the data safety more conveniently, as it is shown in figure
308 2. With the support of more timely and accurate information flow, data can be transmitted
309 simultaneously with other activities. Thus, each company can significantly improve the
310 efficiency of its work and optimize its cash costs.
311
312 In the pharmaceutical industry, there are already several options for using Distributed ledger
313 technology in supply chains: Merck (USA) in partnership with SAP (Germany) developed the
314 SAP Pharma Blockchain POC application. This system is based on the existing solution by SAP
315 not associated with the Distributed ledger technology, which is called SAP Advanced Track and
316 Trace System for Pharmaceuticals (ATTP)[21]. It works on Android or iOS mobile devices. It uses
317 a simple barcode scan to see the location of medicines in real-time, wherever they are, including
318 manufacturer, brand owner, wholesaler, and delivery[22].
319
320 When a manufacturer sends a batch of drugs, it registers the item in the SAP Pharma POC
321 blockchain system. The system generates a unique identifier that stores four pieces of
322 information coming from the ATTP: item number (based on GS1 standard), serial number, batch
323 number, and expiration date. This ensures that the delivery information is kept intact and
324 transparent. Other parties can get access to information from their local copy of the Distributed
325 ledger technology system. On the distributor side, an application is used to scan the ID, which
326 extracts the information from the packaging barcode. Thus, they can check any drugs returned to
327 them that has a unique code.
328

329 Also in SAP added the ability to track each event, the transition of products to another owner.
330 Thus, it is possible to track when the buyer purchases medicines. If the manufacturer receives a
331 returned parcel with the previously used identifier, it is much easier to detect a fake. Also, there
332 is a map that helps to make sure that the medicines are in the region in which you expect to find
333 them [23].
334
335 Pharmaceutical company Novartis (Switzerland) is also experimenting with Distributed ledger
336 technology since 2016 to identify counterfeit drugs and track temperature in real-time for all
337 participants in the supply chain, using blockchain and IoT. This concept involves the use of a
338 computing network of physical objects ("things") equipped with built-in technologies to interact
339 with each other or with the external environment[24]. The purpose of their work is to use
340 Distributed ledger technology to detect counterfeit drugs and track temperature with real-time
341 monitoring for all participants in the supply chain[25].
342
343 Novartis is also currently engaged in the development of the network based on Distributed ledger
344 technology for the consortium between the European pharmaceutical industry and the EU, which
345 is called the "IMI Blockchain Enabled Healthcare program"[26] (IMI). The consortium will consist
346 of companies engaged in Distributed ledger technology for small and medium-sized businesses,
347 universities, clinical laboratories, hospitals, representatives of patients and others. It aims to
348 investigate the use of counterfeit drugs, supply chain tracking, patient data, and clinical trials.
349
350 Another example is the VeChain system (China), in partnership with DNV GL (Norway) it uses
351 Distributed ledger technology to improve pharmaceuticals tracking, monitoring, safety, and
352 auditing. In 2016, the State Council of China issued the national information plan of the
353 thirteenth five-year plan, which included Distributed ledger technology. VeChain is an approved
354 supplier of Distributed ledger technology-based traceability systems in Shanghai and was given a
355 task to implement traceability requirements in China by 2020. The VeChain traceability solution
356 is being developed and tested in Shanghai and will soon be deployed throughout China.
357
358 In accordance with the VeChain system to track drugs and vaccines highly sensitive IoT devices
359 collect and store in the Distributed ledger VeChainThor all the data connected with the
360 production and transportation of vaccines, including vaccines from manufacturers, warehouses,
361 distribution, cold chain as well as hospitals and even medical use of drugs. Ensuring the
362 reliability of the data source, VeChain also eliminates the potential risks throughout the process
363 and ensures that the records about vaccines are unchanging and permanent[27].
364
365 As an example of a centralized system and the use of cryptocode to fight against counterfeit
366 products, it is possible to give the example of the Russian Federation on the territory of which in
367 the period from 1 February 2017 to 31 December 2019 the conduct of a voluntary experiment in
368 the marking of the control (identification) signs and monitoring over the circulation of certain

369 types of medicinal products for medical use is carried out. During the implementation of the
370 experiment, a Federal state information system for monitoring the movement of medicines from
371 the manufacturer to the end-user should be developed and put into operation[28].
372
373 The Center For Advanced Technology Development (CRPT) creates a unique digital code data
374 Matrix and sends it to manufacturers and importers. The Data Matrix code is divided into two
375 parts: the identification code, which determines the position of the goods in the system and the
376 unified catalog of goods, and the verification code or crypto-tail, which is generated by the
377 operator with the help of domestic cryptography technologies. Cryptocode is a set of additional
378 characters in the Data Matrix code, which is applied to the packaging of goods. It is centrally
379 generated by the operator with the help of domestic cryptography technologies and eliminates
380 the appearance of "doubles" and the possibility of re-entering the market of goods.
381
382 Manufacturers put a code on each package of their goods. Through the digital code, anyone can
383 trace the entire path of the goods from the conveyor to the online cash register which takes it out
384 of circulation. The system records the transfer of goods from the owner to the owner at each
385 stage of the logistics chain, which makes it impossible to "throw" forgery[29].
386
387 At the moment, applications for smartphones "checking the labeling of goods" allowing by
388 scanning the QR code to obtain information about the origin of the packaging of the drug and
389 make sure that the drug is legal, and it is available for free download[30].
390
391 This centralized product labeling and tracking solution currently have a number of shortcomings
392 that the CRPT is trying to address. First is the length of the cryptocode Data Matrix, which is
393 applied to the packaging of goods. Tests at the production facilities of various companies
394 demonstrate that the mechanism with long code printing in some cases requires additional
395 calibration and configuration of equipment to increase the density of code printing. Most
396 attempts to print the data Matrix code with a crypto code on the package give the print quality
397 below the required standards. This means that there are risks that the packaging is already in the
398 process of turnover will cease to be read by scanners. Now the operator of the monitoring system
399 determines the optimal size of the crypto code, which will provide the required level of
400 protection[31].
401

402 ## Conclusions
403 Modern technologies allow demonstrating their capabilities and potential to transform the
404 pharmaceutical industry. In general, distributed ledger technology is one of the rapidly
405 developing areasin medical data sharing[32]. The features of the Distributed ledger technology are
406 to provide unprecedented transparency of information, the immutability of the information
407 entered and the efficiency of data management, strengthening trust and reputation. These

408   advantages reduce the risk of a defective product entering the market and increase the
409   effectiveness of its detection.

410

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500

Figure 1

Blockchain for Supply Chain

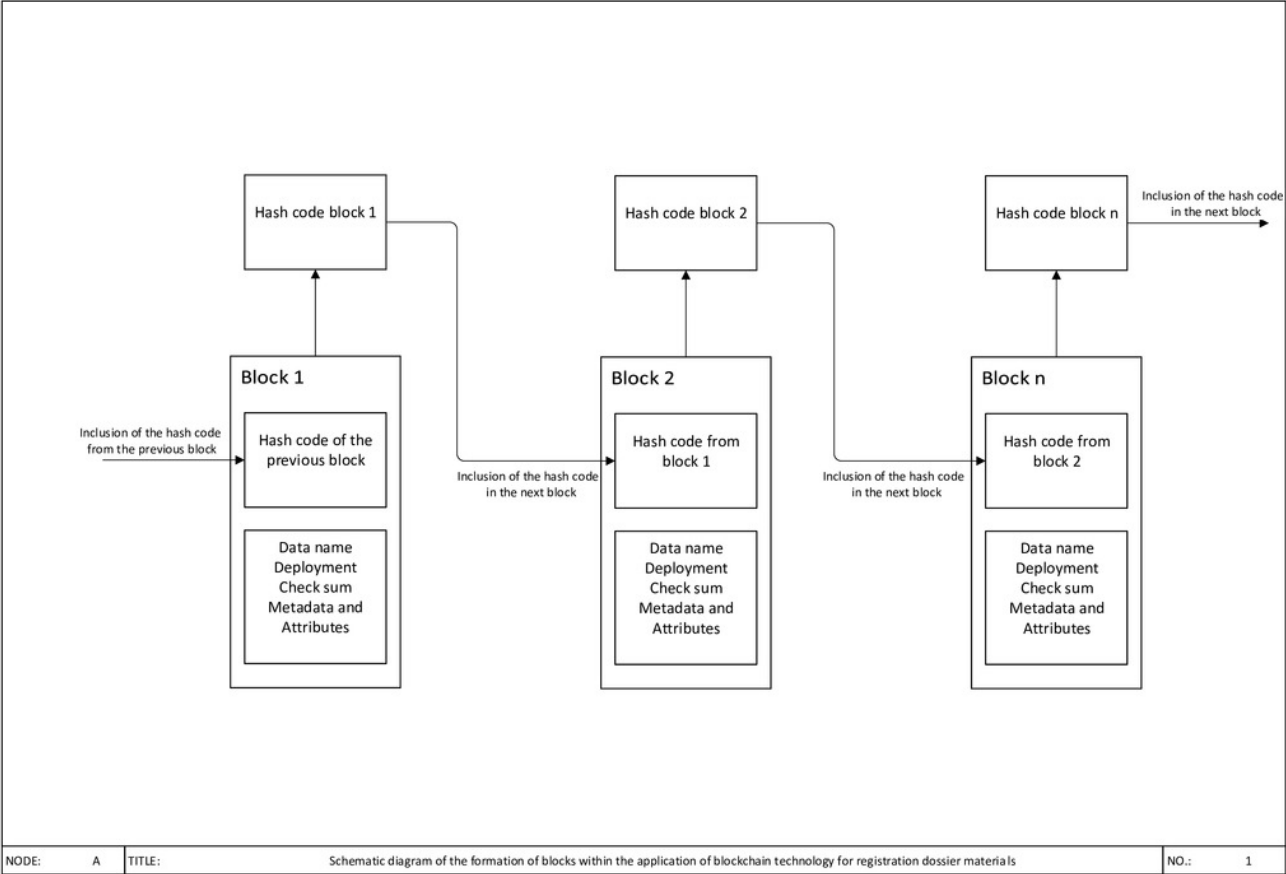



Figure 2

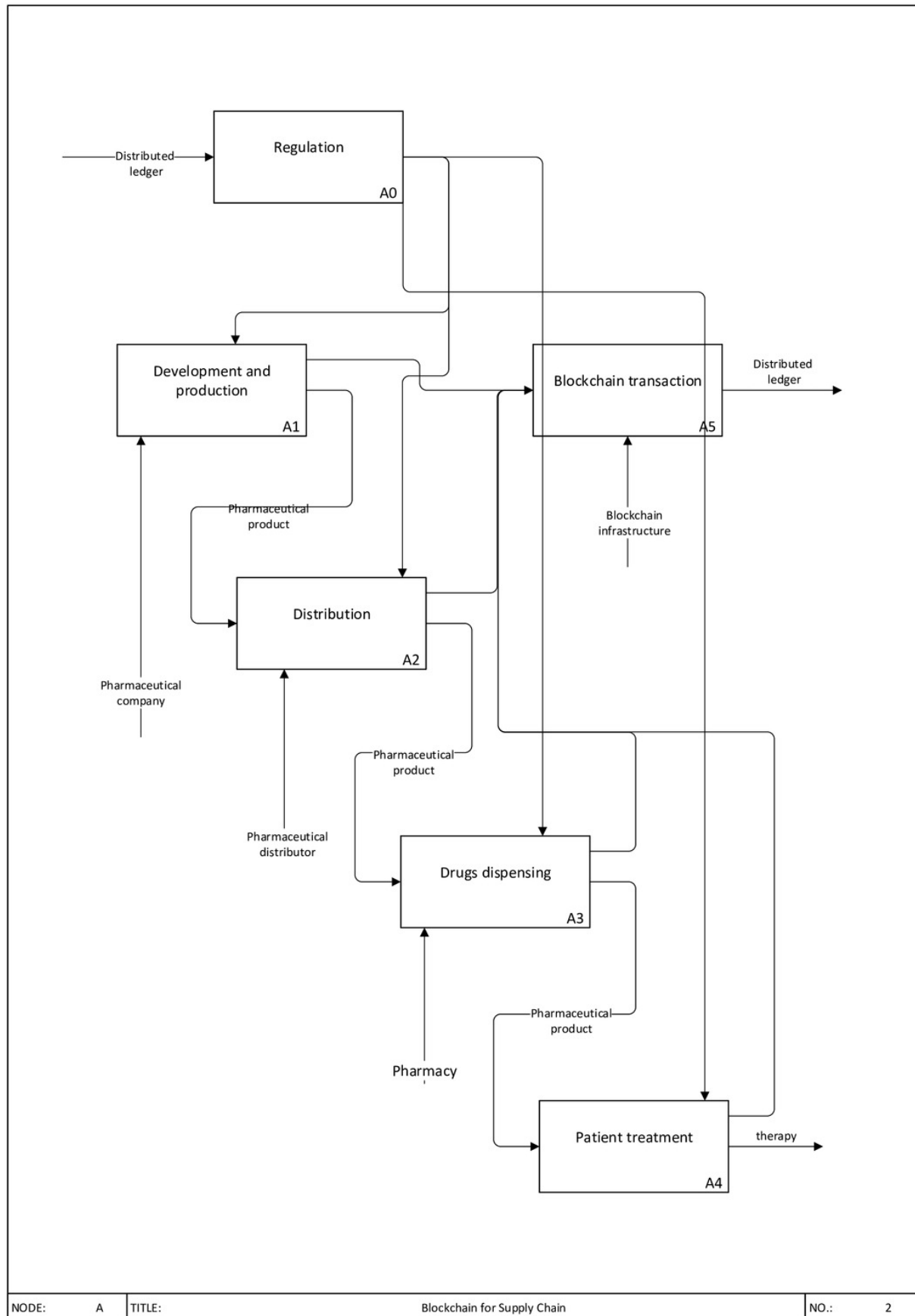
Schematic diagram of the formation of blocks within the application of blockchain technology

Benefits of a Distributed ledger technology supply chain support

Table 1.Benefits of a Distributed ledger technology supply chain support.

Name	Description
Effectiveness	Distributed ledger technology rises effectiveness of cooperation of all representatives involved into a supply chain through existing total trust
Audit	Guarantee full audit of a data log (the opportunity to trace the source of information)
Intermediaries	Cut the number of intermediariesof a deal
Defense	Defense the information in a data log from crashes and attacks as all data are saved in a decentralized way
Optimization	Optimizes the work and lower logistics costs through all the supply chain
Losses	Increases safety of goods, decreases the level of losses in goods delivery and storage
Production transparency	Guaranty transparency and authenticity of information about producers of goods and the process of distribution
Delivery transparency	Guaranty total transparency of medicines supply chain and impossibility to change data
Authenticity	Guarantee authenticity and quality of goods returned
Rights of a consumer	Guarantee the rights of consumers providing total and undeniable information about the origin of goods to be sold in retail
Custom clearanse	Decreases the share of gray (illegal) import and restricts possibility of fraud