

BLOCKCERTS IN THE PRISM OF PUBLIC CERTAINTY

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1. INTRODUCTION

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The use of *blockchain* systems in ever-increasing and diverse legal activities raises questions about the changes that legal institutions might undergo due to the impact of these new technologies. The adoption of a 'cooperative' approach², which integrates the formalisation needs of law with the peculiarities underlying *blockchain*, makes it possible to observe the mutations that, in practice, one seems to bring about in the other, and vice versa.

The intention is, in other words, to make a contribution to the legal qualification of *blockchain* by starting from a concrete experience, that of *blockcerts*, framing it within the more general topic of administrative certifications, assuming precisely their equivalence to degree certificates.

In order to define more precisely the research area, it is useful to start from the analysis of the experience offered by some Italian universities³, which offer to their students digital *badge*, corresponding to their degree diploma, registered in the Ethereum *blockchain*. More specifically, these universities issue dematerialised degree certificates, through the

² This category is taken up by T. SHREPEL, *Foreword*, in B. CAPPIELLO, G. CARULLO, (eds) *Blockchain, Law and Governance*, Springer, 2020, and it is useful to anticipate that the entire contribution does not intend to oppose 'law' and '*blockchain*', as it does not believe that this dichotomy has any analytical usefulness. On the contrary, one of the underlying assumptions is the recognition that the *blockchain* tool can concretely contribute to the improvement of certifying procedures, in the ways and limits that will be attempted to be set out throughout the contribution.

³ Those joining the initiative include the University of Milan *Bicocca*, cf. *Bicocca rilascia le prime certificazioni di laurea Blockchain*, 28.6.2019, (<https://www.unimib.it/news/bicocca-rilascia-prime-certificazioni-laurea-blockcerts>) and the University of Padua, cf. *Certificati digitali: le lauree con blockcerts disponibili da giugno*, 4.6.2020, (<https://www.unipd.it/news/lauree-blockcerts>)

adoption of an '*open standard for blockchain credentials*'⁴ called *Blockcerts*, developed by MIT Lab and Hyland Credentials, promoters of the initiative.⁵

The contribution will be developed in three sections. The first offers contextual elements to the use of *blockchain* in education. This will help to better understand the practical relevance of the present study and to pave the way for the theoretical study on public certainties - the heart of the contribution and the subject of the second part of the paper. The third part summarizes the findings of the analysis in point of positive law and the reflections offered by the literature that tackled the topic of public certainties. In the final considerations, therefore, an attempt will be made to confirm or deny the initial hypothesis, on the ability of *blockchain* to bring about changes to the performance of the administrative function, in particular to the certifying function of universities.

Firstly, however, it is appropriate to provide some clarification of the technical terms that will be encountered in this contribution, in particular that of *blockchain*, *open badges* and *blockerts*.

1. *Short taxonomy of technical terms relevant to the analysis*

⁴ See <https://www.blockcerts.org/about.html>

⁵ Italian universities join the initiative through the mediation of the *Bestr* platform, created by CINECA, which has evolved into a *digital credentialing platform* precisely to offer this additional service to its members.

The *blockchain* is a form of Distributed Ledger Technology (DLT)⁶. As such, it is part of the so-called *distributed ledgers*, a set where it is possible to manage and store data in such a way that each of the ledger is simultaneously stored on several devices, called '*nodes*', connected to each other but autonomous and physically located⁷. Being placed in parallel on different devices, the correctness and integrity of the data must be ensured through specific mechanisms, called '*consensus mechanisms*', which avoid the so-called 'byzantine generals' problem, i.e. guaranteeing the reliability of the information circulating, assuming that among the actors some of them are lying. These management algorithms, in turn, can be roughly defined as probabilistic or finalistic. The formers require only the verification of the information by a simple majority of the 'honest' nodes - it will then still be possible to change the state of things later; whereas the latter require all nodes to agree on the final state of the chain, i.e. on the set of information recorded. In this second case, in a hierarchical network, some *nodes* are given privileges over others, to attest to the actual reliability of the final state. The *blockchain* is a type of *distributed databases* where the *ledgers*: i) only receive new information, without allowing modifications and/or alterations of the stored information; ii)

⁶ See also S. CARDARELLI, *L'uso della tecnologia blockchain nel settore delle pubbliche amministrazioni: tra "mito" e realtà giuridica*, in *Il Diritto dell'Informazione e dell'Informatica*, 4/2020, p.857, cited by M. MATASSA, *Blockchain e pubblica amministrazione: stato dell'arte e prospettive*, in *Le istituzioni del federalismo*, 3/2021, pp.803-838

⁷ A. SUNYAEV, *Internet Computing. Principles of Distributed Systems and Emerging Internet-Based Technologies*, Springer International Publishing Cham, 2020, pp. 266 ff., where DLTs are differentiated from the models of: i) "*centralised databases*", which "*reside on a single storage device and can, therefore, be better maintained than those distributed across multiple, physically separated, storage devices*" and "*decentralised databases*", where "*there is no central storage; data are simply stored on multiple storage devices connected with one another, but usually located in different physical locations. A decentralised database's storage devices are organised in a hierarchical structure with a set of nodes communicating with a particular node, which can be a node of a superordinate set of nodes*".

assume the presence of 'malicious' *nodes* and apply the *consensus mechanism* to guarantee the reliability of the data.⁸

When first attempting to apply these new technologies to value transfer⁹, it immediately loomed the high risk of using twice the same 'currency' for different transactions, the so-called *double payment*. The ground-breaking character of the first *blockchain* system was that it overcame that problem. To do this '*without relying on trusted intermediaries*' the cryptographic authentication algorithms of the *nodes* were implemented as *time-stamping* tools. Transactions, before being recorded as part of the 'block', are validated¹⁰ by a network of computers solving complex mathematical problems. Once a predetermined number of transactions has been reached, the block to be added to the chain is formed and the transactions become immutable.¹¹

Summarily, one could classify *blockchain* systems according to whether the entry of new '*nodes*' to the network is free (*permissionless*) or subject to obtaining permission from

⁸ Cf. *ibid.*, p.269.

⁹ Cf. *ibid.*, pp.272 ff.; cf. also B. CAPIELLO, G. CARULLO, M. PAGANI, M. ATTARDO, *Il finanziamento delle opere pubbliche con la tecnologia blockchain: nuove forme di collaborazione pubblico-privato per una più efficace raccolta fondi bottom-up ed una più effettiva partecipazione della popolazione*, CERIDAP, no.2/2020, available here: <https://ceridap.eu/il-finanziamento-delle-opere-pubbliche-con-la-tecnologia-blockchain/?lng=en#post-1687-footnote-ref-29>

¹⁰ With reference to validation models, there are currently mainly three: '*proof of work*', '*proof of steak*', and '*proof of authority*'; for a more in-depth discussion of them, which is not relevant here, see S. CARDARELLI, *cit.*

¹¹ The only to alter the record would require computing power that is currently difficult to achieve (this is because the time-stamping technologies employed would require all previous blocks to be modified). See G. BEAUMIER, K. KALOMENI, *Ruling through technology: politicising blockchain services*, in *Review of International Political Economy*, 2021, available here: <https://doi.org/10.1080/09692290.2021.1959377>, pp. 9 ff. Where similar criteria for classifying *blockchain* systems can also be found, pp. 12 ff.

other members (*permissioned*). Instead, according to the subjective scope of who has access to the recorded information, one can distinguish between *public* networks - which allow everyone to view transactions - and *private* networks - which restrict access to members only.¹²

Open badges are a type of digital credential¹³ - digital certificate - consisting of a digital image of the skills acquired in one's training.¹⁴

Blockcerts, on the other hand, constitute a sub-type of *open badges*, from which they differ because one of their fingerprints is recorded on a *blockchain*.

¹² Cf. WORLD BANK, *Distributed Ledger Technology (DLT) and Blockchain*, 2017, available here: <https://openknowledge.worldbank.org/bitstream/handle/10986/29053/WP-PUBLIC-Distributed-Ledger-Technology-and-Blockchain-Fintech-Notes.pdf?sequence=5>. According to the scientific literature, the cryptography and registration systems used in *blockchain* systems guarantee i) the immutability of the data; ii) and the traceability of the transcription back to its author; iii) the integrity of the data; public access, on the other hand, guarantees iv) its transparency, and the absence of privileges - i.e., the absence of a central authority - while the alleged horizontality of all *nodes* establishes, at least within the network, equal rights among users. The *consensus mechanism*, on the other hand, governs the creation of new '*blocks*' and the management of any conflicts that may arise, cf. X. XU, I. WEBER, M. STAPLES, *Architecture for Blockchain Applications*, Springer International Publishing, Cham, 2019, pp. 45 ff; work recalled in B. CAPIELLO, G. CARULLO, M. PAGANI, M. ATTARDO, *cit.*

¹³ A. GRECH, I. SOOD, L. ARIÑO, *Blockchain, Self-Sovereign Identity and Digital Credentials: Promise Versus Praxis in Education*, in *Frontiers of Blockchain*, 2021, p.4

¹⁴ Cf. UNESCO, *Digital Credentialing. Implications for the recognition of learning across borders*, Paris, 2018, available here: https://unesdoc.unesco.org/in/documentViewer.xhtml?v=2.1.196&id=p:usmarcdef_0000264428&file=/in/rest/annotationSVC/DownloadWatermarkedAttachment/attach_import_8af0e95b-e972-4d97-b434-071162a5e473%3F%20264428eng.pdf&locale=en&multi=true&ark=/ark:/48223/pf0000264428/PDF/264428eng.pdf#1143_18_ED_EN_int.indd%3AFigure%201%20The%20digital%20credentials%20ecosystem%3A98

The *digital credentials* belong to the latter category. Through the intermediation of the *digital credentialing* platform, *Bestr*¹⁵ managed by CINECA, the universities¹⁶ adhering to the MIT-Lab project issue such credentials to their graduates.¹⁷ More specifically, the platform offers to its members two distinct services: issuing *open badges* and in particular issuing *blockcerts*, built on the "*Open Badge 2.0 standard*", then transcribed by Bestr itself "*on the public Ethereum blockchain, using hashing and merkle-tree systems to ensure the lowest number of transactions and the highest level of privacy*"¹⁸. It is important to clarify that only "*the digital fingerprint of the document (hash) is saved in the Blockchain*" because "*in this way, the holder of the document can calculate the digital fingerprint and verify if it matches with what is stored in the Blockchain*". Therefore, '*no personal information is written in the blockchain. It is not possible to infer the content of the certificate from what is*

¹⁵ <https://blog.bestr.it/en/2016/04/14/open-badge-what-it-and-what-does-it-do>

¹⁶ As the initiative involved only public universities, the considerations proposed in this paper refers more properly to the public educational sector.

¹⁷ It is a non-profit consortium with legal personality under private law, subject to the supervision of the Ministry of Education and the Ministry of Universities and Research, whose purposes, among others, are the realisation of innovative IT services for the Consortium members, in order to make them more efficient and modern, in the most cost-effective manner through the exploitation of technologies and the sharing of development objectives; to promote the development of homogeneous and shared solutions with a view to developing integrated platforms to support the national research, higher training and education system, with particular reference to the Ministry of Education, the Ministry of University and Research and the universities to promote the use of the most advanced information processing systems to support scientific and technological research, both public and private, and its applications; to foster the transfer of cutting-edge technological solutions to the Consortium members and to the country system, also by promoting the establishment of new initiatives and fostering the initiatives of the Consortium member universities and research organisations. Cf. CINECA, *Consortium Statute*, with amendments last resolved by the Consortium Assembly on 6.5.2020 approved by Interministerial Decree no. 87 dated 20 May 2020, OJ General Series no. 133 of 25-05-2020.

¹⁸ Cf. <https://bestr.it/about>

written in the blockchain. It is possible to check only the integrity of the relevant certificate' and, consequently, 'only the owner of the certificate can decide to disclose it - thus share its content - with a third party, for example a potential employer'.¹⁹

a. Blockcerts in their context.

According to J. Philipp Schmidt, Director of Digital Learning and Collaboration at the MIT Media Lab, the creation of an '*Open Platform for Reputation*' would allow recipients to store, share and dispose of their degree certificates securely, at any time - via an internet connection - and above all without the collaboration of the issuing universities.²⁰

Indeed, there is an increasingly widespread perception that it is necessary to grant autonomy to individuals by guaranteeing them full access to and possession of their data. In particular, with regard to the educational sector, one can find clear traces of this trend in the

¹⁹ <https://blog.bestr.it/en/2019/06/13/blockcerts-bestr-faq>.

²⁰ The operating protocol involves five steps: i) Media Lab creates "a digital file that contains some basic information such as the name of the recipient, the name of the issuer (MIT Media Lab), an issue date, etc."; ii) then it affixes a signature to "the contents of the certificate using a private key to which only the Media Lab has access, and append that signature to the certificate itself."; iii) next, they append a signature to the "contents of the certificate using a private key to which only the Media Lab has access, and append that signature to the certificate itself"; iv) "next we create a hash, which is a short string that can be used to verify that nobody has tampered with the content of the certificate"; v) "finally, we use our private key again to create a record on the Bitcoin blockchain that states we issued a certain certificate to a certain person on a certain date"; v) Media Lab's system "makes it possible to verify who a certificate was issued to, by whom, and validate the content of the certificate itself". P. SCHMIDT, *Certificates, Reputation, and the Blockchain*, available here: <https://medium.com/mit-media-lab/certificates-reputation-and-the-blockchain-aea03622426f#hf5ur1fir>

recent reports by UNESCO²¹ and the European Commission²² which consider digital credentialing and the use of *blockchain* to be excellent tools for pursuing aims of high social value such as *self-sovereignty*, personal identity, mutual trust, transparency of relations and disintermediation. The institutional voices are accompanied by those of the scientific literature which, in a more or less critical manner²³, glimpses tools to allow easier access to higher education to individuals²⁴, to personalise their growth paths²⁵, or to facilitate students'

²¹ UNESCO, *cit.*

²² JRC EUROPEAN COMMISSION, A., INAMORATO DOS SANTOS, (ed.), A. GRECH, A. F., CAMILLERI, *Blockchain in Education*. 2017, EUR 28778 EN; available at: <https://publications.jrc.ec.europa.eu/repository/handle/JRC108255>

²³ See the critical observations on the tendencies to individualise and commercialise educational action through the use of *blockchain*, L. CASTAÑEDA, N. SELWYN, *More than tools? Making sense of the ongoing digitizations of higher education*, in *International Journal of Educational Technology*, 15/2018, available at: <https://doi.org/10.1186/s41239-018-0109-y>

²⁴ I. SOOD, H. PIIRKKALAINEN, A. CAMILLERI, *Can Blockchain Technology Facilitate the Unbundling of Higher Education*. In *Proceedings of the 12th International Conference on Computer Supported Education*, Vol. 2, 2020, P.231

²⁵ P. DYJUR, LINDSTROM, G., *Perceptions and Uses of Digital Badges for Professional Learning Development in Higher Education*, in *TechTrend*, no.61/2017, pp. 386-392, available here: <https://link.springer.com/article/10.1007/s11528-017-0168-2>

search for jobs and employers' search for reliable candidates²⁶, in other words to facilitate the supply of a workforce adapted to the rapidly changing demand.²⁷

The choice of universities then tends to involve a plurality of social actors: the university itself, embracing the goal to contribute to the labour market issuing credentials to facilitate the match between supply and demand; the students, who as future employees, are given new instruments to share their skills in the market and the employers, who can improve their selection.²⁸

In this new context, *open badges* reveal their potential: being verifiable 'at any time and in any place, and above all regardless of the reachability of the issuing body'.²⁹

²⁶ M.F MAINA, L GUÀRDIA ORTIZ, F.MANCINI, ET AL., *A micro-credentialing methodology for improved recognition of HE employability skills*, in *International Journal of Educational Technology in Higher Education*, no.19/2022, pp. 16,17, available at: <https://doi.org/10.1186/s41239-021-00315-5>

²⁷ See K. LEMOIE, L. SOARES, *Connected impact. Unlocking education and workforce opportunities through blockchain*. Washington, D.C., United States: American Council on Education (ACE) (2020), Available at: <https://www.acenet.edu/Documents/ACE-Education-Blockchain-Initiative-Connected-Impact-June2020.pdf>.

²⁸ Cf. the statements made by the chancellors of the universities involved in the initiative are interesting on this point: "*visti i rapidissimi progressi della scienza e della tecnologia - continue the chancellors of the universities involved - un breve periodo (dai 3 ai 5 anni) di studio non è più sufficiente a creare le competenze che saranno necessarie ad un professionista nell'intera vita: ci sarà bisogno di aggiornamento continuo, e ogni "tassello" di questo percorso andrà certificato e aggiunto agli altri tasselli*", CHERUBINI, P., MAPELLI, D., *Digitalizzazione del titolo di studio, come la blockchain ridefinirà il concetto di laurea* (<https://www.agendadigitale.eu/documenti/digitalizzazione-del-titolo-di-studio-come-la-blockchain-ridefinira-il-concetto-di-laurea/>)

²⁹ *Ibid.*

2. THE DIGITALISATION OF GRADUATE TITLES IN POSITIVE LAW

2.1. *Relevant subjects*

While it may be easy to reconstruct the historical climate in which the uses of *blockchain* in the educational sector has spread, the search for normative and jurisprudential footholds that would allow for a widespread and accomplished legal analysis requires a deeper analysis as the topic immediately arises as transversal to various subjects and therefore difficult to directly approach.

The intent of the research is to offer some methodological tools to identify the most relevant regulatory provisions.

In the institutional action of the university³⁰, two main movements, for the purpose of this paper, can be identified. A first ascending one, mainly aimed at constitutional law and European and international law, where attribution of functions can be found. In this frame the university, seen as the administrative organisation, is established to give substance to a social right³¹ - education - and is protected in its autonomy, to guarantee the freedom of research and teaching. The administrative bodies of universities are no less important to achieve those constitutional scopes, that would be not effective without their cooperation.

³⁰ On the qualifications of the administrative action of the public university see A. POGGI, *Le autonomie funzionali tra sussidiarietà verticale e sussidiarietà orizzontale*, Milan, Giuffrè, 2001

³¹ On organisation - as an institution - as the logical *prius* of law itself, see E. CARLONI, *Rights by design. Considerazioni su organizzazione, autonomia organizzatoria e protezione degli interessi*, in *P.A. Persona e Amministrazione*, n.1/2020, where it is stated that " *l'organizzazione non pone solo come condizione per il migliore esercizio dei diritti, ma per la loro stessa esistenza come nel caso dei diritti a prestazione* ", p.55

So, as administrations, universities must act in compliance with the principles established for all administrations by Articles 95 and 97 of the Italian Constitution.³²

³² On the general framework of the university system see the encyclopaedic entry, by BARETTONI ARLERI ALBERTO, F. MATARAZZO, *Università degli Studi*, in *Enc. Giur.* Giuffrè, Milan, 1992, On the university as a particular administration see the considerations made by A. GIANMARIA, GAGLIARDI, B., CAVALLO PERIN, R., *cit.*, *L'Università: un'amministrazione pubblica particolare*, in *Federalismi.it*, 14/2017, p.7 where the generic adjective is first referred to the functional nature of university autonomy (with due reference to A. POGGI, *Le autonomie funzionali tra sussidiarietà verticale e sussidiarietà orizzontale*, Milan, Giuffrè, 2001, cited therein) and then more extensively identified in the fact that universities are "un luogo - anche immateriale - ove si assume istituzionalmente il compito di assolvere al bisogno di conoscenza - di scienza plurale e universale - che è la ragione istitutiva delle università pubbliche, in ciò unicamente contornate nel nostro sistema dalle altre università, istituti di alta cultura o accademie (art. 33, u. c., Cost.). Trattasi di un elemento istitutivo, che per ciò solo distingue le università pubbliche da ogni altra istituzione privata, ma che le differenzia, come si è poc'anzi osservato, tra le pubbliche amministrazioni, costituendone una species tra le altre, del tutto particolare", *ibid.*, p.10

At European level, harmonisation processes have already been underway in the European Union³³ as well as in the Council of Europe³⁴ - see *Bologna process*³⁵ - to establish and consolidate a "European Higher Education Area"³⁶ in which "*academic freedom, institutional autonomy and the participation of teachers and students in the governance of higher education*" can be guaranteed and, at the same time, encourage "*economic development, social cohesion, the movement of students, as well as, among others, maximum employability and lifelong learning of graduates*".³⁷ European institutions responded to new

³³The European Union has a shared competence in the field of technological development, in which universities receive express recognition of their essential role in strengthening the European Union's scientific and technological foundations by creating a European research area "in which researchers, scientific knowledge and technologies circulate freely, to foster the development of its competitiveness, including that of its industry" (Art.179 TFEU, on which it has a shared competence, see Art.4. c.3). Whereas in the field of education it can only carry out promotion and coordination activities (Art.6 TFEU).

³⁴ Cf. the *Convention on the Recognition of Qualifications concerning Higher Education in the European Region*, which, in addition to the recognition of studies, already saw the recognition of certificates and degrees obtained in another country as an important measure to promote academic mobility between the contracting parties. ³⁴ Cf. Council of Europe, *Convention on the Recognition of Qualifications concerning Higher Education in the European Region*, 11.4.1997, "*the recognition of studies, certificates, diplomas and degrees obtained in another country of the European region [...] an important measure for promoting academic mobility between the Parties*", available here: <https://rm.coe.int/168007f2c7>

³⁵ Joint declaration of the European Ministers of Education, The Bologna Declaration of 19 June 1999; T. G. RAMIREZ, *El proceso de convergencia europea y la identidad de las universidades en la europa del conocimiento*, Revista Fuentes, no.6/2005,

³⁶ For developments on this front see the most recent EC Communication *on a European strategy for universities*, COM(2022) 16 final; EC Communication *on a renewed EU agenda for higher education*, COM/2017/0247 final

³⁷ *Ibid.*

demands made by the 'knowledge society' with the so-called 'Lisbon Strategy' of 2000³⁸: maintaining adequate standards of economic freedom requires that education systems developed by member states adapt to the needs of new mobility in the European and international labour market. *Lifelong learning* thus acquires a key role in meeting challenges arising from globalisation and it is necessary for educational institutions to actively participate in the commitment to "employability".³⁹ This explains why "learning mobility for all, [...] is key to building inclusive, cohesive and resilient societies and sustaining the

³⁸ European Council, *The Lisbon Special European Council (March 2000): Towards a Europe of Innovation and Knowledge*, available here: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=LEGISSUM:c10241&from=IT>. The Lisbon strategy was then updated in the part on the dissemination of skills across Europe in the Horizon 2020 strategy, EU Commission, *EUROPE 2020. A strategy for smart, sustainable and inclusive growth*, COM(2010) 2020 final, March 2010 (available here: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC2020&from=IT>) composed of seven different initiatives, among which the one called "Youth on the move", aimed at "to enhance the performance of education systems and to facilitate the entry of young people to the labour market", EU Commission, *ibid.*, p.5, is of particular interest. The objectives of the "Youth to Move" action also include "to increase transparency and transfer of competences acquired through both formal and non-formal learning across the European Union", cf. EU Commission, *Youth on the Move An initiative to unleash the potential of young people to achieve smart, sustainable and inclusive growth in the European Union*, COM(2010) 477 final, September, 2010, p.9

³⁹ W. Streeck, *The European social model: from redistribution to competitive solidarity*, in *State and Market*, no.1/2000. It is interesting to note that these active policies in the field of education are part of a more general transition of social models from a redistributive to a competitive solidaristic matrix: national communities, under the competitive pressures generated by the opening up of markets, try to defend their internal solidarity, not with redistributive policies, which are now unsustainable, but through productive success and competing with that of other communities, through specialisation in productive sectors. Cf. W. Streeck, *ibid.*, p. 13

competitiveness of the Union, and is all the more important in the context of rapid and profound change driven by technological revolution and globalisation".⁴⁰

In the context of this reorganisation of the public apparatus⁴¹, one can read *blockchain* as a tool for the digital transition of education, through the improvement of

⁴⁰First whereas, Regulation (eu) 2021/817 of the European Parliament and of the Council of 20 may 2021 establishing Erasmus+: the Union Programme for education and training, youth and sport and repealing Regulation (EU) No 1288/2013.

⁴¹ There are considerable recommendations on this point in a recent UNESCO report, *Digital Credentialing. Implications for the recognition of learning across borders, 2019*. The document is valuable for several reasons. Firstly, because it closely links work, education and digitisation (pp. 7,8). On this point it acts in synergy with the European Union, which seems to be aware of how digitisation has led the different subjects to intersect more and more. To get confirmation of this, one only has to look at the Digital Education Action Plan (2021-2027), where these subjects are always related. See EU Commission, *Digital Education Action Plan 2021-2027. Resetting education and training for the digital age*, COM(2020) 624 final, September 2020 (available here: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0624&from=EN>), which builds on the first Digital Education Action Plan (2018-2020), (available here: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0022&from=EN>) The adoption of these programmes also fulfils one of the priorities of the EU Commission, *A Europe fit for the digital age* (https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en) and is part of the broader framework of the Next Generation EU (https://ec.europa.eu/info/strategy/recovery-plan-europe_en). However, the Plan, as stated in the same communication, is strongly connected to other interventions: "*the Action Plan can benefit from the Erasmus programme, the European Social Fund, the European Regional Development Fund and smart specialisation policies, the Connecting Europe Facility, the Digital Europe Programme, and Horizon Europe*", p.3. Among the noteworthy instruments useful to foster the internationalisation of students is certainly "*the European Student Card Initiative*" that "*will allow students to identify and authenticate themselves online in a secure and trusted manner based on the EU's electronic identification rules (eIDAS regulation) when carrying out online learning activities at a host institution in another Member State. By connecting universities' various IT systems, we will achieve a paperless Erasmus mobility in full respect of General Data Protection Rules*". Secondly, because the report acknowledges some examples where institutions have changed their organisation in order to interoperate: "*the Electronic Database for Global Education (EDGE)*", developed by the American Association of Collegiate

material management of paper documents certification systems, their circulation, verification procedures and the autonomy of subjects in the management of their titles.⁴²

2.2. *Digitised degrees in the process of administrative simplification*

The second - descending - movement in positive law leads us, on the other hand, to focus our gaze on administrative activity. From this perspective, degree certificate shows itself as a document.

Focusing on *blockchain* in another process involving universities as administrations, namely that of the digitalisation of administrative documentation as a tool for administrative simplification, a relevant milestone is the administrative simplification in the Consolidated Text on Administrative Documentation⁴³. The latter generalises the instrument of self-certification in relations with the public administration and Articles 40 and 46 of the T.U. provide for the obligation to replace the submission of certificates to public administrations with a 'substitute declaration' attesting to the possession of certain states, personal qualities and facts, then listing which of these cases fall within the objective scope of application of

Registrars and Admissions Officers (AACRAO), and, at European level "the ENIC-NARIC (European Network of Information Centres - National Academic Recognition Information Centres) network, which has strengthened collaboration between countries and contributed directly to more sophisticated credential practices", ibid.

⁴² *Ibid.* p. 19

⁴³ Presidential Decree No. 445/2000

the measure, including, precisely, the degree⁴⁴. The system thus introduced provides for an affiliation between offices and private individuals that can be described as follows. The "proceeding administration"⁴⁵, to ascertain *ex officio*⁴⁶ the truthfulness of the substitute declaration received, connects with⁴⁷ the "certifying administration"⁴⁸. The latter must then

⁴⁴ Cf. Art. 42 *ibid.* whereby the legislator clarifies that 'evidence of entitlement issued on completion of training courses or procedures authorising the pursuit of certain activities, even if defined as a "certificate", shall be referred to as a "diploma" or "patent" respectively'.

⁴⁵ Art.1 letter o) C.A.D. "*PROCEDURING ADMINISTRATIONS* the administrations and, in relations with users, the managers of public services that receive the substitute declarations referred to in letters g) and h) or make *ex officio* verifications pursuant to Article 43".

⁴⁶ Art. 43 c.1 C.A.D. : "*Public administrations and public service managers are obliged to acquire ex officio the information that is the subject of substitute declarations under [Articles 46](#) and [47](#), as well as all the data and documents that are in the possession of the public administrations, upon indication by the interested party of the elements that are indispensable for finding the information or data requested, or to accept the substitute declaration produced by the interested party.*"

⁴⁷ Cf. Art. 43 c.3 C.A.D.

⁴⁸ Art. 1(p) C.A.D. "*CERTIFYING ADMINISTRATIONS* the administrations and managers of public services that hold in their archives the information and data contained in the substitute declarations, or requested directly by the proceeding administrations pursuant to Articles 43 and 71".

allow direct access to its information⁴⁹ by using the appropriate "computerised document management systems"⁵⁰.

However, private individuals tend to be excluded from this system. Indeed, they generally cannot access to the information held by the proceeding administrations. This does not mean that private actors can never have access to the information held by public administration, since opening a proceeding and respecting the adversarial principle could in principle overcome this restriction. The other issue is that private individuals usually are not in a position to verify the reliability of the information in a possible substitute declaration, because they do not have access to the original information.

As previously mentioned, *blockcerts* are representation of a piece of information - the attainment of a degree - recorded on the Ethereum *blockchain*⁵¹, at the request of a public administration - the university - which accesses the service through the purchase of cryptocurrency (*ether*). As such, *blockcerts* can to all intents and purposes be considered as computerised administrative documents, i.e. '*computerised representation of legally relevant*

⁴⁹ Access to the archives of another administration must respect the protection of personal data, but the legislator has provided, by introducing a legal presumption, that access carried out by the proceeding administration is to be considered as being carried out '*for purposes of overriding public interest*', thus providing the legal basis under Article 9(g) GDPR

⁵⁰ Art. 1(r) C.A.D. : "*set of computing resources, equipment, communication networks and IT procedures used by administrations for document management*", which covers a range of activities, including registration.

⁵¹ This choice appears to be compatible with Art.8-ter of d.l. 135/2018, whereby the legislator has positivised "*blockchain*" by defining it as a set of "*distributed ledger-based technologies*" that "*use a shared, distributed, replicable, simultaneously accessible, architecturally decentralised ledger on cryptographic bases, such as to allow the recording, validation, updating and storage of data both in plain text and further protected by encryption verifiable by each participant, not alterable and not modifiable*"⁵¹. The option is therefore for public and permissionless *blockchain* systems. For a commentary see F. Votta, L'amministrazione pubblica e la tecnologia *blockchain*, in *Giornale di diritto amministrativo*, 4/2022, pp. 454 et seq. and the bibliographical references therein.

*acts, facts or data*⁵² - but they still allow the private individual to carry out a similar check asked to interlocutors for a traditional certificate.

In this way, private individual who wants to verify the authenticity of information will simply have to consult the public register of the *blockchain* - essentially verifying the combination of private and public key. It will therefore be the *blockchain* management platform that will perform the functions of the certifying administration, because it is in fact on this that the fingerprint with which the comparison is made, insists. Or, at the same time, it will have to request the production of a specific certificate, also in digital format, produced by the certifying administration, which is the only one entitled to issue it, since it holds the relevant registers.⁵³

Briefly summarising the contents of this section, it can be stated that the actions undertaken at international and European level take place on two fronts. Some of them aim at integrating the different education systems of different countries, either by resorting to the instrument of international conventions or, as in the case of the EU, by adopting transversal interventions. Others, instead, try to integrate the education systems with European and international labour market. In the documents reported, there are numerous references to the need to conceive of education as a phase of preparation for work and as a place of continuous training, to which one must resort in order to be constantly competitive in that market. The world of education, therefore, through this connection, is affected by the technologically

⁵² Art. 1 C.A.D.

⁵³ On the function of registers in law, see the encyclopaedic entry F. BASSI, *Registrazione e registro*, in *Enciclopedia del diritto*, vol. XXXIX, 1988, where it is assumed that the peculiarity of the tool “*non incide né sulla natura, né sul regime né sulla funzione che l’ordinamento giuridico attribuisce al registro tradizionalmente inteso.*”

determined changes in the world of work⁵⁴ and seems to adapt to them. At the same time, this harmonisation phenomenon leverages the administrative functions exercised by universities. Certifications, as administrative documents, become an essential tool for the general functioning of the integrated system.

Having reached this point in the analysis, what has been summarised so far as the 'impact' of technology on administrative law can be re-read, from a legal point of view, as the problem of defining the ownership of the power to issue administrative certificates and the manner in which it is carried out.

The study therefore shifts to the so-called '*certifying power*⁵⁵', which constitutes the theoretical substratum of those acts and lies exactly at the centre of that intersection just mentioned.

3. A BRIEF OVERVIEW OF THE PUBLIC CERTAINTY SYSTEM

3.1. *The monist thesis*

⁵⁴ This refers to the changing nature of the work services required, which are becoming increasingly specialised and highly intellectual in content

⁵⁵ M.S. GIANNINI, *Certezza pubblica*, in *Enciclopedia del diritto*, Vol. VI, Milan, Giuffrè, 1960, p. 769; cf. also by the same author *Diritto pubblico dell'economia*, il Mulino, Bologna, 1995; *Lezioni di diritto amministrativo*, CEDAM, Padua, 1950, p. 176; also taken up by A. BENEDETTI, *Certezza pubblica e "certezze" private*, Giuffrè, Milan, 2010, p.11

The area of public certainty, although among the most common activities of public administration, has rarely received specific attention from the science of administrative law.⁵⁶

On the basis of the effectiveness⁵⁷ of acts of certification, Giannini proposes the well-known *summa divisio* into 'informational certainties' and 'legal certainties'. The former, incapable of affecting subjective legal situations, participate in declarations of science contained in the deeds or at least make them accessible. They do not bind, however, the addressees who can choose whether or not to make use of them.⁵⁸ The second, on the other hand, produce legal situations and are binding.⁵⁹ They do share two characteristics: both of

⁵⁶ For a monographic approach to the topic of public certainty see: A. FIORITTO, *La funzione di certezza pubblica*, Cedam, Padua, 2003; A. BENEDETTI, *cit.*; M. GNES, *La decertificazione. Dalle certificazioni amministrative alle dichiarazioni sostitutive*, Maggioli, Rimini, 2012. Although not monographic, the contribution of A. ROMANO TASSONE, *Amministrazione pubblica e produzione di "certezza": Problemi attuali e spunti ricostruttivi*, in *Diritto Amministrativo*, n.4/2005, pp. 867 ff. is essential for understanding the historicist aspects of public certainty. Among the non-monographic contributions we also note A. BENEDETTI, *Certificazioni "private" e pubblica fiducia*, in F. FRACCHIA, M. OCCHIENA (eds.), *I sistemi di qualificazione tra qualità e certezza*, *cit.*, 20 ff. The reasons for the apparent lack of interest could lie in the solidity of the first reconstruction of the subject proposed by GIANNINI, who sets the constituent elements of the subject matter i) in the centrality of the certifying authority, ii) in the distinction between the declarative and cognitive phases and, finally, iii) in the possibility of bringing back to reality what is considered certain. On these hypotheses, see E. CARLONI, *Le verità amministrative. L'attività conoscitiva pubblica tra procedimento e processo*, Milan, Giuffrè, 2011, p. 92.

⁵⁷ On the concept of effectiveness in the general theory of law see G. ZAGREBELSKY, *Validità, effettività, efficacia*, in *Diritto e Società*, no.1/2018, p 10

⁵⁸ The adoption of these acts may sometimes be mandatory in the supplementary/final stages of the administrative procedure, with consequences for the effectiveness of the measure adopted in their absence; however, they do not affect legal situations. Examples of this type of certainty are weather bulletins, stock lists, cf. M.S. GIANNINI, *Certezza pubblica*, *cit.*, p.772

⁵⁹ These certainly include degrees

them ascertain a fact and certify it. But legal certainties '*cannot be explained except by the existence of a sovereign power, which imposes their acceptance on all citizens*'. Thus, while information certainties constitute a public service, the latter expresses the performance of a public function. As such, it may also be exercised by private subjects without, however, being able to take ownership of it⁶⁰.

The intertwining with the issue of the private exercise of public functions is evident and gives rise to the main differences in the literature.

The heterogeneity of certifications, it has been argued, on the basis of Giannini's lesson, would not prevent the reconstruction of a 'system' of public certainty, to provide a '*unitary definition of public certainty*'⁶¹, now meaning 'public relevance'. In fact, from an objective point of view, these would arise from acts or conduct that are legally relevant, because they are fixed by rules of various kinds (legal/technical). From the subjective point of view - i.e. of the certifying party - all types of certainties take root within the State: those coming from public subjects would take root immediately; those from private parties, on the other hand, would find efficacy in the legal system, through 'acts of recognition' (recognition procedures, accreditation, entrustment), thus being incorporated and made public. However, these structural elements alone would not be sufficient to isolate the system of public certainties⁶². The distinction, in fact, is in the finalistic element - typical of administrative

⁶⁰ Cf. M. S. GIANNINI, *Certezza pubblica*, p.779

⁶¹ A. FIORITTO, *cit.*, p. 384

⁶² The subdivision between objective and subjective element recalls that traditionally used to describe the concept of public service, cf. A. FIORITTO, *cit.*, p.384, where the author does not fail to mention the analogy with the usual treatment of the concept of public service, with respect to which the differentiations proposed by U. POTOTSCHNIG, *I pubblici servizi*, Cedam, 1955, now in U. POTOTSCHNIG, *Scritti scelti*, Padua, Cedam, 1999, pp. 591 ff, cited and commented on by D. SORACE, *La riflessione giuridica di Umberto Pototschnig: i "servizi pubblici"* in *Diritto*

law⁶³ - that is, the immanent destination to "create trust, security, clarity among the people for whom they are intended".⁶⁴ The purpose, therefore, would neutralise the difference between public certainty and the certainty of private individuals, since these would, in any case, be attributable to a public power.⁶⁵ In this reconstruction, public certainty would perform a function of guaranteeing relationships. This *certainty-guarantee* would be deeply connected with the principle of legal certainty - with the former, public certainty would share the purpose of "making people's lives safer and more orderly"⁶⁶ - and with legitimate expectations. It is the rule that specifically regulates the case of public certainty that generates legitimate expectations in the community, not the administrative activity carried out.⁶⁷ In other words, the production of certainty would pertain to the observance and implementation of the rule, not to the "expectation of similar behaviour".⁶⁸ The guarantee would thus relate

pubblico, 2/2002, where one can find useful reflections on the topicality of the old monograph: "il libro di Pototschnig sia nella sua interesse attuale e condivisibile, ma credo si possa dire che alcuni degli aspetti per i quali è stato criticato possono essere oggi valutati in tutt'altro modo e che non soltanto l'idea di fondo (la predicabilità di una 'nozione oggettiva' di servizio pubblico) - per la quale, non solo in Italia, è considerato un preconcizzatore degli sviluppi comunitari - ma anche una gran parte delle sue attente e approfondite elaborazioni sono ancora oggi di grande attualità e, soprattutto, forniscono una preziosa indicazione di metodo per ricerche che proprio la situazione attuale rende nuovamente impellenti", cf. *Ibid.*, p.596

⁶³ Cf. S. CASSESE, *The Foundations of Administrative Law*, p.125

⁶⁴ *Ibid.*, p. 386

⁶⁵ *Ibid.*, pp.394 ff.

⁶⁶ ". Evidence of this would be in the appearance of the first land registers precisely following the affirmation of the principle in question, an expression of central law and an instrument for clarifying relations between private individuals, cf. "rendere più sicura e ordinata la vita delle persone"*ibid.*

⁶⁸ "'aspettativa di un comportamento analogo'*Ibid.*, p. 406

to the tightness of the system and the stability of the information certified and put into circulation. The legitimate expectation aroused in the community by public certainty would therefore concern the compliance with the rules specifically governing the recognition of states, qualities and/or facts. To protect this guarantee there can only be the public administration, the only subject traceable to a democratic-representative circuit, capable of representing, always, all the interests of the system.⁶⁹

3.2. *The dualist thesis*

Bringing all acts of certification back to the public subject, for a different thesis, would not adequately restore legal reality to certification systems. This second reading hypothesises a clear break between today's society and the one in which public certification theories were developed. The process of globalisation would have entailed a qualitative leap in social systems.⁷⁰ In fact, globalisation would have brought into play the function of the regulatory state because the '*market exceeds the size of the state and is not bound by territorial boundaries*⁷¹. The state would be a *regulator*, among others, in the arena of market regulation characterised by two elements: (i) a strongly cognitivist conception that values the fact as the origin of the norm; (ii) 'consequentialism' that defines action '*in relation to its aims*

⁶⁹ This presupposes a unitary conception of the administration on which see *contra* M. NIGRO, *La pubblica amministrazione fra Costituzione formale e Costituzione materiale*, now in *Scritti giuridici*, vol. III, Giuffrè, Milan, 1996, pp. 1845 ff.

⁷⁰ Cf. "L'attenzione [...] deve volgersi all'indagine delle ragioni di crisi di quello stesso impianto concettuale ove si consideri la produzione delle "certezze" nel contesto 'globale'", thus A. BENEDETTI, *cit.*, p.22

⁷¹ *Ibid.*

and effects'⁷². This thesis adopts the interpretative tools of the economic analysis of law: public certainties are meant as an expression of the need to ease trades and, therefore, the best perspective would not be the vertical one - State-individual - but the horizontal one - the law of private individuals ("diritto dei privati")⁷³, a category on which we must give some considerations. The author, in fact, resorts to it to highlight a break between two different spheres of regulation and, above all, to oppose to the 'monist' reading a pluralist immanence allegedly found in the different markets. In this thesis, which refers to Cesarini Sforza's institutionalist thesis, the separation between *private law* and the *law of private individuals* is repeated. The former would constitute the instrument for regulating legal transactions between private individuals within the state system. They would find their source, the regulation of their execution or the sanction of their violation, in the state legal system. The second, on the other hand, presupposes more than one legal system, that of the state and that of social bodies, and would in turn be subdivided into *public law of private individuals* and *private law of private individuals*. Cesarini Sforza refers to the 'public law of private individuals' to indicate the part of the order of the society that refers to 'a) its structure; b) the relations between its members and the social government); c) the relations of its members among themselves'.⁷⁴ The 'private law of private individuals', on the other hand, would include those rules which, drawn up by private autonomy, imperatively override state rules. These are not arrangements of interests determined by social bodies (i.e. intermediate bodies) expressing an autonomy recognised by the state and therefore protected by it. The private law of private individuals operates 'in certain areas of social life' effectively taking the place

⁷² *Ibid.*, p.23

⁷³ A. BENEDETTI, *cit.*, p.200 with express reference to the theses of W. CESARINI SFORZA, *Il diritto dei privati*, Giuffrè, Milan, 1963, recently reissued edited by M. SPANÒ by Quodlibet, Macerata, 2018

⁷⁴ "a) alla sua struttura; b) ai rapporti fra i suoi componenti e il governo sociale); c) ai rapporti dei suoi componenti fra loro'" see W. CESARINI SFORZA, *cit.*, pp. 74 ff.

of state rules. This would be the field of those modifications - frequent '*in the sphere of organisations that have the sole and prevalent purpose of protecting certain interests (usually industrial and commercial)*' - that private individuals introduce "*into the legal models prepared by the legislator*".⁷⁵ Here Cesarini Sforza refers to the category of *usages* under section 1124 of the Italian Civil Code in force at the time, but closes the argument by stating that, regardless of the origin of the rule - custom or positivised by the organs of the social body⁷⁶ - it can be considered as a manifestation of the social order. Thus, there will always be a judicial body in charge of its application. This power, the author continues, "*cannot but be connected to technical functions*".⁷⁷ One can then understand the potential that Cesarini Sforza's institutionalist theory can develop in the reading of certification mechanisms, as will be seen immediately below.

Returning to Benedetti's reconstruction, in fact, the certificates issued by private individuals would contain acts of ascertainment performed through the application of technical rules drawn up and shared within certain bodies, as will be seen in a moment. However, the function of certification would not be to reduce social complexity, but to

⁷⁵ "*nell'ambito delle organizzazioni che hanno come scopo unico e prevalente quello di tutelare determinati interessi (di solito industriali e commerciali)*" - "*nei modelli giuridici predisposti dal legislatore*" see *Ibid.* pp.91-92

⁷⁶ S. ROMANO, *L'ordinamento giuridico* (1918), II ed. Firenze, Sansoni, 1945, p. 25, in G. TRIFONE, *L'istituzione e il suo motivo esistenziale. Intorno al valore dell'effettività nella teoria di Santi Romano*, in *Jura Gentium*, XV (2018), 2, p.59

⁷⁷ "*non può non connettersi a funzioni tecniche*" Cf. p. 93

manage it by reducing information asymmetries between the agents⁷⁸ and, consequently, the higher transaction costs '*essentially linked to the retrieval of information*'. The normative forecasts of ever new forms of certification in ever different spheres would therefore be the result of a legalisation of the instruments deputed to facilitate exchanges between private parties, aimed at guaranteeing a '*sustainable insecurity*', not certainty, which would not be objectively achievable within the sphere of private autonomy. Here is the crucial passage: questions of 'certainty' tend, in the market, to become questions of 'trust', which are resolved through the adoption of measures that guarantee the knowability of what is said about the appropriateness of what is exchanged.⁷⁹ Ultimately, certifications would be "*institutions that arise from a phenomenon of progressive legalisation of areas of individual freedom, aimed at making up for conditions of interpersonal trust that cannot be achieved spontaneously*".⁸⁰ The two concepts would be in a dialectical relationship with each other, since certainty includes trust-confidence but not the other way around.⁸¹

⁷⁸ See the extensive references *ibid.*, pp. 24 ff. to the literature on *rational choice*, in particular the iconic quotation from G. AKERLOF, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*. Here "agent" stands for operators in the market as meant in the recalled literature.

⁷⁹ Pregnant on this point are the critical points raised by E. CARLONI, *cit.*, p. 91 n.14, who emphasises the risk arising from an excessive focus on 'acts of certainty': a reading entirely centred on the declaratory moment to the detriment of the ascertaining moment, runs the risk of fostering '*a disconnection between the externalization phase (the act of certainty) and the cognitive phase (the cognitive procedure that precedes it)*'; in other words, the author highlights the systemic risks arising from an excessive distancing from the material moment of ascertainment of the content on which certainty is to be conferred.

⁸⁰ *Ibid.*, p.29

⁸¹ On this point, see the increasing number of studies on trust, masterfully systematised by N. LUHMANN, *La fiducia*, Il Mulino, Bologna, 2002 and on the connections with the "*risk society*", for which see U. BECK, *La società del rischio. Verso una seconda modernità*, Carocci, Roma, 2010, not by chance both referred to by A. BENEDETTI, *cit.*

If this is the object of certainties, it is now necessary to understand the role of subjects, which we have said is the area of greatest contrast with the positivist perspective. Having radically abandoned the prospect of tracing certainty back to truth – which was not the intention in the first thesis – the model of the "*Reputational Intermediaries*" has been developed in Anglo-Saxon literature, as an instrument of market governance to meet the need to guarantee sufficient levels of certainty to guarantee exchanges.⁸² According to this theory, it would be third-party 'experts' - the certifiers - who would be able to guarantee the reliability of information. These subjects would live off an annuity of 'reputational capital', irreparably damaged when they attributed credibility to information that later turned out to be false. Their independence of judgement would be protected and sustained by the need to survive in the secondary market of 'certifiers'.⁸³

The search for 'certainty', therefore, takes place in the market of certifiers. These are economic operators distinguishable by the *specific 'organisational factors that are linked to [their] specific cognitive capacity'*⁸⁴ and legitimised on the reputational mechanisms, mentioned above.⁸⁵ This market is not governed by central authorities but by bodies that set

⁸² Cf. A. BENEDETTI, *ibid.*, p.32

⁸³ Note how the contribution under review acknowledges that such a model proved to be a failure in preventing the 2008 financial crisis. Although this is not the place, one cannot help but note that from this example, the doctrine offered in support of this failure nevertheless circumscribed the effects of the crisis on the theoretical construction. It did not go so far as to affirm the failure of the system designed - which still persists - but, rather, to note its simple insufficiency. The solution would lie, therefore, in deepening the tasks of supervision and control over intermediaries. Needless to further emphasise the recursive nature of this argument. (cf. A. BENEDETTI, *cit.*, p.34)

⁸⁴ Cf. E. CARLONI, *cit.*, p. 33

⁸⁵ Hence the agreeable remarks on the critical issues arising from the unequal representation of interests within these organisations and their deliberations, which set themselves up as private sources of normative production of a general nature. On this point, the representation of these bodies is expressly defined as "*unequal*", *the perception of*

the standards, the so-called *epistemic authorities*⁸⁶, who are disengaged from the '*political-representative circuits*' (id est, the public administration).

For this reason, it would be wrong to extend to them the status of public subjects, since their activity, all of it, can be traced back to the exercise of free economic initiative.⁸⁷ However, even the dualist approach of the ordinamental reading would be insufficient, because this approach leads to confusing two different issues: on one side the juridical nature of the organisational phenomenon and, on the other side, the recognition by the general order of the '*manifestations of the particular order*'.⁸⁸ Indeed, in the various certification systems found in the legal reality: i) in some, both the organisational element and the normative

which is clear, especially in the overseas literature,, which has not failed to emphasise the 'democratic deficit' that characterises systems in which the standardisation, accreditation and certification bodies are prevalently the expression of the production associations (if not even of the large international corporations that have the resources to be able to participate with continuity and direct 'from within' the activity of the representative bodies)", sic A. Benedetti, cit., p. 196. Even more decisive on the issue are the obiter dicta found in R. Bin, I diritti di chi non consuma. Relazione al Convegno Diritti dell'individuo e diritti del consumatore, Milan, 14 December 2007 available on the Forum Quaderni Costituzionali, [here: https://www.forumcostituzionale.it/wordpress/images/stories/pdf/documenti_forum/paper/0159_bin.pdf](https://www.forumcostituzionale.it/wordpress/images/stories/pdf/documenti_forum/paper/0159_bin.pdf)

⁸⁶ A definition coined to represent those technical standardisation bodies, in which the interests of market players (producers, intermediaries and consumers) are represented, legitimised by the ability to summarise in their rulings the *expertise* in the sector entrusted to them. Cf. A. BENEDETTI, *cit.*, p.192. On the normativity of markets see to N. IRTI, *L'ordine giuridico del mercato*, Laterza, Roma-Bari, 1998, not by chance also recalled by A. BENEDETTI herself, *cit.*, p.193. See also J.GRUIN, *The epistemic evolution of market authority: Big data, blockchain and China's neo-statist challenge to neoliberalism*, in *Competition & Change*, v. 5/2021, Sage, pp.580-604

⁸⁷ A. BENEDETTI, *cit.*

⁸⁸ "*manifestazioni dell'ordinamento particolare*" Cf. A. BENEDETTI, *cit.*, p.200

element would be totally lacking⁸⁹ ; ii) the multi-subjectivity would not always reach "a compact and externally recognisable whole, presenting itself instead with a much more non-homogeneous connotation"; iii) among the sanctions that could be envisaged there would only be that of the withdrawal or suspension of the certification. The only way to frame this legal phenomenon would then be to bring it back into the 'hybrid' law⁹⁰, where 'phenomena of representation and organisation of interests in the market' intersect with the 'reticular and diffuse structure of multiple relations, formalised [...] and non-formalised' con la "reticular and diffuse structure of multiple relations, formalised [...] and non-formalised"⁹¹. It would be this "disarticulation" that would make it possible to "understand the variety of ways through which public power can relate to such systems as well as the specificity of the subjective situations that derive from them and that require an autonomous configuration, centred on the concept, albeit a polysense one, of trust"⁹² .

If this second thesis allows us to distance ourselves from the normativist one, which is unable to account for the different rationales underlying the two ways of producing certainty, it does not allow us to make much progress. No systematisation is, in fact, possible, given the

⁸⁹ The example given is that of rating agencies, cf. A. BENEDETTI, *cit.*, pp. 201 ff.

⁹⁰ With reference to G. TEUBNER, *Diritti ibridi: costituzionalizzare le reti di private governance*, in R. PRANDINI (ed.), *La cultura del diritto nell'epoca della globalizzazione. L'emergere delle costituzioni civili*, Armando editore, Rome, 2005, pp. 88 ff, reproduced by A. BENEDETTI, *cit.*, p. 204

⁹¹ "fenomeni di rappresentazione e organizzazione di interessi nel mercato"; "struttura reticolare e diffusa delle molteplici relazioni, formalizzate [...] e non formalizzate", cf. *ibid.*

⁹² "comprendere la varietà dei modi attraverso i quali il potere pubblico può relazionarsi con tali sistemi nonché la specificità delle situazioni soggettive che ne derivano e che necessitano di un'autonoma configurazione, centrata sul concetto, pur polisenso, di fiducia" cf. *Ibid.*

irreducible fragmentary nature of the facts to be found in legal reality. The only way forward is that of analysing concrete cases in an attempt to outline multiple 'models' of reference, that would be an open number and always modifiable from time to time as the reality to which they refer changes. These realities correspond in particular to different markets - which the individual certifications, which could be analytically studied, help to manage⁹³ - and, therefore, to different regulatory statutes establishing them.⁹⁴ This multiplicity, however, characterised by a common *artificiality*⁹⁵, allows us to identify a *social body* - that of *merchants*⁹⁶ - characterised by homogeneous interests, certainly different but equal and opposed. The aforementioned multiplicity, therefore, can be traced back to a class of interests, those who need to see their products declared as conforming to standards in order to be able to market them. The explanatory principles of certainties would therefore be essentially twofold. There would be *state-conform* or *market-conform* certainties. The

⁹³ As in the study by A. BENEDETTI

⁹⁴ On the equivalence of market and regulatory status, in open opposition to the recognition of the naturalness of markets, see N. IRTI, *cit.*, pp.90-92

⁹⁵ On the concept of the market as *locus artificialis*, see N. IRTI, *ibid.*, p.98

⁹⁶ On the category of the 'merchant', see J. LE GOFF, *Au Moyen Âge: temps de l'Église et temps du marchand*, in *Annales*, .3/1960, pp.417-433, also translated and collected in J. LE GOFF, *Tempo della Chiesa e tempo del mercante e altri saggi sul lavoro e la cultura nel Medioevo*, Einaudi, Torino, 2000. The essay reads about the construction of a bell tower in the village of Aire-sur-la-Lys in 1355. The governor, responding to the requests of local merchants, built the tower so that the bells could ring the hours of business transactions and work. The author notes "*the use, for professional purposes, of a new measure of time is resoundingly indicated therein*" [...]. The hegemony exercised by the drapers over communal life is manifested in the construction of a communal clock that proves to be '*an instrument of economic, social and political domination of the merchants who rule the commune*' (cf. p. 21 of the Italian translation). It is interesting to note the attention that M.S. GIANNINI himself, notoriously attentive to the historical reasons of administrative science, gave to the so-called metrological activity in his *Diritto pubblico dell'economia*, *cit.*

subjects of certitude can be found in the state or in the market, as a set of systems. Hence, this second theory can be called dualist, well summarised in the title of the analysed monograph, which refers to public certainties - the state - on the one hand, and the certainties of private individuals - organised in the market - on the other.

3.3. *The pluralist thesis.*

On the one hand, therefore, there is a theory wrapped up in the need to bring the phenomenon of certainty entirely back into the sphere of the state legal order. This brings us reading it exclusively in the vertical dynamic and in the expression of a sovereign power, even where there is no concrete exercise of authoritative power. On the other hand, another theory, although antimonist, seems to renounce to even sketching out systems of public certainties, reserving the sole possibility of sketching out some models, thus coming to a halt before mere socio-legal plurality. A chance to overcome this bottleneck is perhaps offered by a short contribution by Romano Tassone, specifically dedicated to the theme of public certainties.⁹⁷

The author proposes an interesting reconstruction because it recognises the signs of the time of 'Giannini's' elaboration but overcomes the objectification of the function of certainty with recourse to the finalistic element; and by adducing arguments other than the mere authoritative principle, it allows the theme of public certainty to be refocused on the public power but in a plural context.

First of all, the author brings back the obsolescence of the traditional theory to two different orders of reasons. The public law literature reworked the concepts of negotiation

⁹⁷ ROMANO TASSONE, *cit.*

acts and declaratory acts (that lack of manifestation of will) that had been elaborated by the previous private law literature. Having changed the latter, as consequence also the former should be updated.⁹⁸ Secondly, the author states the "*crisis of the public-private dichotomy, [...] once again of general scope (and induced, perhaps not irreversibly, by the neo-liberal temperament that has dominated this last fifteen years)*"⁹⁹. These crises would have driven new transformations in the number and role of the productive instruments of certainty. The certainty that *'today is increasingly demanded, and of which there is therefore a positive question, falls less and less on legal relations or facts, and more and more on intrinsic (and often economically assessable) qualities of the goods of life'*.¹⁰⁰

Traditional doctrine excluded the concept of "truth" from the debate on legal ascertainment in order to make room for the concept of certainty, which allows inclusive disjunctions ("*as a psychic phenomenon*"¹⁰¹). Unlike the latter, the former admits only exclusive ones.¹⁰² Certainty would have the typical effect - in the technical sense - of

⁹⁸On the changing role of the state in the economy, see already M. S: GIANNINI, *Diritto pubblico dell'economia*, cit.

⁹⁹ "*crisi della dicotomia pubblico-privata, [...] ancora una volta di portata generale (ed indotta, forse non irreversibilmente, dalla temperie neolibera che ha dominato quest'ultimo quindicennio*" cf. A. ROMANO TASSONE, cit., p. 875.

¹⁰⁰ *'oggi sempre più spesso si richiede, e di cui quindi si fa positivamente questione, ricade sempre meno su rapporti o su fatti giuridici, e sempre più su qualità intrinseche (e sovente economicamente valutabili) di beni della vita'* cf. *Ibid.*, p. 876

¹⁰¹ *Ibid.*, p.877

¹⁰² Indeed, the author goes so far as to present the concept of certainty as the result of what he sees as two opposing forces, law and justice, whose relationship was traditionally "*nei termini del possibile, deprecabile ma non sempre rimediabile contrasto tra le c.d. «verità legali» e la verità sans phrase* ('set up until then in the terms of the possible, regrettable but not always remediable contrast between so-called 'legal truths' and truth sans phrase'), p.877

preclusion¹⁰³, i.e. that of definitively ascertaining a pre-existing legal situation, irrespective of the actual correspondence with the historical fact of what has been ascertained. And this can occur because the ascertainment is not simply a '*logical-intellectual operation*', governed by the principles of formal logic, but in it - despite the aforementioned hypotheses on the absence of voluntaristic determinations in such acts - there is an eminently decisional content because it represents '*an instrument of settlement of an ongoing social conflict*'¹⁰⁴. Administrative ascertainment can be seen a composite phenomenon. On one hand, it consists in the use of the modern state's monopoly of 'legal' force - the public power that *facit de albo nigrum* (to use the elegant expression employed by Romano Tassone himself). On the other hand, however, it shows the public power claiming to itself the exclusivity of the resolution of social contrasts according to the rules it has laid down. Therefore, it is at a material, not logical, level that the functionalist element is encountered and developed. The function of ascertainment and its product, public certainty, would thus be the instrument that the general order has set up to preserve its integrity in a situation of permanent social conflict that it recognises within itself. The author, moving on a systemic level, extends to all ascertainment proceedings the contentious character that had been attributed to decisions alone, as *species of the genus* ascertainment¹⁰⁵. If the resolution of uncertainty and the reduction of social complexity are among the primary aims of the state system, then the application of rules on the recognition of status, qualifications and/or titles is one of those decisions made upstream

¹⁰³ Reference is made for this to the example of the same author on Article 2909 of the Civil Code on substantive adjudication

¹⁰⁴ A. ROMANO TASSONE, *ibid.*; the theme of social conflict, under the species of '*social question*', has recently been reasserting itself in the constitutionalist debate, see on this point F. MEDICO, *Il ruolo della Carta di Nizza e la questione sociale: ci può essere solidarietà senza integrazione politica?*, in AIC Magazine, 3/2021, pp. 236-257

¹⁰⁵ See the encyclopaedic entries by M. NIGRO, *Administrative Decision*, in *Enciclopedia del Diritto*, VI, 1962, Giuffrè, Milan; M.S. GIANNINI, *Accertamento (constitutional and administrative law)*, in *Enciclopedia del Diritto*, I, 1958, Giuffrè, Milan

by the legislature. It reflects a positioning of interests at a higher level of the system, without losing its decision-making character. In fact, the legal system does not tend towards the ascertainment of reality in order to guarantee the exact and indefectible traceability of the certain to the real. It rather aims at reducing legal uncertainty as a reflection of social uncertainty. The state system, therefore, by intervening with its public law and the action of its apparatus, inserted in a democratic-representative circuit, resolves the conflict by establishing a determined order of legal relations.

This also explains why the legal system cannot tell 'truths'¹⁰⁶. By virtue of the vitalism that inhabits it¹⁰⁷, the legal system stands on the plane of certainties, which are always contestable - albeit with certain aggravated procedures (see the suit for forgery)¹⁰⁸.

It is no coincidence that the author insists on the usefulness of adopting *social impact* as a perspective angle to understand the difference between different types of certainties - public and private - and between the different instruments and subjects of their production. Only from this viewpoint would objects and effects acquire their different depths, even though they are similar in their conceptual profile. The relationship between the two would always live in tension, acquiring more or less clarity depending on adopting either the perspective of the legal relationship being assessed or, differently, that of its social impact. Once the necessary correspondence to the truth of what has been ascertained has been excluded, or rather, once the link between "truthfulness" and the efficacy of the certainty has

¹⁰⁶ On the 'truth function' in administrative law see G. BOTTINO, *Brevi considerazioni sulla funzione di verità nel diritto amministrativo*, in *Sociologia del diritto*, no. 1/2013, pp. 136-146

¹⁰⁷ With obvious reference to A. SALVATORE (ed.), M. HAURIUO, *La teoria dell'istituzione e della fondazione (Saggio di vitalismo sociale)*, Quodlibet, Macerata, 2019.

¹⁰⁸ Art. 221 c.p.c.; in criminal law too, "public faith" is a legal good that is debated, see G. COCCO, *Il falso bene giuridico della fede pubblica*, in *Riv. it. dir. e proc. pen.*, 1/2010, p. 68

been broken, it also collapses with reference to the "*operativity of the social value of certainties concerning intrinsic qualities and [...] of persons and 'goods of life'*".¹⁰⁹ Then, with reference to certainty-stability, it will be worth nothing the effectiveness of the ascertainment the correctness of the ascertainment.

Different considerations must be made for what Romano Tassone defines as '*certainty-reliance*'. On a social level, this cluster is relevant for their actual correspondence to the historical fact, otherwise the affirmed certainty will not produce effects. This different social impact would find its reasons in the fact that the legal system can only produce legal effects within its organisation, but not beyond. In tune with institutionalist theories, therefore, society is recognised as a distinct and qualitatively different sphere in which other, not necessarily legal, institutions can arise. Thus, there would be '*socially relevant qualities that are not available to the [legal] order, or rather, that cannot be constructed by means of stabilising ascertainment techniques*'¹¹⁰.

On the basis of these various arguments, we return to proposing a relocation of the means of production of certification according to the more canonical categories of public and/or private exercise of public functions and public utilities.

¹⁰⁹ Although distant from the present discourse, the theme of the limits of legal certainties and public power in expressing itself through them could find new topicality and, above all, new tensions and interesting profiles for future research if placed in the strand of *gender studies*. The relevance to the issue of legal certainties is evident in the case of gender reassignment proceedings, which concern the certificates contained in the civil status registers, on the subject, with attention obviously to the profile of judicial ascertainment, G. CARDACI, *Il processo di rettificazione dell'atto di nascita della persona intersex*, GenIUS, 1/2018, pp.40 ff.

¹¹⁰ "*qualità socialmente rilevanti non disponibili per l'ordinamento [giuridico] o meglio, non costruibili con tecniche di stabilizzazione dell'accertamento*" cf. *Ibid.* p. 882

The former would include all *certainty-stability*, regardless of the nature of the subject. The progressive increase of subjects in the productive context of public certainties would not in itself be able to reconfigure the categories elaborated on the level of theory. This would ultimately exclude the ability of the “normativity of fact” to modify the theory of public certainties.¹¹¹ On the contrary, *certainty-reliance*, on the basis of the limits of the legal system, would belong, and should belong, to private autonomy.¹¹²

Public intervention in this second sector, then, which is not structurally necessary, is not precluded but can be motivated on ideological grounds or by virtue of the '*Greater trust that, in principle, normally arouses the assessment made by a body in a position of institutional representation of collective interests, such as the*¹¹³. The presence of the public subject in the sphere of private autonomy, then, can find desirable spaces due to the democratic legitimisation of its action, as well as technical.

It therefore distances itself from the monist theory because it recognises the existence and validity of different orders - in other words, it recognises social autonomy. For similar reasons, it distances itself from the dualist theory because it does not stop at the

¹¹¹ The category is used here in a broad sense, but nevertheless relevant on the basis of the reflections offered on the 'normativity of the factual' by R. BIN, *Critica della teoria delle fonti*, FrancoAngeli, Milano-Roma, 2022, pp. 183 ff.

¹¹² The author here makes explicit reference to entrepreneurial freedom but, given the argumentative framework, one would think that this singular reference is merely descriptive rather than prescriptive in nature. In other words, from a theoretical point of view, there are no obstacles whatsoever to the entry of social actors not characterised by the organisational factors typical of entrepreneurship into the systems of production of public certainties.

¹¹³ “*maggiore fiducia che, in linea di massima, suscita normalmente l'accertamento compiuto da una istanza in posizione di istituzionale rappresentanza degli interessi collettivi, qual è l'amministrazione*”, Cf. R. ROMANO TASSONE, *ibid.*

multiplicity of markets but, by recognising spaces for social autonomy, takes note of the fragmentary nature of groups and the diversity, as well as conflictuality, of interests that each of them manifests. The theory under consideration, therefore, breaks free from both a monist and a dualist approach and can correctly qualify as pluralist.¹¹⁴ On the contrary, the public power, by virtue of his links to a democratic-representative circuit, can discover new spaces of action precisely in that autonomy.

Having reached this point, the study must trace back to public certainties the case of *blockcerts*. The aim of trying to isolate on a legal level the possible transformations that the use of new technologies, such as *blockchain*, may bring about in administrative law.

4. BLOCKCERTS AS A MEANS OF PRODUCING PUBLIC CERTAINITIES

Having clarified the technical aspects and identified some approaches to the topic of public certainties, an attempt can now be made to relate them with *blockcerts*.¹¹⁵

¹¹⁴ For an exhaustive reconstruction of the concept of pluralism see P. Costa, *Il pluralismo giuridico: paradigmi ed esperienze*, in *Quaderni fiorentini*, n.50/2021, in particular pp. 47 ff. On the concept in general see M. Corsale, *Pluralismo giuridico* [encyclopaedic entry], in *Enciclopedia del diritto*, XXXIII, Giuffrè, Milano, 1983; N. Matteucci, *Pluralismo* [encyclopaedic entry], in *Enciclopedia delle scienze sociali*, Treccani, Roma, 1996; F. Modugno, *Plurality of Orders*, [encyclopaedic entry], in *Enciclopedia del diritto*, XXXIV, Giuffrè, Milan, 1985; N. Roughan, *Pluralist Authority and the Relation between Plurality and Pluralism*, in P. Schiff Berman (ed.), *The Oxford Handbook of Global Legal Pluralism*, Oxford Academic, 2020

¹¹⁵ Leaving aside other types of problems, which also emerge from the use of *blockchain* for which see F. VOTTA, *cit.*, pp. 454 et seq. It should only be noted that with reference to data protection criticalities, in the case of *blockcerts*, the *Bestr* platform records - as mentioned - only the fingerprint of the original computer document, nothing more. No personal data are therefore provided, which remain in the possession of the university that creates and manages the *open badges*, in the same way as it would treat the respective paper certificates. *Nulla, vel minima, quaestio*.

It has been shown how the theory conveniently called 'monist' is grounded on a strict positivist and finalistic interpretation. It entails the substantial overlap between the certainties rendered by public subjects and those rendered by private subjects, attributing direct and/or indirect responsibility for their actions to the former. This theory immediately proves to be unsuitable for explaining the rationality of *blockcerts* because, as previously stated, only a part of the digital certificate is transcribed on the *blockchain* and this would overshadow, on a methodological level, the innovative side of the use of this technology. It would result in a simple service completely ancillary to the exercise of the certifying function of which the universities would be the holders. While reducing concerns about an infringement of the principle of legality, this interpretation would result in debasing the intentions of the universities themselves to autonomise users through the use of technologies, that are different and constitutively separate from their own offices. Another obstacle is dictated by the structural constitution of *blockchain* networks, which are based on decentralisation¹¹⁶, which would impose a *fiction iuris* to allow a 'community of miners' that is not and does not want to unite in a public subject.

The second theory identified, on the contrary, emerges as the most malleable and potentially capable of explaining the *blockcerts*. Indeed these could overcome the problem of the control of the secondary market of *reputational intermediaries*, and it is no coincidence that the spread of *blockchain* finds fertile ground precisely in those sectors currently governed by a network of specific certifying bodies. The *blockchain* would thus constitute a new system of certainty production based on trust, rather than on certainty, and on the possibility of constantly verifying the integrity of the certificate. The centrifugal thrusts of the legal system would not, however, be eliminated, with the probable risk of marginalising - moreover, in a completely *technical* way - the certification circuits of political legitimacy.

¹¹⁶ The possibility of tracing it back to a formal imputation centre in the United States is completely irrelevant to overcome these findings.

These, in fact, are already 'chasing' these new structures, but it is difficult to envisage happy developments, given that, to date, the only case of 'state *blockchain*'¹¹⁷ is the Chinese one, which, however, has political-administrative peculiarities that make it a model that is difficult to export elsewhere.

Finally, testing the pluralist theory means putting the *blockchain* phenomenon in its context. This approach, in essence, seems to restore some depth to the problem by first of all placing it in a dynamic, dialectical context, not determined by a temporal linearity. The theme would then be traced back to the relationship between material and political conditions of society and its institutions. A recurring element in the documents examined, in fact, is the potential for development and improvement of society's legal devices for relations - the contract¹¹⁸, for relations between private individuals, and the administrative measure, for those with the organised community - within it.¹¹⁹ If one does not want to adopt an anti-modernist approach, refractory to recognising the benefits of technological development, one must nevertheless recognise its ambivalence. Pluralist theory, in essence, recognises the plurality of social expressions but does not postulate their peaceful coexistence. At this level, it emerges that such technology, on the basis of their alleged insufficiency in the area of reliance is also applied in the area of legal certainty. In other words, the present conjuncture, indeed, *blockcerts* would act in concrete as instrument of disintermediation in the market of labour, facilitating the actual processes of flexibilization. The matter of *blockchains* brings back to the table the role of public power in the market, that it is no more a trace of representativeness but of facility.

¹¹⁷ Cf. F. VOTTA, *cit.*

¹¹⁸ See the focus on *smart contracts*

¹¹⁹ E.g. see most recently L. PREVITI, *La decisione amministrativa robotica*, Editoriale Scientifica, Naples, 2022

5. CONCLUDING REMARKS

The contribution, starting from the experience of *blockcerts*, first sought the justification of their use in the education sector through the analysis of the relevant documents, normative and otherwise. It emphasised the synergy between the European Union and the Council of Europe at the end of the last century to encourage the movement of students and *lifelong learning* paths to enable workers to keep up to date and thus avoid exclusion from the labour market.

Subsequently, analysing the most recent UNESCO and European Commission guidelines, it was noted that there is a tendency to make digitalisation a cross-sectoral subject and essential to enable institutional bodies to keep up with the rapid changes that technological developments bring to society. On this front, it was noted that considerable expectations are placed in *blockchain* to specifically enable higher education institutions to facilitate entry and retention in the labour market. In this section, the importance acquired by degrees, in their documentality, as an expression of the acquisition of skills and, above all, that of their circulation, was therefore highlighted.

In the second part of the contribution, however, the focus was turned to the framing of certifications within the broader theme of public certainty. Here an attempt was made to reconstruct some of the theories that have developed starting from the contributions of doctrine specifically dedicated to the subject. This study has revealed the various conceptions concealed behind a simple administrative act, such as certification, concerning not only the state in itself but of the state in relation to other systems and its relationship with society. Finally, in the third part, the summary of knowledge gained from the analysis of the documents with the reflections offered by the literature was made to try to offer a contribution to the qualification of DLTs within the legal system.

At the end of the analysis, there are no certain elements to assume a change in the function of certainties due to the use of *blockchain*. What seems reasonable to conclude, however, is that depending on the approach taken, peculiarities emerge that make *blockchain* an eccentric mode of certainty production, not yet fully assimilable to traditional

categorisations, despite attempts at positivization by legal systems. Bringing the application of *blockchain* back to monist theory, it has been observed how it would lose its innovative charge. Looking at the individual legal relationship between the administration and the platform, in fact, it could be, if anything, detected the different way of recording a piece of information - the digital footprint - but without being able to identify the subject to which part of the function is delegated. By adopting, instead, the second approach, the *blockchain* would be domesticated as a model, a new one, with which the general legal system recognises the production of private certainty. The third approach, finally, allowed to re-read the topic from the perspective of the conflicting relationship between different legal systems.

Abstract. *The article examines the use of blockcerts by public universities for the awarding of degrees. First their legal basis is examined and then an attempt is made to frame them within the paradigm of public certainty. The contribution therefore highlights some essential features of public certainty in order to assess whether or not they are affected by the use of new technologies.*