Research Articles - Invention Patents Equilibrium; Research Integration, Spatiotemporal Development Strategy, and Circular Economy

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Abstract: Scientific researchers usually announce their achievements in conferences, magazines, and patent offices. Our study was initiated to improve the ascending ratio of research article publishing versus invention patent filing. World development relies, amongst others, upon two innovation indicators, the volume of Patent applications and the number of Scientific journal articles. To avoid data inconsistencies for our research, we created a new dataset with e corresponding data from different sources like WIPO, OECD, EU, EPO, and SCIMAGO. All primary external data after our calculations created an externally published dataset. After annual and country data analysis, we found irregularities in specific areas like University commercialization, country-specific drawbacks, possible patent troll pursuit, and unexplained gratification for investments through patenting. These results need further clarification at regional patent offices. Our main target was to raise the applied research country impact through patentability. To achieve it, we propose several specific actions. The homogenization of paper/patent worlds under LATEX; the evolvement of the ”claims” patent document into a lawful Artificial Intelligence supplement; and a Patent Stock Exchange as a Circular Economy sustainable asset. Finally, after wandering around the fascinating world of articles and patents, we came to the political correctness of research publishing. We extend the scientist’s effort in three steps. First, the initial research is published in a Research Magazine. Simultaneously or after a maturity stage, a WIPO patent application must be filed. Finally, as the third step, an ”after-Patent” more mature research again in a research magazine.

Key-Words: Research and development, Information Retrieval, Industrialization, Patent commodification, Patent Claims, Evaluation in Education, Knowledge Management, Economy Circularity, University Commercialization, JEL C23; I22; O14; O30; O31; O32

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1 Introduction

Multidimensional Research synopsis headlines are:

- Research publication vs. invention patent ratio as an industrialization indicator.
- Several unexpected irregularities in the paper/patent ratio.
- New Patent and paper ”CLAIMS” entity adaptation to the Artificial Intelligence era.
- Unexpected-disappointing paper/patent ratio of 276 for high-ranked countries.
- University commodification through Patent rights and stock market platform.

1.1 Antithetical Wars for Science, Technology, and Development

Every human action, idea, proposal, or development affects present-day and future generations. Usually, there are imperfections, inconveniences, weaknesses, and failings. Nevertheless, human beings’ «free will» is the cornerstone of our life as described in the Bible book Genesis seventy-eight centuries ago. A long later, Socrates, in his Crito Dialogues, said that ”we do not care about the opinion of the Many”, [24]. Today, during Pascal’s times, Physics teaches us that universe’s internal balance keeps running

through opposing forces. Recently Econo-physics applied to regional development design, research, and patenting factors, [23], along with interdisciplinary approaches like sustainability and invention patents, [39].

Furthermore, there are increasing text similarities in papers and patents, [45]. Our initial study found the inconsistencies in the Research Articles vs. Invention Patent ratio as a statistically valuable phenomenon for economic development and international cooperation. The scientist, first of all, must be free to select his work vehicle. The selection has two decisions patent profit lovers and idealistic article publishing fanatics.

For our research, we attempt a summary of current definitions as seen from a strategic point of view:

- Google Search machine based on an accumulated statistical consultation of past search attempts.
- SCOPUS facilitates the research quality in an open association of publishers and magazines.
- WIPO (World Intellectual Property) invention Patent repository hosts world innovation and grants exclusive preferential rights to the academic community and companies.
- Federal Trade Commission's Bureau of Competition (USA), along with the Directorate-General (DG) for Competition (EU), both guard our free market economy with various antitrust laws.
- The European Association for Quality Assurance in Higher Education (ENQUA) and similar agencies worldwide facilitate educational accreditation.
- Libraries want everything under their control and power.

1.2 Multidimensional Interacted Forces

All of the above try to manipulate world research and innovation in a contradictory direction. Given the size of the above monopolies, in most cases, two enemies face antagonistic conflicts. The "tug of war" game is played with different participants according to the application and expected benefits.

All parties play the "tug" of Freewill, but everybody instead means internal only freedom. Google temporarily blocks certain subjects and ideas through GDPR, while ENQUA supports more standardization of Education than evolution and revolution. In some cases, academic freedom and democratic university functioning are violated by archaic, primitive actions, downgrading researchers into ochlocracy, [16]. George Bernard Shaw's quotation dominates the "tug" of research and teaching concerns, "He who can, does; he who cannot, teaches", [22]. The game of Research Publishing transferred from publishing to indexing. Competing parties here are SCOPUS, Google, Universities, and Libraries, while WIPO only watches its monopoly.

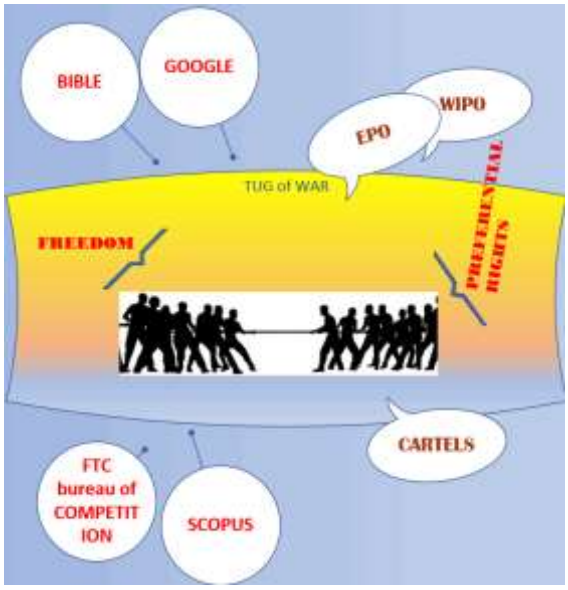

Fig. 1: Tug of war between Research Articles and Invention Patents

Finally, the perpetual "tug" of the politically correct ratio between antipodes of Research Articles and Invention did not gain awareness so far, with one exception, [28]. Papers and patents both look similar, but an abyss separates them. Figure 1 presents the players of the popular game of "tug of war". Many contesting powers join their forces accordingly:

- On the left side: Bible, SCOPUS, Google, Competition Authorities, Universities, and Libraries.
- On the right side are shown: WIPO, EPO, Global Monopolies, and Cartels.

1.3 From WIPO to Scopus through Google

Google Search is helpful in innovation and research, while patenting is adequate and only for brainstorming. Figure 1 shows various players in a push-pull schema. It is challenging to define bad or good players in the contest. The actual patent application requires an increasing level of free thinking and inspiration. Paper-Patent worlds have communicated since Google Scholar migrated recently superficially with patents. Various researchers cover simple Intellectual rights in Libraries to complex Intellectual properties ruling the industries of our world, [48]. A few answers and improvements over Intellectual property Legislation by Larsen, [29], are :

1. Research articles have short life primarily due

to the widespread indexing and delivering information like the Internet and Scopus.
2. Patent 20-year preferential rights are not social rights, which the consumer finally pays.
3. Open technology evolution.
4. Existing technology is an obstacle to new patents.

1.4 First WIPO, then SCOPUS

University commodification inspires researchers and professors to apply for an invention patent. For our research, we partially follow successfully the rule "FIRST WIPO THEN SCOPUS". Of course, it is not always the golden rule, but sometimes the ethical reward is much more than the prize of an actual 24 Carat gold bullion.

The most current research on the subject correlates higher levels of research productivity with commercialization, entrepreneurial orientation, crowdfunding, and crowdsourced research and development, [4], [6], [12], [32].

One of the following steps is severe research on article/patent impact similar to real-world data from Scopus and WIPO, [8].

2 Media and Methods

2.1 Article/Patent Analogy according to World Bank Indicators

Two major research articles for the paper/patent concept were studied. Pereira analyzed the same idea in a vast dataset with minimal patent coverage, [11]. WIPO reports that 15 million patents were in force globally in 2019, which is only 0.0014 percent of the corpus, and it was a giant work. In a linguistics rime, Ferreira conducted more generic research with significant findings in University and company patent filing behavior, [15]. In addition, a recent study proved that the h-index evaluation method needs reconsideration, [25]. We focus on the temporospatial mode for the relationship between the two central research pylons: research articles and invention patents.

The World Bank released a complete list of economic indicators for 189 countries, [51]. Their initial data fed our dataset with numerous sheets in the first (1) data file, [53]. We avoided preprocessed data, and we used raw numeric data in our dataset, isolating only two indicators:

- Number of Patent applications, resident's indicator (code 2012)
- Number of Scientific and technical journal articles (code 2012)

Simple calculations of how many papers in a country in a given year correspond to a filed patent. The results were verified through textual analysis of the European Patent Office, SCIMAGO site, Research Funding agencies, and professor opinion.

The ten countries with the maximum paper/patent ratio are listed in table 1. These countries are not the worst and, of course, not the best. Every nation has its development strategy, and OECD and WIPO SCIMAGO retain only a consultancy role. A worldwide view of the paper/patent indicator is in figure 2. The results were astonishing and far beyond expectations. To evaluate the results, we proceed with a more accurate statistical method.

Table 1. The ten countries with the worst Paper/Patent ratio.

country	ratio
Pakistan	34.3
Tunisia	27.9
Portugal	24.8
Algeria	22.5
Belgium	20.6
Venezuela, RB	19.0
Lithuania	19.0
Greece	18.5
Saudi Arabia	17.9
Bangladesh	17.8

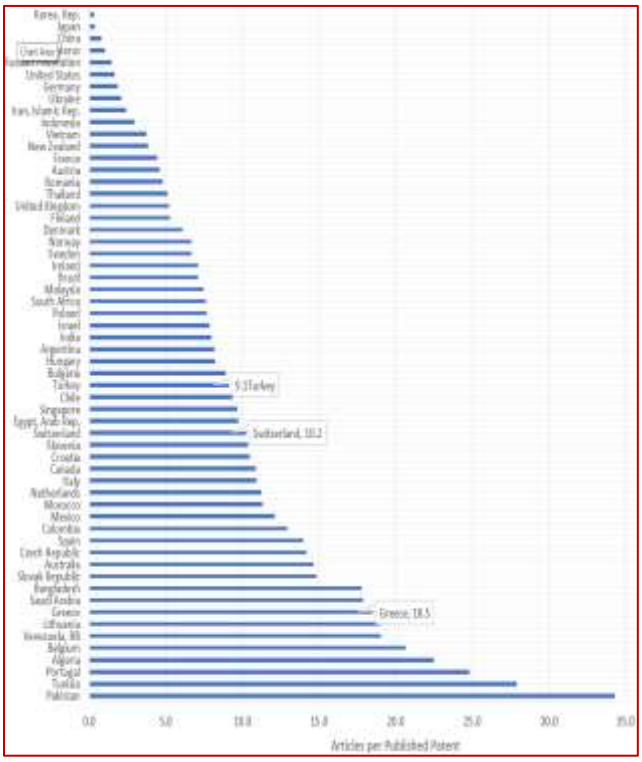

Fig. 2: Countries classification according to Article/Patent Ratio (WORLD bank)

2.1.1 Patent/Paper Ratio Normalized with Min-Max Scaling Methods

A more appropriate approach to compare patents with papers is to normalize the data with the min-max scaling method. The normalized score calculation is: X new = (X — X min)/ (X max — X min). Their initial data fed our dataset as Python authoring in the fourth (4) data file, [53]. Figure 3 indicates the general layout where all countries are in the lower right corner, and the best countries are high above the left. Countries like the USA, China, Japan, Korea, and Germany differentiate from the others. For example, USA and China have higher scores for patents and papers than others. In figure 4, the ten countries with the best and worst scores are shown.

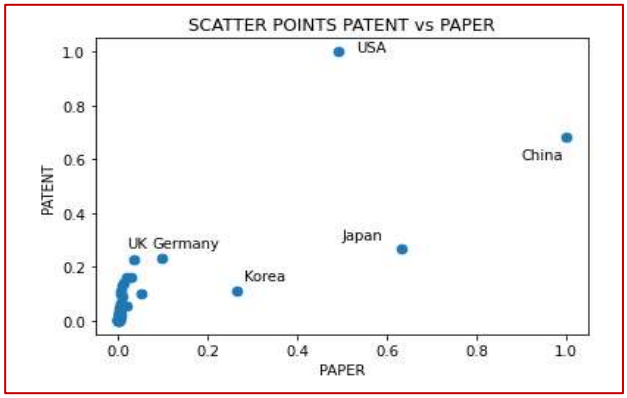

Fig. 3: Scattering points with normalized score calculation for Patent/Article (WORLD bank data)

Greece's position is 27th of 56 countries, just in the middle of the score tables. Greece elevated from the previous last-but-two place in the universe to a descent mid-place in the world ranking. Unfortunately, Greece's position is getting worse in the following statistical category. Fortunately, from advanced funds management view, Greece is in the most admirable position in case of adoption, not current, not next but "after next-generation technology".

	Country	score
0	China	1.68474
1	United States	1.49009
2	Japan	0.90015
3	Korea, Rep.	0.37730
4	Germany	0.33174
5	United Kingdom	0.26274
6	France	0.19075
7	India	0.17927
8	Russian Federation	0.15509
9	Italy	0.15345

	Country	score
0	Venezuela, RB	0.00014
1	Bangladesh	0.00075
2	Vietnam	0.00101
3	Lithuania	0.00194
4	Belarus	0.00208
5	Morocco	0.00242
6	Algeria	0.00309
7	Bulgaria	0.00344
8	Slovenia	0.00463
9	Tunisia	0.00514

Fig. 4: Normalized score best and "worst" countries for patent/paper ratio

2.2 Article/patent Ratio according to Global Innovation Index

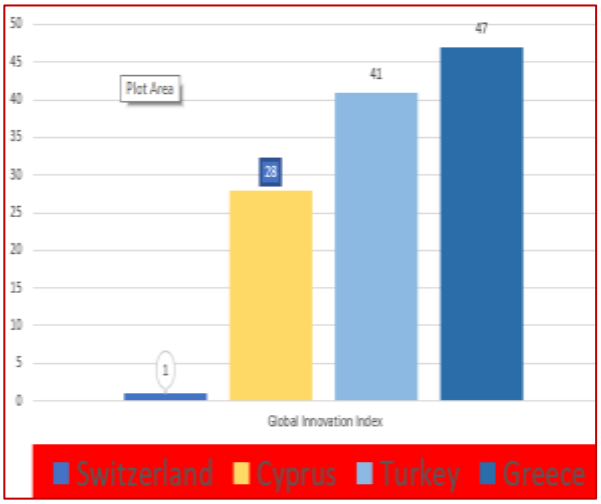

Fig. 5: Worldwide Countries' paper/patent ranking

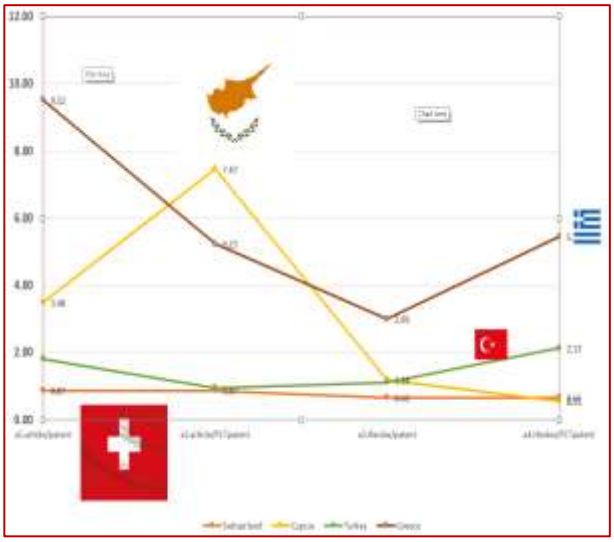

Fig. 6: Selected Countries article, H-index, PCT patent ratio (Global Innovation Index)

The Global Innovation Index (GII), released in September 2021, provides the current status of global innovation ecosystem performance in more than 130 economies, [13]. The GII data fed our dataset with numerous sheets in the second(2) data file, [53]. The main difference from the previous dataset is that data are given in bn PPP USD GDP. From this source, we select three Innovation Output Sub-indexes:

- Indicator code 6.1.2.PCT patents by origin/bn PPP USD GDP.
- Indicator code 6.1.4.Scientific and technical articles/bn PPP USD GDP.
- Indicator code 6.1.5.Citable documents H-index.

Four different countries were selected for presentation purposes. Switzerland holds the top worldwide position in GII classification, Turkey and Greece have similar economies, and Cyprus presents an astonishingly excellent ranking. Figure 5 shows the initial country ranking in the GII classification. Figure 6 demonstrates the country performance ratio in the four generated sub-indexes for the four countries.

1. article/patent
2. article/PCTpatent
3. H-index/patent
4. H-index/PCTpatent

The graph maintains our knowledge from the previous methodology with minor exceptions:

1. Switzerland is the only innovation power in the universe.
2. Turkey, in position 41 in the world, achieves an outstanding paper/patent ratio.
3. Cyprus, in position 28 on the innovation index, is very far away in this context.
4. From the world overall position 47, Greece has five times worse numbers than the Swiss and two than Turkey.

The authors watch similar results in area conferences and business opportunities daily to compare research results with real-world economic and political development actions.

2.3 Research Articles and Granted Invention Patents Ratio according to European Patent Office

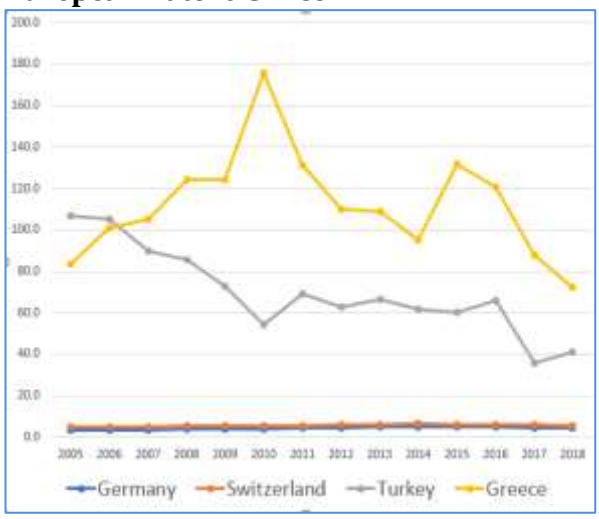

Fig. 7: European Patent Office paper/filed patent ratio for selected countries

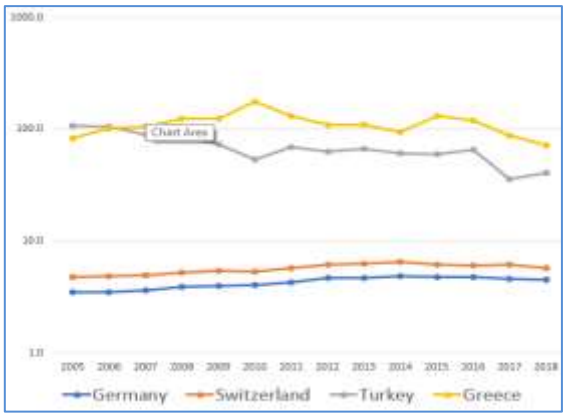

Fig. 8: European Patent Office paper/patent ratio in Logarithmic scale

Patents data received from OECD iLibrary, [37], and processed through the dataset file number three (3), [53]. We keep the Research article's annual numbers the same as the previous calculation, mostly SCIMAGO tables. For patent data, we investigated two sets with data collection started in the year 1978 in very few countries:

1. Patent applications to the European Patent Office (EPO);
2. Patents granted by the EPO;

Not all patent quotations represent accurate intercountry accurate data. The dataset counts various patenting options: Patents filed to EPO, Patents granted by EPO, filed to USPTO, granted by the USPTO, filed under PCT, and Patents belonging to Triadic Patent Family. There is an overlapping here, with patents filed to three bureaus, but this is not crucial for our research. Regional EPO offices have the exact figures but our data set is still a fast, very close estimation. For our preliminary study, we selected the filed (not granted) patents in EPO from four Countries: Germany as the leader in everything, Switzerland as the top Innovation Country, Türkiye, and Greece. Figure 7 describes the paper/patent ratio for a decade. Likewise, a logarithmic presentation in figure 8 shows the vast difference of over two orders of magnitude.

2.4 Paper/Patent ratio Irregularities for Greece

Usually, University management finds patent data inaccurate. We use WIPO, SCIMAGO, and internal

Table 2. Article vs. Patent ratio for GREECE

year	granted Patents	Articles	ratio
2005	43.5	09226.77	212
2006	39.2	10605.54	270
2007	39.8	11151.57	280
2008	46.7	11817.55	253
2009	47.3	12102.77	255
2010	25.6	11994.49	468
2011	46.7	11958.26	256
2012	57.0	11924.42	209
2013	56.5	11881.18	210
2014	56.2	11664.94	207
2015	37.7	11237.15	298
2016	26.2	11156.77	425
average			278

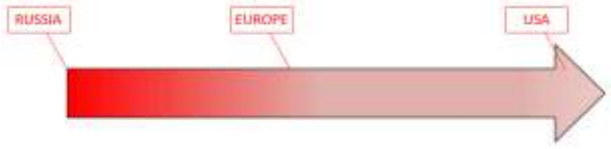

Fig. 9: Globe research Privatization arrow

Mendeley datasets. They all have old patent data. The latency was expected for many reasons. The patent filing procedure for the first 18 months is not public. Also, the average time to acquire a patent is three years. After that time frame, national agencies report data to the European patent Office. Finally, data arrive at United Nations and OECD to disseminate to the world authorities, [53]. We use a more reliable ”granted data” indicator within the same EPO dataset. Since the number of published articles remains the same, the granted patents in EPO offices are pretty different, [37]. Table 2 displays Greece’s annual rate for granted patents.

The research article versus granted Greek Patents ratio for 2005-2016 is an astonishing number of two hundreds-seventy-six. For the last decade, 277 Greek scientists have worked on Academic Research. The first two hundred seventy-six got accreditation from SCOPUS for their 276 papers, and only one (1) has a successfully granted patent from EPO. Numbers cannot always tell the truth, but such irregularities are valuable for research policies.

3 New Media and Methodology

The current research’s next step is to connect the association between product innovation and marketing innovation, [43]. We propose three distinct development steps as a result of the above analysis:

1. Patents as a Sustainable Asset
2. Invention Patents Stock Exchange
3. Latex for Patent Claims

3.1 Patents as a Sustainable Asset of Circular Economy

Sustainability Journal defined new methods in patent policy evaluation research in a particular issue, [17].

On the other hand, the research deteriorates patenting in the strictly University environment, [49]. On the other hand, the subject is a vast and absolute necessity for marketing and management in the Academic domain. Therefore many scientists presented more detailed works, [9], [19], [27].

On the center of all the Oceans, the USA dominates, as a mother-born country, the Patent industry with advanced privatized policies, [14]. In figure 9, the arrow shows research privatization growing. An empirical principle is that in the straight geographical longitude line from the church of Arkhangelsk Michael in Okhotnik to the Westernmost point of the USA, University and PRI research funding from State dissolves:

- In Okhotnic Russia, the powerful central government funds Universities and PRCs (Public Research Centers) with 100 percent of the research funds.
- In Anchorage, USA, funding for research and patents is mainly funded by private companies in private or public strategies

The situation in Russia East evolved slightly to the dominant model. A recent study indicated that the influence of expenditures on technological innovations and products is growing by Western standards. [42].

USA leads the research funding with six product development steps, as displayed in figure 10, as a result of R-D sales and all over again, even recursively, [18]. Patents lifetime Infographics include:

1. Basic and applied research.
2. Patent filing.
3. Sell the whole patent.
4. Allocate partial production rights.
5. Profit from commercial activity.
6. Part of the profit is assigned all over to step 1.

In some countries and territories, instead of such refeeding action, they prefer to keep the research results on a beautiful, glorious bookshelf. As a result, these countries are most likely to retain high paper/patent ratings. It is obvious that research articles are pure academic exercises, and nobility comes after ”hateful money”.

Table 3. Research Articles and Invention patents integration under LaTeX

Research Articles	common tags	Invention Patent
-	Research Title	-
Short title	-	-
-	print agency	-
-	Abstract	-
JEL (partial)	Keywords	IPC
-	References	in text ref
NO	NEW claims	Claims
intext	Drawing	external file
Images	-	NO
Tables	Tables	tables in text
Dataset	-	NO
Citation	-	NO
DOI	-	No DOI
NO	-	Payment Schema

3.2 Invention Patents Stock Exchange

The original Environmental management Life cycle assessment (LCA) ISO 14040 delineated renewable tangible resources a century ago. Patent Life Cycle Assessment (PLCA) borrows the concept from the ISO definition, [31], and adapts to the supernatural world with minor changes to the original definition. Another study connects the ”Society 5.0” intellectual capital with the economic security of enterprises, [21]. By no means the Inventions Patents Stock Exchange is based on Blockchain technology. The days of the rich and anonymous passed the way, with negative, [10], and positive opinions, [40]. The PLCA stock market must be a WIPO-owned stock market from all these definitions. It would be the first United Nations property stock market. There automatically, everyone could sell and purchase innovative items like:

1. identifying opportunities to improve the holistic technology performance of machinery, factories, and consumer products at all stages of their life,
2. informing decision-makers in Worldwide Authorities, international industry, and local government,
3. Irrevocably adopting existing and innovative indicators for patent evaluation techniques,
4. Creation of an invention patent stock exchange for profitable intellectual property trading.
5. Integration Marketing with its various forms one-to-one marketing, and Quantum Marketing.

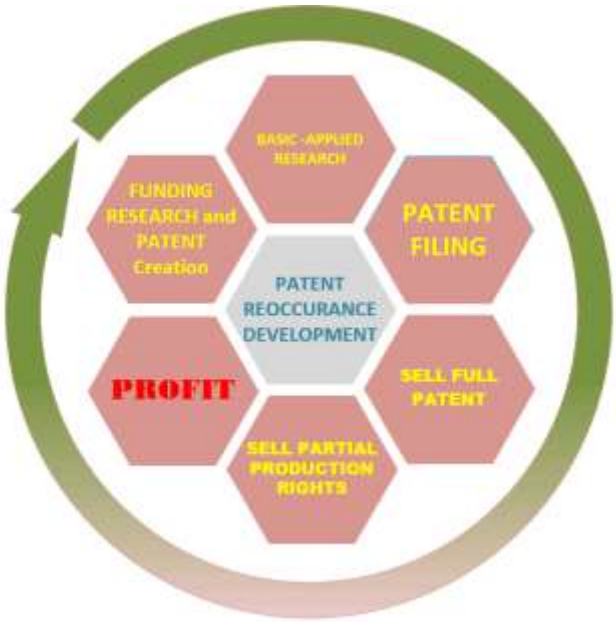

Fig. 10: The Patent Life Cycle Assessment

Such a patent stock market’s ”LCA” feature increases total patent awareness. Production companies could use old technology or technology to offer new products and services. We propose various forms of intellectual space representation. The most recent uses mathematical modeling, innovation and project management, and organizational design, [36]. A replica of any Stock Exchange is enough but QFS, [7], [40], would boost the new patent stock market with new monetary tools.

4 Discussion

4.1 LaTeX for Patents

For similar research, [52], we found unforeseen advantages and new options for email in university research, [38]. Since a Simple Mail Transfer Protocol (SMTP) has many applications, something more complex like LATEX and Artificial Intelligence could start a revolution. One of the differences between Publishing Articles and Patents is authoring procedures, [1], [5]. The authoring and writing timeline started in 1968 with ”ed, vi, nroff and troff” and finished in 1983 with LaTeX and Microsoft Word. One step back and two ahead, Elsevier recently adopted
LATEX is the primary format for almost all Research Articles in its dominant Research Space, [26]. A small preliminary homogenization step of the search and patent worlds denotes a giant step for integrating Business and Science. A comparison of a unified research layout for papers and patents

appears in table 3. The standard entity chapters are in the middle, while the right and left sides present unique existing entities. The old LaTeX is closer to our new unified space Proposal standard for papers and patents.

The benefits of such a unification/migration/evolution, [44], are:

- A practical step for a scientist writing in LaTeX only for research articles and invention patents.
- A pleasant unified standard text layout for all scientists without blatant exaggerations.
- A major step to knowledge retrieval systems that could handle the chunk of information more efficiently.
- A giant step for Artificial Intelligence systems with automated interrelation and engineering, [2].

We do not expect this radical proposal to be endorsed initially. Small steps in Scopus and WIPO are possible, but we propose evolution instead revolution.

4.2 Patent Claim Rationalization

The above LaTeX table indicates the article's superiority over patents in meaningful discourse in all aspects of research dissemination. The main issue here is that the Patent "Claims" structure is legacy, archaic, older than two centuries, but still valuable, [35], [47]. Therefore, the adoption of a new claims section is necessary, [33], to:

- Boost productivity through patent rights selling.
- Facilitates the Understanding between researchers.
- Search in information systems and semantics in Artificial Intelligence engines.
- Digital transformation actions.

The claims document/sector for patent/paper needs adaptation to our times in a more structured form. The patent Claims section needs reconsideration. For example, in a recent patent, our seven claims were violated initially by the evaluator agency from a similar patent with seven pages of claims, [3]. In that case, a significant company attempted, in an aggressive claim, the whole universe, [20]. Apart from this story, there are very effective ways to formulate a decent claim document, [30]. The Lee and Hsiang method could be studied as the initial step to reconfigure the claims section of future patent applications. The claims document/sector for patent/paper needs adaptation to our times in a more structured form. We work currently on a proposal to the international community to reform the "Claims Document" according to this research:

- Focus more on Law aspects than technology.
- Based on Info-Linguistics existing and future knowledge.
- The automatic formulation of a knowledge tree based on WIPO numbering, [50].
- Under a micro-funding development Schema.

We propose a claims chapter in the research magazine industry, primarily due to the need for a governing body. Since patent (and article) claims started, they will evolve into a huge business.

4.3 Population as an Asset for Country Quotation

A great Global Currency Reset is a possible monetary situation with many thrilling actions and questions, [41], [52].

According to internal documents, one solution to the international debt crisis is to use a country-specific formula for a quota in the new monetary system, [7], [46]. Assets include classic ground and gold assets, population, and other resources. At this point in history, a specific citizen education level would be needed. Papers and Patent indicators in absolute and relational numbers will be a necessity.

5 Conclusions

We disagree with Marshall McLuhan that "technologies are the messages", [34], but this does not change the preferences of the research community that effectively believe that the medium is the message. Researchers express their radical scientific opinion in a magazine, but they all refuse to shift to a despicable profit option in a Patent Office.

The article/patent ratio analyzed above in time and space revealed a helpful conclusion. We recommend actions to be adopted:

- University commercialization through patent submission in a handful of countries is necessary. Greece, for example, lives once more in his Pericles Golden Age with significant research achievements while assigning innovation and development to other less glorious countries.
- Generally, first-class countries remain first in all indicators, but the paper/patent indicator rings the bell in several cases.
- Many irregularities are found in statistical data that point out dangerous economic coincidences in the future due to pap/pat anomalies.
- Ratio inconsistency is also caused by statistical data adaptation along various collecting methods and systems.

We propose three large-scale improvements in the research and patent market:

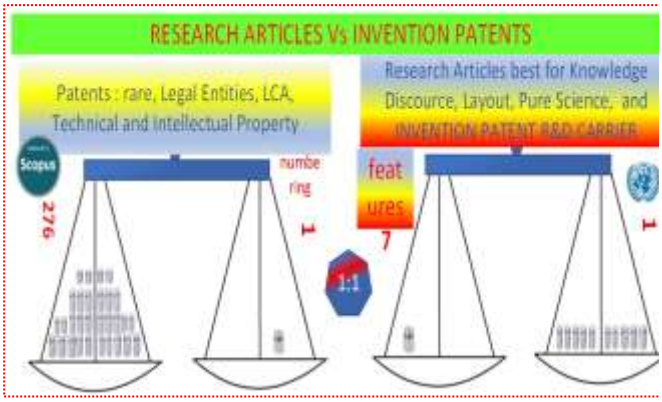

Fig. 11: Management EQUILIBRIUM Graphical Abstract

1. The Patent Stock Exchange market, an exact copy of any other Stock market.
2. The Patent Stock Exchange with the QFS investment money market.
3. Research Article and Invention Patent migration and endorsement of typical or similar research appearance.
4. Regeneration of "Claims Document" in Patents in a modern computer-supported Artificial Intelligence entity.

To achieve this result, we evaluated several options. Our final opinion is that research will continue to be based on Scopus but with the life-preservation attributes that invention patents have. In conclusion, the researcher's effort must follow three steps. The first step is when he publishes preliminary research in Scopus Magazine. The second must be a profitable WIPO patent application. The final third step is again a reputable Research Magazine hosting an "after-Patent" more mature researchopinion.

These proposals are not a global management solution. Moreover, the commercialization has drawbacks like Research commercialization, problems in the patents office from increased patent production, and Science hetero-determination.

The graphical abstract 11 presents by exaggerating one patent with 276 Scopus (relatively "light") articles but altogether elevates Scopus paper payload Seven times more than United Nations' WIPO.

References:

[1] Stephen Adams. Is the full text the full answer? – considerations of database quality. *World Patent Information*, 54:S66–S71, 2018. Best of Search Matters.

[2] Sam Arts, Jianan Hou, and Juan Carlos Gomez. Natural language processing to identify the creation and impact of new technologies in patent text: Code, data, and new measures. *Research Policy*, 50(2):104144, 2021.

[3] Zisopoulos Athanasios. Airborne pipeline docked to an earth reservoir to deliver water over long distances for aerial firefighting and irrigation, 2017.

[4] Nisa Yazici Aydemir, Wan-Ling Huang, and Eric W. Welch. Late-stage academic entrepreneurship: Explaining why academic scientists collaborate with industry to commercialize their patents. *Technological Forecasting and Social Change*, 176:121436, 2022.

[5] H. Bechtel, I. Zoeke, H. Marhan, and H. Klein-schmager. Online patent searching — useful, but still in its infancy. *World Patent Information*, 7(1):68–82, 1985.

[6] Susanne Beck, Tiare-Maria Brasseur, Marion Poetz, and Henry Sauermann. Crowdsourcing research questions in science. *Research Policy*, 51(4):104491, 2022.

[7] Joe Biden. Fact sheet: President Biden signed an executive order to ensure responsible digital asset development, White House, 2022.

[8] Jorge Camargo, Maximiliano González, Alexander Guzmán, Enrique ter Horst, and María Andrea Trujillo. Topics and methods in economics, finance, and business journals: A content analysis inquiry. *Heliyon*, 4(12):e01062, 2018.

[9] Shu-Hao Chang. The technology networks and development trends of university-industry collaborative patents. *Technological Forecasting and Social Change*, 118:107–113,2017.

[10] Victor Andrade Da Silveira, Stella Regina Reis Da Costa, and David Resende. Blockchain technology in innovation ecosystems for sustainable purchases through the perception of public managers. *Journal: WSEAS TRANSACTIONS ON BUSINESS AND ECONOMICS*, pages 790–804, 2022.

[11] Fernanda de Carvalho Pereira, Helder Gomes Costa, and Valdecy Pereira. Patent filings versus articles published: A review of the literature in the context of a multicriteria decision aid. *World Patent Information*, 50:17–26, 2017.

[12] Claudia Aparecida de Mattos, Kumiko Oshio Kissimoto, and Fernando José Barbin Laurindo. The role of information technology in building virtual environments to integrate crowdsourcing mechanisms into the open innovation process. *Technological Forecasting and Social Change*, 129:143–153, 2018.

[13] Soumitra Dutta, Bruno Lanvin, and Sacha Wunsch-Vincent. *Global innovation index 2020*. WIPO, Johnson Cornell University, 2020.

[14] Mohammed Abdul Fasi. An overview of patenting trends and technology commercialization practices in the university technology transfer offices in the USA and China. *World Patent Information*, 68:102097, 2022.

[15] Rafael Batista Ferreira, Micael Rosa Parreira, and Joao Carlos Nabout. Is there a concordance between science and technology in natural science? Mapping the relationship among the number of papers and patents from research on cerrado Norwegians. *World Patent Information*, 69:102108, 2022.

[16] SERGE. GALAM. *SOCIOPHYSICS: A Physicist's Modeling of Psycho-political Phenomena*. SPRINGER, 2016.

[17] Jiafeng Gu. Effects of patent policy on outputs and commercialization of academic patents in china: A spatial difference-in-differences analysis. *Sustainability*, 13(23), 2021.

[18] Roberto Rivas Hermann, Mario Pansera, Leti- cia Antunes Nogueira, and Marko Monteiro. Socio-technical imaginaries of a circular economy in governmental discourse and among science, technology, and innovation actors: A Norwegian case study. *Technological Forecasting and Social Change*, 183:121903, 2022.

[19] Sam Horner, Nikolaos Papageorgiadis, Wolfgang Sofka, and Sofia Angelidou. Standing your ground: Examining the signaling effects of patent litigation in university technology licensing. *Research Policy*, 51(10):104598, 2022.

[20] Kenneth Guang-Lih Huang, Can Huang, Hui-jun Shen, and Hao Mao. Assessing the value of china's patented inventions. *Technological Forecasting and Social Change*, 170:120868, 2021.

[21] MISHCHUK Ievgeniia, Riabykina Yekateryna, Ushenko Natalya, Hamova Oksana, Tkachenko Sergii, and Yastremska Natalia. Intellectual capital as a factor forming economic security of enterprises in society 5.0. *WSEAS Transactions on Business and Economics*, 19:269–277, 2022.

[22] Toni A Ihme and Jens Muller. "he who can, does; he who cannot, teaches?": Stereotype threat and preservice teachers. *Journal of Educational Psychology*, 107(1):300, 2015.

[23] Bojana Jokanovic, Bojan Lalic, and Milos Milovancevic. Economic development evaluation based on science and patents. *Physica A, Statistical Mechanics, and its Applications*, 481:141–145, 2017.

[24] Benjamin Jowett. The internet classics archive Crito by Plato.

[25] George Kaptay. The k-index is introduced to replace the h-index to evaluate better the scientific excellence of individuals. *Heliyon*, 6(7):e04415, 2020.

[26] Leonie Koch and Martin Simmler. How important are local knowledge spillovers of public R&D, and what drives them? *Research Policy*, 49(7):104009, 2020.

[27] L.G. Kravets. Fifty years of patent information centers in Russia. *World Patent Information*, 33(3):282–285, 2011.

[28] Seokbeom Kwon and Alan C. Marco. Can antitrust law enforcement spur innovation? Antitrust regulation of patent consolidation and its impact on follow-on innovations. *Research Policy*, 50(9):104295, 2021.

[29] Randall Larsen. Intellectual property law. In Donald H. Johnston, editor, *Encyclopedia of International Media and Communications*, pages 429–449. Elsevier, New York, 2003.

[30] Jieh-Sheng Lee and Jieh Hsiang. Patent claim generation by fine-tuning. Open AI GPT-2. *World Patent Information*, 62:101983, 2020.

[31] Won Sang Lee and So Young Sohn. Effects of standardization on the evolution of information and communications technology. *Technological Forecasting and Social Change*, 132:308–317, 2018.

[32] Manuela Lucchese, Natalia Aversano, Ferdinando Di Carlo, and PAOLO TARTAGLIA Polcini. Assessing the intellectual capital and related performance in the teaching process using FES models first evidence in Italian universities. *WSEAS Transactions On Business And Economics*, 17:1–20, 2020.

[33] Alan C. Marco, Joshua D. Sarnoff, and Charles A.W. de Grazia. Patent claims and patent scope. *Research Policy*, 48(9):103790, 2019.

[34] Marshall McLuhan and Quentin Fiore. The medium is the message. *New York*, 123(1):126–128, 1967.

[35] Antonio Messeni Petruzzelli, Daniele Rotolo, and Vito Albino. Determinants of patent citations in biotechnology: An analysis of patent in- fluence across the industrial and organizational boundaries. *Technological Forecasting and Social Change*, 91:208–221, 2015.

[36] Batova Marina Mikhailovna and Baranova Irina Vyacheslavovna. Information technology knowledge management in the system of interaction of educational and scientific-production structures. *WSEAS Transactions on Business and Economics*, 16:545–551, 2019.

[37] OECD. Patents by main technology and by international patent classification (IPC). 2014.

[38] Mario Pagliaro. Enhancing the use of email in scientific research and the academy. *Heliyon*, 6(1):e03087, 2020.

[39] Linda Ponta, Gloria Puliga, Raffaella Manzini, and Silvano Cincotti. Sustainability-oriented innovation and co-patenting role in the agrifood sector: Empirical analysis with patents. *Technological Forecasting and Social Change*, 178:121595, 2022.

[40] Volks Netzwerk Team. QFS Quanten Finanzsystem Internationales Wahrungs System. https://www.volksnetzwerk.de , https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi0mrf42sD7AhWjS_EDHVzmAjoQFnoECAsQAQ&url=https%3A%2F%2F8000lichter.com%2Fget_file.php%3Fid%3D34876656%26vnr%3D461473&usg=AOvVaw1AB839ESeAKPShGl-yWzcs , as retrieved 27/11/2022.

[41] Klaus Schwab and Thierry Malleret. Covid-19: The great reset. 2020.

[42] Olga P Smirnova, AO Ponomareva, OM Barbakov, and Marina V Vinogradova. Model- ing of the innovation activity of Russia's regions. *WSEAS transactions on business and economics*, 16:403–413, 2019.

[43] Lewandowska Malgorzata Stefania. Blending innovation types in order to achieve international competitiveness. Multi-country approach. *Journal: WSEAS TRANSACTIONS ON BUSINESS AND ECONOMICS*, pages 1223–1234, 2021.

[44] Kun Su, Ji Wu, and Yue Lu. With trust, we innovate evidence from corporate rd expenditure. *Technological Forecasting and Social Change*, 182:121834, 2022.

[45] Yasutomo Takano and Yuya Kajikawa. Extracting commercialization opportunities of the internet of things: Measuring text similarity between papers and patents. *Technological Forecasting and Social Change*, 138:45–68, 2019.

[46] Aria Thomas. Quantum financial system: The basic overview, 3 2022.

[47] Xuesong Tong and J. Davidson Frame. Measuring national technological performance with patent claims data. *Research Policy*, 23(2):133–141, 1994.

[48] Amy J.C. Trappey, Mihai Lupu, and Josip Stjepandic. Embrace artificial intelligence technologies for advanced analytics and management of intellectual properties. *World Patent Information*, 61:101970, 2020.

[49] Elco van Burg, Jingshu Du, and Jannigje Gerdien Kers. When do academics patent outside their University? An in-depth case study. *Technovation*, 107:102287, 2021.

[50] WIPO. IPC international patent classification publication.

[51] World-Bank. Scientific and technical journal articles - tcdata360, 2022.

[52] Athanasios Zisopoulos. Midas, repository with "under the pillow gold" using unique antipodal identification of golden coins for regional development and monetary applications, 2022, *International Geographical Education Online*, 12(1):628–643, 2022.

[53] Athanasios Zisopoulos and Georgia Broni. Invention patents vs. research articles ratio study on WIPO, OECD, EU tables. *Mendeley Data*, v1, 2022.

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

Athanasios Zisopoulos worked on the initial dataset creation data mining and curation in all chapters, along with the Economy circularity concept and Latex and patent stock exchange options.

Georgia Broni inspired the free will concept in chapter 1, co-authored the Mendeley dataset, and she partially supported overall authoring and chapter 5. Nikos Kartalis worked on chapter 2 on Scopus systems, established the Stock exchange concept in chapter 4.4, and had comprehensive scientific support.

Konstadinos Panitsidis worked on the world bank indicators in chapter 2, Dataset and Latex programming.