



THE CNEL REVIEWS

BLOCKCHAIN AND LABOUR POLICIES

curated by
Silvia Ciucciovino and Michele Faioli

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SUMMARY

ABSTRACT	7
1. <u>RECONAISSANCE</u>	
1.1 <u>What is Blockchain: fundamental characteristic</u>	8
1.2 <u>New frontiers and fields of “social” application of Blockchain</u>	12
1.3 <u>The EU Blockchain Observatory and Forum and Italian Observatory at CNEL</u>	17
2. <u>TARGETING BLOCKCHAIN AND THE LABOUR MARKET</u>	
2.1 <u>Blockchain and pensions</u>	19
2.2 <u>Blockchain and active labour policies</u>	29
3. <u>PROSPECTIVES</u>	
3.1 <u>CNEL - Università degli Studi Roma Tre Research on Blockchain and the labour market</u>	35
3.2 <u>First assessment of Blockchain as a tool for relocation cheque management</u>	37
3.3 <u>Second assessment of Blockchain as a tool for matchmaking between labour demand and supply in three territorial districts</u>	40
4. <u>CONCLUSION</u>	43
<u>BIBLIOGRAPHY</u>	45

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ABSTRACT

The aim of this paper is to carry out an initial comprehensive assessment of the applicative potential of Blockchain on the Italian labour market, in particular, referring to active labour and pension policies within the framework of the Italian Blockchain Observatory instituted at the CNEL headquarters in cooperation with the Università degli Studi Roma Tre.

The paper schematically illustrates the fundamental characteristics of the functioning of Blockchain and the domains in which interesting “social” application assessments are being carried out regarding Blockchain in the private sector and in public administration. The CNEL-Università degli Studi Roma Tre research sets the guidelines on Blockchain and active labour market policies, as well as the first two practical experimental projects on relocation cheque management and *matchmaking* between labour demand and supply in three distinct territorial districts.

1. RECONNAISSANCE

1.1 What is Blockchain: fundamental characteristics

With the advent of cryptocurrency Bitcoin in 2008, a new method for storing and managing information was introduced, also known as Blockchain, and which today has reached a level of maturity such that it is potentially capable of revolutionising society as a whole, and not only the world of financial transactions.

Many describe Blockchain as a revolution capable of modifying the foundations of consolidated technologies for the storage of information and management of complex processes. In reality, another school of thought considers Blockchain as more of an evolution of existing technologies and believes many more years are necessary before the practical advantages of its use will appear clear and consolidated. Both positions are, in a certain way, correct. On the one hand, the disruptive potential of Blockchain has been fully acknowledged, as demonstrated by its worldwide ever-increasing applications. However, it is also true that many of its applications are still in their preliminary study and prototyping phase.

Blockchain allows the creation of innovative, dynamic, organised information systems which can focus the core and starting point of a chain of blocks on a specific asset. The different actors of the system, each in their own specific jurisdiction, will contribute to making access to interest points of the history of a single asset reliable, fast, safe, convenient, inalterable and transparent.

Ultimately, Blockchain is a decentralised and distributed database which stores data and judicial reports in blocks on a peer-to-peer type network (meaning through a direct, unsupervised link) able to guarantee the decentralisation, transparency, safety and true immutability of data and its history.

It is, therefore, a database which is not physically located on a single computer, but rather on various computers simultaneously, perfectly synchronising all documents. The Blockchain deals with managing database replication efficiently, meaning guaranteeing that a data modification in a set database is propagated and duplicated on all the other databases. This means guaranteeing that all databases are identical.

The Blockchain is made up of blocks which register valid information and judicial reports (i.e. transactions) and are inter-related by a *Timestamp*.

Each block is identified by the *timestamp* and is logically connected to the previous block by a hash (a non-invertible computerised algorithmic function). The connected blocks form a chain, with each additional block reinforcing the previous ones.

The *timestamp* guarantees the immutability of data, meaning that once the block is updated it can no longer be altered.

The immutability and security of data represent the two most significant added values of Blockchain. In the case of traditional data archival solutions, in order to modify or damage or destroy a centralised database, a single computer of the central authority managing the data has to be breached, as well as locating it physically. In the case of Blockchain this is simply impossible since all copies of the database owned by all participants of the Blockchain must be breached simultaneously. The bigger the Blockchain in terms of participants, or knots, the more impossible the operation.

Trust and control of the integrity of the data contained in the database goes through a central authority for all participants. Management of the dynamic evolution of data in systems based on Blockchain is not centralised and hidden or closed, but rather decentralised and transparent, and open to all.

This is the case for *Permissionless* Blockchain, meaning “without

authorisation", where there is no authority with the power to influence access and participation policies in the block chain creation process by adding information.

The Blockchain that requires authorisation and depends on one or more central authorities is defined as *Permissioned* and defines the participants and the government policies, for example for managing access, control, authorisation and, most importantly, the possibility to add information/transactions to the database.

Permissioned Blockchain can guarantee, at the same time, values of transparency, immutability and security which characterise Blockchain, as well as the relevant and substantial possibility to control the execution modalities of translations restricting them to banks, companies and public administrations. When a new data or record is added to the approval system it is no longer bonded to the majority of the Blockchain participants, but rather to a limited number of authorised subjects that are defined as *Trusted*.

In this case, the Blockchain can answer the need for visibility of information for a wide variety of actors who can operate independently, while maintaining an active control, but only limited to those who have access. This way, specific rules for access and data visibility can be defined.

More advanced Blockchain models are based on a decentralised data management system oriented towards documents that store data in compendia or collections, i.e. in complex, somehow coded, objects without a rigid pattern, or in any case not based on a relational model (meaning organised in logically inter-related charts using univocal indicators) able to manipulate large quantities of heterogenous data without negatively influencing performance in terms of access and processing times.

The database replication system is simply designed so as to

allow the delivery of highly available services and to guarantee automatic scalability, in order to support large amounts of data, so-called “Big Data”, without influencing complex performances.

Certain characteristics and functions typical of Blockchain technology can be added to this decentralised “Big Data” management system. These characteristics must be suitably modified and efficient in terms of energy consumption, increase of transactions per unit time, zeroing of transaction costs, overcoming congestion issues during multiple accesses. Characteristics and functions include: decentralised control, immutability, creation and transfer of information such as: quality/status of people and services, exchange and established judicial relations (for example in the field of active labour policies: application for relocation cheque, profiling of the unemployed person and quantification of the cheque amount, active labour market policies proposed, recipient response, etc.)

In the field of “Machine learning”, another trendy topic in the media nowadays, the challenge is different and at the same time very complex. Currently, best results have been collected and verified in non-manipulable and well-defined closed systems, just like in the game of chess.

A major scientific problem must be faced in this regard: identifying and verifying the applicability of new techniques of “Machine learning” and “Deep learning” on the efficient treatment of “Big data” in open systems based on Blockchain in order to rapidly and efficiently define, for example, a reasonable employment offering and to encourage the timely matching between employers and job seekers. One last, highly multidisciplinary and scientifically interesting aspect is the topic of legal basis, assurances and reliability of so-called “Smart contracts”, meaning those algorithms capable of automatically carrying out binding activities of people once a well-defined

set of conditions has been automatically verified.

The application of semantic meta-learning techniques is of great interest for the upgrading of the “Smart contract” concept and as far as a form of automatism where Blockchain itself learns and modifies its behaviour based on notions acquired and appropriately processed, making the dynamic scripture of new Smart contracts possible.

1.2 New frontiers and fields of “social” application of Blockchain

As previously stated, Blockchain is a cryptographic digital information system which can make the digital transfer of data, securities, rights and information juridically possible without the presence of third-party certifiers. It allows a network of operators to have historical reconnaissance of the movement of data and information. For a jurist, these are also judicial matters related to a certain good/service/right. Hence, the fulfilment of obligations relating to a contract at the basis of an operation registered by Blockchain is monitored. Blockchain makes replicating the content of documents and governing access control possible, allowing transparency and privacy (as previously stated, the participants have a copy of the register and can verify every record, with a shared highly-transparent register; this allows a regulating body or an independent body to verify with certainty that the content of a database has not been modified in any way).

Blockchain has reached such a level of maturity that it will revolutionise society as a whole and not only the world of financial transactions. The possible “social” applications of Blockchain are innumerable.

True, it is an area which is still being explored and which, like all innovations, can present applicative weaknesses that re-

quire further examination. However, the potential is immense and the benefits which could ensue for the efficient functioning of the Italian labour market deserve to be explored. There are many areas of application for Blockchain which are under trial and study. The following are some examples:

1) Blockchain in Finance and Banking

By eliminating intermediaries in transaction management, Blockchain can reduce bank commission costs thus allowing to save money and, at the same time, guaranteeing speed and reliability of transactions.

2) Blockchain in Insurance Companies

Blockchain can guarantee safe and decentralised transactions, thus contributing to fraud prevention. Furthermore, thanks to Blockchain, insurance companies can have access to realtime up-to-date and accurate data and, therefore, improve risk management and maximise opportunities for the use of capital and funds, and adopt Big Data strategies to obtain secure information on its clients, including their priorities and preferences.

3) Blockchain in Digital Payments

Once transaction processing times are reduced and the efficiency of the complex structure is improved, Blockchain can offer great opportunities in the field of digital payments.

4) Blockchain in Agrifood

Some of Blockchain's applicative characteristics in Agrifood include traceability, transparency and reliability. These are all characteristics which can be used by those who wish to "tell the story" of their food to the widest possible range of final consumers.

5) Blockchain in Industry 4.0

Through Blockchain, it is possible to store data and guarantee the safety of such data, offering security and reliability to the entire productive and distribution chain within Industry 4.0. With Blockchain there are many solutions, in particular, for processing industries and for companies that deal with logistics.

6) Blockchain in IoT

In the area of the Internet of Things, Blockchain can be used thanks to the ease of data exchange which helps communication between connected IoT objects, allowing for a safer and faster data exchange and making the identity of things more reliable and easy to manage.

Blockchain applied to IoT will bring a new concept of identification of people based on user ID and password or on the use of specific certificates. A new system for identification can be developed where people can be identified through objects.

7) Blockchain in Healthcare

As to healthcare, Blockchain can manage clinical records containing medical data of patients through a shared system, allowing physicians to share information on patients quickly and safely.

8) Blockchain in Public Administrations

Blockchain also finds fields of application in public administration. It could be used for the digital identity of citizens and operators with clear advantages for all those services that require the transmission and sharing of data. Important experimentation of Blockchain application in public administration was carried out at European and international level.

An OECD study, in the framework of the Observatory of Public Sector Innovation (OPSI), collected and studied examples

and best practices of innovation in the public sector, highlighting the huge potential of Blockchain use in government and public services management¹.

Other examples of Blockchain application in public administration in other legislations include ID card management, digital healthcare files, revenue agencies and digital relations with the citizen.

9) Blockchain and copyright management

Copyright management has always been a controversial and difficult topic to manage in the music industry, and not only. Blockchain and smart contracts now make it possible to computerise compensation of authors and guarantee control and traceability of the distribution of products of human intellect, as well as the respect of agreements and licenses for exclusive distribution networks.

10) Blockchain and proof/certification of competency

Some universities in Italy and around the world have resorted to Blockchain and learning machine techniques to record degree certificates².

New technologies are used to digitally represent the skills acquired by individuals in formal and informal contexts through the digital credential system; the most widespread system is the Open badge, already adopted in Italy by various Universi-

1. OECD Working Paper on Public Governance No. 28 Blockchains Unchained Blockchain technology and its use in the public sector, curated by Jamie Berryhill, Théo Bourgery, Angelo Hanson.

2. For Malta <http://connectedlearning.edu.mt/malta-first-nation-state-to-deploy-Blockchain-in-education/>, for the Università di Cagliari https://www.unica.it/unica/it/news_notizie_s1.page?contentId=NTZ121111; for the Università di Pisa <http://www.ilsole24ore.com/art/tecnologie/2018-07-06/1-universita-pisa-sale-Blockchain-curriculum-certificati-gli-studenti-162906.shtml?uuid=AEENdPDIF>

ties (first of all by Università di Milano Bicocca). In June 2018, the Italian Conference of University Rectors (CRUI), during the “Digital University” initiative, pointed out the Open badge and Best (by Cineca) platforms as national points of reference for representation and certification of skills, which will be development thanks to Blockchain³.

Some Universities are developing and integrating new micro-credential in their curricula (badge, MOOC, micro-award, certifications), to communicate with the labour market and give value to the skills acquired by students, both specialised and transversal or soft skills.

11) Blockchain and Curriculum Vitae

Numerous systems have been refined to enable the certain, verifiable and reliable demonstration of people’s experience/competencies through Blockchain⁴.

The Blockchain Manifesto, Italy

Additional and numerous applications of Blockchain are indicated in the “Blockchain, Italia” Manifesto by Marco Bentivoglio and Massimo Chiaratti (“IlSole24Ore”, August 12th) with the goal of greater protection of workers. The Manifesto highlights the strategic potential of Blockchain technology for the development of the country, with the aim of democratising governance of the industrial system that stems from the “decentralisation of value between all the subjects of the supply chain”. This solution is particularly useful in countries such as Italy which is characterised by the pulverisation of productive realities and by a preponderance of small and medium enterprises.

The Manifesto also highlights the advantages of Blockchain

3. <http://www.ilsole24ore.com/art/notizie/2018-08-23/con-Blockchain-competenze-diventano-moneta-intellettuale--100545.shtml?uuid=AEBrCydF>

4. https://cverification.com/src/docs/Cverification_Whitepaper.pdf

for Industry 4.0, including for the “management of remuneration systems for services regarding supply chains which are made up of many players involved in the production process and supply chain”, for the management of the life cycle of products, for the control of “recycle supply chain” and for the management of norms on disposal and, more generally, benefits that might arise from the management of economic-social relations.

1.3 The EU Blockchain Observatory and Forum and the CNEL Italian Observatory

Supporting initiatives which aim at evaluating advantages and limitations of the use of Blockchain and, in particular, defining its potential in view of more effective labour policy management are especially appropriate in this historic period.

During the 2018 Digital Day, organised by the European Commission (EC), numerous countries of the European Union united in the European Blockchain Partnership to encourage collaboration between EU countries in the field of artificial intelligence and innovation thanks to Blockchain and for the exchange of experience and know-how in the legal and technical framework. The EC has invested more than 80 million euros in projects relating to Blockchain and about 300 million euros in the development of this technology by 2020.

Furthermore, in February of this year, the EU launched the Blockchain Observatory and Forum⁵, one of the most complete archives on Blockchain which has the objective of mapping key initiatives, monitoring developments and inspiring common actions which can contribute to a single European mar-

5. See EUROPEAN OBSERVATORY website at <https://www.eublockchain-forum.eu>

ket⁶. The European Commission underlines how “Blockchain technologies [...] are considered a great innovation, as they offer high levels of traceability and safety in online economic transactions”. It also underscores that “[...] these technologies will influence digital services and will transform business models in various fields, for example in healthcare, insurance, finance, energy, logistics and management of intellectual property rights and public services”.

The Italian Blockchain Observatory was instituted at CNET in cooperation with the Università degli Studi Roma Tre and linked to the EU Blockchain Observatory and Forum with the goal of monitoring, studying and supporting possible applications of Blockchain in economic and labour market sectors. The Observatory and the European Union Blockchain Forum have jointly decided to nominate working groups to identify and research current Blockchain initiatives in Europe and in technologically advanced countries. Currently, two working groups operate for the Observatory and Forum:

- a) the working group on building politics and framework conditions on Blockchain with the objective of defining policies, legal and legislative conditions necessary for the promotion of an updated legislation and legislative framework useful for the large-scale implementation of Blockchain applications;
- b) the working group Use Cases and Transition Scenarios focused on cases of use of the most promising Blockchain, with special focus on public sector applications, such as innovative services based on digital identity

6. See the project presentation by the EUROPEAN COMMISSION at http://europa.eu/rapid/press-release_IP-18-521_it.htm

2. TARGETING. BLOCKCHAIN AND THE LABOUR MARKET

2.1 Blockchain and pensions (curated by Michele Faioli)⁷

Blockchain, intended as a distributed limited or unlimited access public register, could have a decisive role in the near future in the framework of an advocated reorganisation of social security administration. Blockchain could enable a public administration, including social security, to reduce costs and simultaneously strengthen trust, traceability and safety of judicial, economic and social relations with the citizen/worker. This is a considerable disincentive against possible digital attacks or against data tampering or abuse, thus eliminating or reducing to a minimum any involvement by operators for intermediation between social security administration and citizen/worker.

For the purpose of this study, the field of national and European social legislation (see INPS, INAIL, ANPAL cases) were chosen considering this might be a case study of significant interest for those addressing smart contracts and Blockchain. The intent is to understand whether there is a social desirability for the introduction of smart contracts in Italian and European social legislation and if such desirability, in line with the principles the legislator must attain to, may result in a next generation social legislation. So, without prejudice to the technological tool, in order to ensure protection, the topic is disciplined within acceptable boundaries and criteria for legislation. There is no fear of

7. The content of paragraph 2.1 are partially drawn from the essay by M. Faioli, Social Blockchain systems, social security and smart contracts, in RDSS, 2018, 3, to be published.

the new, but there is an applied rationality to novelty, as always, in the field of legislation. The outcomes of this essay will demonstrate that regulation of smart contracts could shift from being a “new” social legislation, considering that, currently, Blockchain and smart contracts impose a reflection on the legal nature applicable to information that circulates via said technology, since the engineering and IT profiles run autonomously.

The content of paragraph 2.1 are partially drawn from the essay by M. Faioli, Social Blockchain systems, social security and smart contracts, in RDSS, 2018, 3, to be published. Blockchain is defined as a Distributed Ledger System (distributed register of movements that traces the delta of data, documents, information, etc.). It allows data traced via time-stamped block forms to be archived (dated and recorded). The blocks are alpha-numeric, sequential, unmodifiable, visible to all, confirmed by a validation system based on mutual recognition and on mutual consent. Smart contracts are encoded schemes which implement choices which have an impact of Blockchain users. These schemes are self-regulated and based on certain fixed criteria. Smart contracts are formed by means of encrypted and stored safety systems in the Blockchain. Smart contracts are generally decentralised, since there is no central database for validation of the data contained therein; they are structured to be self-efficient. They differ from electronic contracts because smart contracts are formed by numerical sequences and are created by the Blockchain system; electronic contracts, on the other hand, are contracts which, although digital, fall within the traditional definition of legal transaction, made up of words, provisions, learning processes, defaults, objects, corresponding obli-

gations, onerousness, etc... Italian and European social legislation can be an interesting laboratory for Blockchain and smart contracts. In fact, social legislation is based on the need to simplify distributed data management, where Blockchain traces the movement of data, documents, information. The judicial problems for Blockchain are the same as those faced by centralised information systems. In particular, the accessibility, verification and certainty of data. In Blockchain, the solution is not the norm which introduced the centralised information system related to the specific social legislation (see, for example, the INPS or INAIL case, with various systems implemented, or the ANPAL case ex. legislative decree 14 September 2015, n.150), but rather by the type of Blockchain which must be implemented, either closed Blockchain (with selected subjects, participants) or open Blockchain.

To settle judicial issues at the base of Blockchain and smart contracts, an unchanged legislation must be accepted, at least for the moment. This means having a different perspective. Setting aside the discussion on qualification of smart contracts and considering them mere algorithms, which implement, among pre-defined obligations between (conventionally intended) parties of a contracts, some or one of these, smart contracts determine a regime very similar to that of a representative acting in the name and on behalf of the subject/party of an initial contract. If this is true, then it is clear there is no need for a modification of the norm which allows the use of Blockchain/smart contracts. Given the complexity of the fields in which it operates, some adjustments (including technical) might be necessary in specific regulatory environments (banking law, bankruptcy, etc.). On the other hand, in social legislation

environments (see afore-mentioned examples), this would require a theory which imposes subjects participating in the Blockchain to mutually identify each other ex-ante and to define rules, limitations and objectives of social security administrative actions through Blockchain and smart contracts. In other words, Blockchain should be acquired with the institution of a multilateral/associative contract with common objectives and, therefore, with a regime which stems from the association ex-Article 14 ss. of the Civil Code. Blockchain with social purposes (herein also “social Blockchain”) must necessarily be a “closed” Blockchain, with a network of knots and pre-authorised subjects. For the purpose of this research, said Blockchain would be created as an association, from a statutory point of view. Authorised subjects are considered “associates” of the closed Blockchain and they accept the rules of the associative model, the statute, the rules, objectives, effects and limitations of the Blockchain/association. Smart contracts, because they are technically algorithms and legally represent the parties, bring about choices based on initial data input which can be re-elaborated in the event of specific conditions. Therefore, there would be a private governance of a public Blockchain, a social one. This would allow, among other things, to solve privacy problems, in agreement with EU Reg. 27 April 2016, n. 2016/679, i.e. the associative contract at the basis of the Blockchain should specifically regulate the handling and access of data which is “moved” by the network of knots, setting the principles of the protection process for all network participants.

Blockchain is an advanced tool which enables a more effective realisation of subsidiarity in accordance with Articles 118 and 114 of the Constitution. In a certain sense,

there is a personal and community constitutional inspiration in Blockchain. This is due to the fact that Blockchain creates an adjustable polycentrism, based on the subjects involved and the associative pact which should undergo its very creation in a specific context every time. This digital polycentrism encourages a social, economic and institutional pluralism. In this sense, Blockchain is one type of “social learning” which can develop the human person ex Art. 2 of the Constitution. This is true because Blockchain enables, on the one hand, to easily demonstrate the ownership of a social right, given the unmodifiable registration of data, and on the other, the enforcement of that right, if valid, without any intermediation. The polycentrism, which is also pluralism and institutional subsidiarity, created by the Blockchain determines that the perimeter of (normal) public activities is more effectively devolved to a private system (blocks) which may be joined by public and private subjects, based on the rules of an associative contract. In fact, Art. 38 Paragraph 4 of the Constitution insists that the respect of social rights is ensured by “bodies or institutions put in place by or integrated in the State”. In this vision, Blockchain is an “integrated” State institution, which benefits those who intend to participate, with an exchange of data and documents with the idea of transparency, unchangeability and concurrency of data and documents. In this case, the multilateral associative contract which creates the Blockchain (see examples that follow) should also have a self-regulation code to define conducts, sanctions, prudential standards on the management of data and documents, accounting rules, rules on the protection of sensitive data, rules on copyright.

For the purpose of this study, let us suppose the need to manage documents of social relevance in a closed Blockchain,

selected by INPS and INAIL and patronages, to the benefit of the workers. Let us also suppose that the worker has a digital card enabling him to receive documents through Blockchain. The digital card shall be visible via SPID, it wouldn't allow modifications of data and documents, it would collect, by means of blocks and smart contracts, data and documents officially produced by INPS and INAIL and patronages, on situations that generate legal rights or anticipate pension entitlements (old-age, illness, disability, unemployment, etc.). Lastly, let us suppose that smart contracts, as described above, are tools which enable, given specific conditions recognised by the patronage, the release of a certain social benefit, without the direct involvement of an INPS or INAIL operator. This would result from the fact that smart contracts, which are programmed to verify every legal requirement, arrange for the release of a benefit.

At this point, we can analyse a set of practical cases. The first case refers to the digital access process for the civil invalidity benefit; the second case refers to the personalised household agreement introduced by Legislative Decree 15 September 2017, n. 147; the third case refers to managing the position of workers on placement at European level as taxpayers.

In consideration of Art. 20 of Decree-Law 1 July 2009, n. 78, L. Conv. 3 August 2009, n. 102, the benefit recognition process for civil invalidity, civil blindness, civil deafness, handicap and disability, was digitised (see INPS Memorandum 28 December 2012, n. 131). As of 1 January 2010, the civil invalidity process consists of a series of digitally registered operations; (i) medical certificates are filled out online by the physician who will proceed with a new

application for recognition of invalidity; the application must be completed online and is attached to the medical certificate; (ii) the digital system allows the application to be forwarded to INPS, with acknowledgement of receipt of the application, the definition of the IT protocol criteria and, if necessary, reference of the medical examination appointment (place, date and time); (iii) health report of the ASL (Local Health Service) Committee is drafted in electronic format; each office can access to the management application which governs the entire process in integrated mode; (iv) once the medical examinations are (unanimously) completed by the Medical Committee, the next step is to verify socio-economic requirements; (v) if the Medical Committee rules judgement by a majority, the INPS physician of the ASL Medical Committee will set out the necessary steps to recover the files containing the health documentation; (vi) for every report definitively closed, an electronic health file is created.

Let's now reflect on the application of Blockchain and smart contracts. First of all, by changing the technology, the order of things is inverted. The citizen's electronic health file will be empty, at least at the beginning of the chain of blocks and in this specific theory; the smart contract will operate on the health file, with a series of options regarding possible cases: (i) medical certification completed by the physician will flow back into the health card through the Blockchain; (ii) the smart contract will pair the application to the medical certificate; (iii) the smart contract will forward the application to INPS and simultaneously set an appointment (place, date and time); (iv) ASL Committee healthcare reports converge back into the health card through the Blockchain; every office can access the Blockchain; (v) once the Medical Committee has unanimously completed

medical examinations, the smart contract asks the Agenzia delle Entrate (Revenue Agency) for the results of the socio-economic requirements and then records the data on the health card; (vi) if the Medical Committee rules judgement by a majority, the process starts and the smart contract will set up the necessary operations.

Here is a second example. Legislative Decree 15 September 2017, n. 147, which regulated measures in the matter of the fight against poverty, including the REI (social inclusion income), introduced the so-called personalised household project (Art. 6) to have access to REI, which is defined with the participation of the household, considering [...] the desires, expectations and preferences in light of the [...] involvement in the following monitoring and evaluation, as well as promoting, where possible, the active involvement of minors in the part of the project dedicated to them". The personalised project identifies a point of reference which will handle its execution.

Art. 6, Paragraph 4 of Legislative Decree 15 September 2017, n. 147 refers to the relocation cheque. There is reference to activities as per Art. 20, Paragraph 3 of Legislative Decree 14 September 2015, n. 150: the personalised household project refers to the service agreement stipulated as per Art. 20 and Art. 23 of Legislative Decree 14 September 2015, n.150 and the respective intensive employment research program. If Blockchain and smart contracts were now applied to this institution, there would be a more efficient realisation of Art. 2, Paragraph 9 of Legislative Decree 15 September 2017, n. 147 ("The REI-related personalised project envisages commitments the beneficiaries must attain to, failing which the penalties laid down in

Art. 12 are due. Penalties, as per the same article, are also applied in the event of confirmed discrepancies between effectively possessed comprehensive income and assets pertinent to ISEE and what is indicated in the DSU, which result in illegitimate access to the service or an increase in economic benefits"). This would make the IT unified service more efficient as per Art. 24 of the same Decree, which is organised "on an individual basis", with a storage of data and information by INPS. This information would also be made available to the Ministry of Labour "by means of individually applicative cooperation services, but with no reference whatsoever to the subject and, in any case, based on modalities which keeps them unidentifiable. The system would allow, however, a temporal link between information on a single individual". The use of Blockchain is envisaged in such definition, which would allow qualified public subjects (employment centres, revenue agency, schools, etc.) to move information around regarding the will to return to work, information on income and assets, information on children's educational obligations, etc.; smart contracts would allow the exchange of instructions to follow in case of inappropriate conduct within the personalised household project (i.e. violation of compulsory education filed by the school would immediately trigger action by family social services; the report would be located on the Blockchain on an interface with the school; etc.).

The third example considers the application of Blockchain and smart contracts on the contributive status of workers on placement at European level, to which the discipline regulated by CE Reg. 29 April 2004, n. 883 is applied. The phenomenon is complex and concerns elusive practices of tax obligations by employers who, especially in certain sec-

tors (construction, agriculture, transportation, tourism), take advantage of low taxation applied in certain cases to hire personnel in that sector and then move the worker to another sector with higher tax rates. This is legitimate, at least formally, and enables to maintain tax rates of the country of origin for a considerable amount of time (even more than 24 months). Blockchain and smart contracts, if applied to a communication system between European social security institutions or construction workers' funds would enable the exchange of useful information for a more efficient monitoring of professional and tax statuses within the related geographic mobility. Going into detail, we might consider a Blockchain restricted to each country's construction workers' fund, which the national social security institutions and ministries of labour have access to. Today, in many legislations, mandatory welfare communications as per Art. 12 of CE Reg. 29 April 2004, n. 883 (model A1 - or ex-E-101) are not set against mandatory communications as per EU Dir. 2014/67 of 15 May 2014 (in our legislation, introduced by Legislative Decree 17 July 2016, n. 136 and DM 10 August 2016 - model Uni_Distacco_UE), leaving room for tax avoidance or, in some cases, the possibility of limited surveillance by designated authorities. These communications, which are in themselves quite formal, prevail on the facts for the case-law of the Court of Justice. If we were to create a Blockchain dedicated to public authorities which oversees European placement, from a tax-related and legal standpoint. A more efficient exchange of data and information would be possible, as well as supervision, through smart contracts, of information necessary to monitor possible elusive conducts of protective disciplines.

2.2 Blockchain e politiche attive del lavoro

Legislative Decree n. 150/2015 completely reorganised the structure and philosophy of active labour policies and employment services, in the framework of an epic reform of the Italian labour market. The proper functioning of active labour policies (hereinafter “PAL”) is of strategic importance for the fulfilment of an effective protection of citizen workers in new legislative, economic and social scenarios. The ambitious legislative reform clashes against a resistance by subjects involved and with objective operational issues which prevent takeoff. Some of the main limitations encountered include:

- non-completion of interconnection of databases and unified IT systems on labour policies;
- non-creation of the Electronic Worker File (FEL);
- failed coordination and non-communicability of existing databases among all subjects in the national labour policy network;
- partial computerisation of data on status and personal conditions of recipients, which are necessary to recreate individual identity within the labour market, in a diachronic and comprehensive prospective (employment history, training and skills, occupational status, factors of disadvantage, receipt of income support treatments or other benefits, active policy measures suggested and received).

As per the single information system in particular, based on the legislative projections (Art. 13, Legislative Decree n. 150/2015), the system information should constitute the common information asset of ANPAL, the Ministry of labour and social policies, INPS, INAIL, INAPP, of regions and autonomous provinces, as well as employment centres, for the completion of respective institutional tasks.

The single information system of employment services can

be considered as made up of the following elements:

- the information system of social shock absorbers (INPS);
- computerised archive of mandatory communication (Ministry of Labour/ ANPAL);
- data relating to service management for employment and active labour policies, including personal and professional information sheet (Regions and Employment Centres);
- the information system of professional training, where training courses completed by Italian residents are recorded, financed in whole or in part by public resources (INAPP, Regions and accredited subjects);

The system should also receive data of other databases, such as:

- income database of the Revenue Agency based on income statements submitted by natural persons and by withholding agents;
- MIUR databases containing a national register of students and the National student register system as well as the National register of university students and graduates.

The information contained in the labour policy single information system represents, among other things, the information base for training and issuance of the electronic worker file (14, paragraph 1, Legislative Decree 150/2015) which must contain information on:

- a) educational and training courses,
- b) periods of employment,
- c) fruition of public social security and payment of contributions for the purpose of receiving social shock absorbers.

ANPAL and the Ministry of Labour will be able to use the single information system to monitor activities and evaluate the management of active labour policies and employment services, as well as monitor results obtained from accredited public or private subjects for which existing norms require an ongoing inspection of services offered and performance achieved.

The electronic worker file, too, is based on the collection of data and information gathered by various bodies: ANPAL, Ministry of Labour and employment centres (CPI); public and private entities, including inter-professional funds for training; schools, universities, MIUR, INPS, INAIL. Furthermore, the file should be accessible free of charge through telematics reading methods by the single subjects interested.

Experience has proven how technical-operational resistance and difficulties obstruct the convergence of all these sources and databases in a single and centralised system. This is what slowed down the implementation of both the single information system and the electronic worker file. For the correct functioning of the labour markets and implementation of current legislative framework, the following are necessary as a minimum:

- the creation of a single information system of labour policies;
- the activation of the electronic worker file;
- the coordination and communicability of databases among subjects of the network;
- digitisation of data regarding the status and subjective conditions of the recipients (employment history, training and skills, unemployment status, receipt of supplementary income treatments);

- a link between active and passive policies, with the implementation of conditionality and the personalised service agreement;
- standardisation of regional private operator accreditation regimes;
- transparency/accessibility of job offers and/or training in the labour market;
- supervision on results obtained by accredited public and private operators;
- registering of “exchange relations” established by actors of the network;
- full implementation of the competency certification system;
- verification of the respect of essential levels of performance (lep) by the Regions.

For active labour policies to work well, the following aspects appear to have strategic relevance:

- governance = interconnection and cooperation of all actors involved; full implementation of the single information system; evidence/transparency of results obtained by accredited subjects;
- matching of demand / supply = maximising matching between job seekers and employers;
- active policies = verification of performance results, orientation of resources based on results obtained; respect by the Regions of essential levels of performance;
- conditionality = stable and automatic verification mechanisms of the implementation of services supporting get unemployed;
- service agreement = adequate service offering tailored to the needs and characteristics of the recipient.

In this framework, Blockchain presents characteristics which aim to efficiently and effectively manage certain fundamental focal points of active labour policies, offering innovative and concrete solutions in order to overcome limitations which currently prevent the labour market reform launched in 2015 to take off.

In brief, among the more interesting characteristics presented by Blockchain with a view to improve the labour market, the following can be mentioned:

- a) it is based on a distributed database as opposed to the transfer and/or centralisation of data;
- b) enables both quality/status of people and services, and judicial relations and exchanges to be safely recorded and certified in a reliable, unmodifiable and time-specified way;
- c) it can be configured so as to be managed in complete safety by a plurality of subjects, both public and private, each competent for its own attributions and authorised to intervene on the chain by an centrally-authorized subject.

The Blockchain, as a decentralised database which can guarantee immutability and certification of data, may represent a Copernican revolution in the labour market since it allows the creation and supply of the electronic worker file, converging all data regarding a single individual possessed by the different subjects on the national network and can, therefore, retrace educational and training courses, working periods, social benefits and contributing received, etc.

The systematic gathering of data would occur without overwriting of data, meaning without the need to create new databases, hence maintaining the autonomous creation and management of the respective information sour-

ces by the different subjects operating on the network. It would therefore be possible to overcome a large part of the concerns and difficulties which have slowed down the implementation of the electronic worker file and the single information system, being able to count on the comprehensiveness, accuracy, immutability, definitive temporal referencing.

By creating a Blockchain between subjects of the national network, the different authorised subjects (ANPAL, Ministry of Labour, Regions, Employment Centres, INPS, INAIL, MIUR, etc.) keep full proprietorship and exclusive management of the respective databases and compete in the creation of single blocks of the chain. Each subject enters data and recordings regarding the single worker in the single block for which they are responsible.

The Blockchain would also make the systematic interconnection of databases of the Ministry of labour and social policies, ANPAL, INPS, INAIL and INAPP possible, in the field of labour and full mutual accessibility of the databases" (Art. 14, paragraph 4).

This way, the Blockchain allows to implement the electronic worker file and, simultaneously, to launch the creation of the single information system envisage by Legislative Decree n. 150/2015 and, therefore, to follow up on the fundamental inspiration of legal policies underlying the labour market reform, which aims at refocusing the protection of the worker in his/her transitions within the labour market.

It must be pointed out that other opportunities in terms of profiling, which is an effective application of conditionality and remuneration of accredited operators of active policies, can be supplied by "smart contracts" made possible by the Blockchain. As previously stated, smart contracts

consist of a “translation” or “transposition” of a contract in code, in order to automatically verify the realisation of specific conditions (supervision of basic contract data) and to auto-perform actions (or give instructions so that certain actions can be carried out) when specific conditions between the parties are reached and verified.

With the Blockchain, the smart contract logic lends itself well for:

- profiling of the unemployed person;
- effective implementation of conditionality;
- remuneration of accredited operators of active policies;
- managing of the personalised service agreement (PSP);
- managing of the relocation cheque;
- regular update of profiling category of the job seeker.

3. PROSPECTIVES

3.1 CNEL - Università degli Studi Roma Tre Research on Blockchain and the labour market

In 2018, a framework convention between CNEL and the Università degli Studi Roma Tre was underwritten. The objective was to promote enquiries, measurements, studies, seminars and conferences aimed at evaluating the developments and impact of Blockchain technology, as well as possible applications in economic and labour market sectors within the framework of the Italian Blockchain Observatory and in conjunction with the EU Blockchain Observatory and Forum promoted by the European Commission.

Within this context, an interdisciplinary research group of the Università Roma Tre and CNEL elaborated a research project on the predisposition of a first operating expe-

rimental model on “Blockchain and Active Labour Policies”, in collaboration with ANPAL and in contact with the Authority for the protection of personal data.

In particular, the project focuses on the elaboration of a conceptual and technological model for the creation of the electronic worker file through Blockchain, in the form of a Permissioned Ledger open to a limited number of authorised subjects and based on a non-relatable type database. The information assets regarding the single worker is stored in the electronic worker file and recorded in the blocks which make up the Blockchain, to which the authorised subjects of the national network for labour policies are connected.

Competing in the formation of the chain of blocks associated uniquely to each worker are the subjects who have access to information regarding:

- employment/unemployment status of the worker (unemployment centre professional files, mandatory communications MDL/ANPAL, statement for immediate availability to work released to ANPAL online by the worker);
- application and use of social benefits and respective contributory requirements (INPS, INAIL);
- qualifications and certificates (MIUR);
- training courses completed (accredited training centres of regions or inter-professional funds).

In the suggested model, authorised subjects enter the documentation and data on the Blockchain (personal profile, CV, contributive history, participation in training initiatives, employment relations started and ended, DID released, etc.).

This documentation is safely stored on the Blockchain/FEL and made available according to agreed access proto-

cols between the parties and ANPAL, in respect of personal data protection regulation.

The main advantages which would ensure apply to the following profiles:

- the FEL is available telematically;
- verification by means of centralised paper or digital certificates is not longer applicable;
- qualifications and information is tamper-proof;
- processes are optimised and time/resources are saved;
- total transparency is guaranteed;
- performance and services can be easily monitored;
- a virtuous competition generates among the distributors of active labour policies.

The Blockchain is designed to supply the tools necessary to:

- define and efficiently manage the personalised service agreement;
- outline the active policy measures suggested and received;
- strengthen conditionality measures;
- manage endowments and relocation cheques;
- match labour demand and supply.

3.2 First assessment of Blockchain as a tool for relocation cheque management

A first in-depth study on the use of Blockchain for innovative management of relocation cheques (hereinafter, for the sake of brevity, “AdR”) has already been launched. Within the active labour policies framework, this use presents characteristics which make it an ideal candidate for initial study.

This initial analysis, concretely, means evaluating the actual capacity of Blockchain to offer innovative and concrete solutions for the management of the entire segment of relocation cheques, completely overhauling the approach of the single information systems.

Blockchain would allow to link and organise with transparency, chronologically and with selective access all information related to the history of a single relocation cheque, with the subsequent elimination of delays and costs relating to the transfer of data and communicative flows between institutions.

The actors to be involved in the Blockchain dedicated to AdR are illustrated in Table 1.

ACTOR	INFORMATION ASSET TO ENTER INTO THE BLOCKCHAIN
JOB SEEKER	- AdR application
INPS	- Partial receipt of NASPI allowance for at least 4 years by recipient - REI receiver
ANPAL	- Mandatory Communication Data of the recipient (previous and subsequent to AdR) - Accredited providers at national and regional level who have shown interest in providing AdR services - Verification of conditions for disbursement to providers of "achievement sums" and "Free4Services" - AdR quantification
EMPLOYMENT CENTRES	- Unemployment status (DID) - Personalised service agreement - AdR application - Personal employability profile - Absence of precluding conditions (contemporary receipt of other active policy measures, internships, etc.) - Appointments with recipients
PATRONAGE AUTHORISED TO GATHER ADR APPLICATIONS	- AdR application by recipients
PROVIDERS (EMPLOYMENT CENTRES, AUTHORISED PUBLIC AND PRIVATE EMPLOYMENT AGENCIES TO TAKE CHARGE OF ADR BENEFICIARIES)	- Registering request for relocation service activities
LOCAL EMPLOYER ASSOCIATIONS (CONFINDUSTRIA AND CNAPMI)	- Reasonable job offers made available and visible to providers

Table 1

A Blockchain with this configuration allows to:

- verify and automatically make the subjective requirements of recipients visible,
- set up and efficiently manage relocation support services,
- regularly trace active policy measures suggested and received,
- readily make AdR recipients and those entered in relocation programs visible to businesses, to facilitate matching between reasonable supply and demand,
- strengthen conditionality mechanisms,
- monitor the performance of accredited subjects and complete rating of providers based on real time and comparable data,
- easily monitor system function and the behaviour of single actors.

Smart contracts would make managing the personalised service agreement, the conditionality of economic incentives and employment incentives automatic, fast and safe.

3.3 Second assessment of Blockchain as a tool for matchmaking between labour demand and offer in three territorial districts

The Blockchain can be configured and used to optimise matchmaking between labour supply and demand through the cooperation of a series of public and private subjects: employment centres, private employment agencies, businesses, workers, universities and upper secondary schools.

The Blockchain allows these subjects to share realtime updated, certified, reliable, complete information on the characteristics of labour supply and demand in a specific territory, exponentially increasing matching opportunities

between job seekers and employers. At the same time, it allows a more efficient monitoring, in the territory or sector of reference, of employment needs expressed by the market and occupational results linked to the possession of specific subjective requirements of job seekers, including qualifications.

A concrete study on the district Blockchain will be carried out in order to demonstrate the positive impact and potential inherent to the application of a this type of Blockchain. The study is appropriately set up in at least three representative regions of Northern, Central and Southern Italy so as to consent an impact assessment in a predetermined timeframe.

In particular, the study will involve the following territories: Lombardy, Latium, Sardinia, with the involvement of the following subjects: employment centres, private employment agencies, businesses, universities and upper secondary schools (technical institute), for an estimated timeframe of six-eight months.

Through the Blockchain, these subjects are put in the condition of sharing realtime updated, certified, reliable, complete information on the characteristics of labour supply and demand in a specific territory, exponentially increasing matching opportunities between job seekers and employers. At the same time, it allows a more efficient monitoring, in the territory or sector of reference, of employment needs expressed by the market and occupational results linked to the possession of specific subjective requirements of job seekers, including qualifications.

The subjects who will take part in the study will stipulate a research protocol with which they commit to enter confirmed data of the workers involved. The protocol will

comply with privacy regulations.

The Blockchain is activated and managed by the University: the CPIs and agencies will be launching the Blockchain; the University will submit all qualifications and other certificates of competences; the businesses will access the Blockchain to view the data or activate matching based on actual employment needs.

Tracking occurs on a weekly/monthly basis. Not only occupational data will be surveyed, but also administrative conducts so as to demonstrate the effectiveness of Blockchain.

Table 2 below shows a schematic representation of the information asset to be entered into the Blockchain.

ACTOR	INFORMATION ASSET TO ENTER INTO BLOCKCHAIN
Job seeker	- Statement of immediate availability to work (DID) - Personal and professional characteristics - Certificates, skills, competencies
Employment centres	- Personal professional card - Unemployment status (DID) - Personalised service agreement - Personal employability profile - Active policies disbursed
Private Employment agencies	- Intensive job search program - Personal assistance and training initiatives - Promoting professional profile of worker in the search for employment opportunities - Details of job offer
Businesses	- Job offer details, vacancy description
Universities and Schools	skills/certificates

Table 2

4. CONCLUSIONI

As it clearly emerges, even from a superficial reading of media and scientific publications, the universally recognised position on the true effectiveness of Blockchain is still emerging.

On the one hand, indeed, the forceful potential of Blockchain has been fully recognised, as demonstrated by its increasing numerous worldwide applications. However, it is also true that many of these applications are still in the preliminary study and prototyping phase.

This position paper gives a simple definition of what Blockchain is, listing its fundamental characteristics and what makes this technology potentially “revolutionary”, with practical examples in specific economic, public administration and tertiary sectors.

Special emphasis was given to the evaluation of advantages and limitations in the use of Blockchain in the field of active labour policies and welfare.

Two experiments in progress on the use of Blockchain for the management of the relocation cheque and job offers, respectively, were presented within the framework of the collaboration protocol between CNEL and Università degli Studi Roma Tre.

In conclusion, this study shows us how the use of Blockchain in the field of active labour policies would bring significant benefits, enabling: a) the setting up, creation and continuous supply of the electronic worker file, an essential tool for a transparent and appropriate refocusing of the protection of the worker moving in the labour market; b) the implementation of a single labour policy information system, without the need to merge databases of competing subjects; c) the systematic and capillary ac-

quisition of useful data by ANPAL for the completion of its institutional functions envisaged by Art. 9, Legislative Decree n. 150/2015.

Clearly, there is still much to do and it is not a simple task. Only by combining efforts on an equal footing, can universities, institutions and all those who wish to collaborate ever hope to achieve significant results. This is only possible if everyone involved is willing to dedicate their time and experience with enthusiasm for the common good.

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