EMPRAD ENCONTRO DOS PROGRAMAS DE PÓS-GRADUAÇÃO PROFISSIONAIS EM ADMINISTRAÇÃO

BIBLIOMETRIC REVIEW ABOUT US-GAAP AND ASC 830: A CONTRIBUTION WITH AN ARTIFICIAL INTELLIGENCE APPROACH

Alexsandro Toaldo - Universidade Presbiteriana Mackenzie

Arnaldo R. A. Vallim Filho

Resumo

Este artigo tem como objetivo identificar o que está sendo pesquisado sobre os US-GAAP no mundo, mais especificamente sobre o pronunciamento contábil ASC 830 (Foreign Currency Matters), quem está produzindo, quais são as pesquisas de maior impacto; quais periódicos mais veiculam artigos sobre o assunto e quais possuem maior fator de impacto; os períodos de maior produção sobre o assunto, instituições e locais. A metodologia aplicada baseou-se na pesquisa bibliométrica, utilizando como banco de dados o sistema Web of Science (WoS) do Institute for Scientific Information. Foram encontrados 219 artigos para o termo de busca “US-GAAP” e 0 (zero) artigo para o termo “ASC 830”, nas quatro principais categorias de WoS relacionadas ao assunto. Além da análise, o WoS não foi capaz de responder a questões importantes. Para tentar suprir essa lacuna, os autores confiaram na Inteligência Artificial, por meio do software Rapid Miner®. Os resultados foram uma árvore de decisão regressiva, demonstrando que de 219 artigos, apenas 30 eram sobre US-GAAP.

Palavras-chave:1. USGAAP; 2. ASC 830; 3. Foreign Currency; 4. Artificial Intelligence.

Abstract

This article aims to identify what is being researched about US-GAAP in the world, more specifically about the accounting pronouncement ASC 830 (Foreign Currency Matters), who is producing, which are the most impactful research; which journals most convey articles on the subject and which have the most impact factor; the periods of greatest production on the matter, institutions and locations. The applied methodology was based on bibliometric research, using as a database the Web of Science (WoS) system of the Institute for Scientific Information. It was founded 219 articles for the search term “US-GAAP” and 0 (zero) article for the term “ASC 830”, in the four main categories of WoS related to the subject. Besides the analysis, WoS was not able to respond important questions. To try to address this gap, the authors relied on Artificial Intelligence, using the software Rapid Miner®. The findings were a regressive decision tree, demonstrating that out of 219 papers, only 30 were about US-GAAP.

Keywords: 1. USGAAP; 2. ASC 830; 3. Foreign Currency; 4. Artificial Intelligence.

Bibliometric review about US-GAAP and ASC 830: A contribution with an Artificial Intelligence approach

Revisão bibliométrica sobre US-GAAP e ASC 830: Uma contribuição com uma abordagem de Inteligência Artificial

ABSTRACT

This article aims to identify what is being researched about US-GAAP in the world, more specifically about the accounting pronouncement ASC 830 (Foreign Currency Matters), who is producing, which are the most impactful research; which journals most convey articles on the subject and which have the most impact factor; the periods of greatest production on the matter, institutions and locations. The applied methodology was based on bibliometric research, using as a database the *Web of Science (WoS)* system of the Institute for Scientific Information. It was founded 219 articles for the search term "US-GAAP" and 0 (zero) article for the term "ASC 830", in the four main categories of *WoS* related to the subject. Besides the analysis, *WoS* was not able to respond important questions. To try to address this gap, the authors relied on Artificial Intelligence, using the software Rapid Miner®. The findings were a regressive decision tree, demonstrating that out of 219 papers, only 30 were about US-GAAP.

Keywords: 1. USGAAP; 2. ASC 830; 3. Foreign Currency; 4. Artificial Intelligence.

1 INTRODUCTION

As (Watts and Zimmerman 1990) already pointed out, accounting is outlined by political and economic aspects. Therefore, with the globalized world, the issuance of international accounting standards and their application by countries inserted in the global scenario has become almost inevitable. This accounting integration process represented by the adoption of the International Financial Reporting Standards ("IFRS") by several countries in the world is pointed out by (Daske and Gebhardt 2006) as the biggest regulatory change in the history of accounting.

However, the same speed of migration to the international accounting standards is still slow when it refers to the US-GAAP (principles adopted by the United States of America). The US does not harmonize their principles yet and it sounds to be a continued challenge for the future.

Besides the GAAP's harmonization, the main objective of this research is to identify and analyze what is being researched about the application of US-GAAP in the world: (1) who is producing more research and which are the most impactful; (2) which journals most carry articles on the subject and which carry the articles with the greatest repercussion; (3) in which countries such surveys have been carried out and (4) which are the periods of greatest production on the matter.

To achieve the research objectives, a quantitative and qualitative analysis of the scientific production on US-GAAP will be made, through a bibliometric study carried out through the Web of Science (*WoS*) system of the Institute for Scientific Information- ISI - Citation Indexes, one of the main databases available for this type of research.

The mere fact that this is a discussion involving one of the largest economic powers in the world, as well as the way that country regulates and guides the accounting principles and postulates imposed by the United States, would be an important justification to motivate this article.

But that is not all. Despite the importance of the topic, the research carried out in the largest database of academic articles used in the present study, *WoS*, results in approximately 219 (two hundred and nineteen) articles on the subject that return to the criterion "US-GAAP", which indicates that worldwide scientific production on the

subject, at least the one that is indexed in the database under analysis, is still scarce, a fact that deserves the attention of researchers and the scientific community.

Finally, bibliometric studies have been highlighted in several other areas related to Administration and Finance, in Brazil and abroad, mentioning the works of (CHUNG and COX 1990) that investigated productivity in Finance; (CHUNG, PAK, and COX 1992) who investigated productivity in the accounting area; (Pereira Câmara Leal, de Oliveira, and Feldman Soluri 2003) investigated the productivity of authors in Finance in Brazil. Additionally, we found (Carpes et al. 2010) who investigated the profile of international publications in International Business and in the Accounting area, (Mendonça Neto, Riccio, and Sakata 2009) who examined productivity in accounting; (Filho, Silva, and Pinto 2009) examined publications on Controllership using the method in question.

However, just a few works have been identified with a specific focus on US-GAAP, which is considered one of the ‘hot topics’ discussed within accounting matters. This is solely a strong indication of the relevance and pertinence of this article.

2 The United States Generally Accepted Accounting Principles (US-GAAP)

2.1 Background

The US-GAAP or United States Generally Accepted Accounting Principles is the accounting guidance stablished for that country. The word "principle", used in the context of generally accepted accounting principles, in the United States, has no connotation of universal principle or natural law, such as those found in the studies of astronomy, physics, mathematics, among other sciences. The US-GAAP have been developed to assist in the preparation of financial information and represent the best possible procedure, based on observations and experiences, to meet the needs of useful information, being continuously reviewed and revised to keep up to date with the increase in the complexity of business activities.

In accordance with Accounting Principle Board (APB), Statement 4 (McGee 2009) states that GAAP "contemplates the conventions, rules and procedures necessary to define accounting practices at a given time (Coe and Delaney 2013). Based on this statement, we can extract two particularities from US-GAAP; firstly, the accounting standard is emanated from the accounting practice; and the second is that it is valid for a certain

period. Although APB 4 has the best definition of US-GAAP, it is not part of it, that is, it is not incorporated into the set that makes up US-GAAP. The following important characteristics are also presented:

a) the US-GAAP are influenced by the economic environment in which they operate.
b) its development is influenced by the concept of materiality.
c) it can be classified into two categories: measurement and disclosure.
d) has substantive authority and
e) the US GAAP pronouncements, standards and practices follow a hierarchy.

US GAAP is a product of the economic environment, where it is developed, and the complexity of business activities usually results in a complex set of accounting principles. (Ampofo and Sellani 2005) argues that an accounting principle to be qualified as generally accepted must meet at least one of the following conditions:

i. the method must currently be in use in a significant number of cases where circumstances are satisfactory.
ii. the method must be supported by statements made by accounting firms, or other authorized bodies or
iii. the method must be supported in the work of several respected professors and accounting thinkers.

US-GAAP is about materiality qualitative and quantitative concept. This concept has great significance in understanding, researching and implementing the principles (measurement and disclosure) (McEnroe and Sullivan 2018).

The standardization of US-GAAP includes not only broad guidelines, but also detailed practices and procedures. US-GAAP is related to the measurement of economic activities, the periodicity of the preparation and dissemination of measurements, the disclosure of activities, and the preparation and presentation of economic activities summarized in the financial statements.

Accounting policy is the way that companies disclose their financial situation and can be determined by the company itself or by regulatory authorities, such as the FASB and SEC. The first efforts to formulate accounting policies at the company level date back to 1929, due to the crisis in the New York Stock Exchange, culminating in the creation of the SEC in 1934, with the aim of supervising companies and regulating accounting principles. The

SEC has delegated power to set standards to the private sector but has not lost its top management status and the power to set limitations and exercise the right of veto.

Many countries regulate their accounting policies, the vast majority of which are regulated by government agencies through specific legislation. In the case of the United States of America, the US Congress has given the SEC the responsibility for establishing accounting standards. However, the SEC, judging that it is not the most qualified body in regulating accounting standards, determined, through the Accounting Series Release (ASR) No. 150 (Miller 2002), that the principles, standards and practices issued by the FASB (and predecessors) are absolutely necessary to be applied in the preparation of financial statements. This accounting policy adopted in the United States since 1934, called the Substantive Authority, in which the SEC has as its main attributes, that of supervising financial institutions and regulating accounting principles; it delegated powers to the setting of standards to the private sector, without losing its top management status and the power to set limitations and exercise the right of veto (Figure 1).

Figure 1 - Substantive Authority

Source: US-GAAP Substantive Authority structure, adapted by the authors

In the United States, standards are not laws, but the SEC supports legal compliance with FASB standards. According to (Eldon S. Hendriksen 1999) there are the following arguments for regulation:

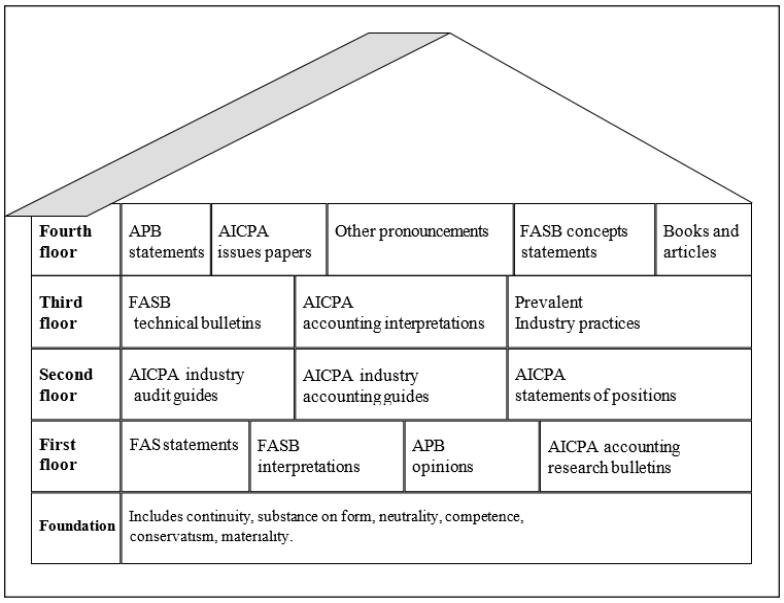
- information monopoly.
- existence of a public good and
- lack of comparability.

About the US-GAAP structure, the sources that creates have expanded over the years, including numerous statements, opinions and other pronouncements from a variety of representative bodies. Currently, the entities that issue accounting standards in the United States are AICPA, SEC and mainly, the FASB (Bhasin 2016). Since 1973, FASB has been the designated organization in the private sector, to set standards for accounting and

financial reporting, which regulates the preparation of financial reports. It was officially recognized as authorized by the SEC through Financial Reporting Release No. 1, Section 101 (FRR 1), and by the Rule 203 of AICPA Code of Professional Conduct, issued in May 1973 and amended in May 1979.

The Figure 2 shows the hierarchy of the various sources that compose the US-GAAP.

Figure 2: The "US-GAAP house"



Source: Adapted from Belkaoui, 2000, p.41.

In the absence of any source within US-GAAP to outline a particular event, other sources should be considered, its use depending on its relevance to particular circumstances, the accuracy of the guidance, and the general recognition of the issuer or author as an authority on the subject. They fit in like other sources, for example:

- FASB Statements of Financial Accounting Concepts (SFACs).
- AICPA Issues Papers.
- SEC Staff Accounting Bulletins (SABs).
- IASC International Accounting Standards.
- pronouncements from other professional associations or regulatory agencies.
- technical Information Service inquiries and Replies.
- AICPA Technical Practice Aids and
- accounting textbooks and articles.

One of the most relevant, complex and controversial topics around the US-GAAP arena is the currently pronouncement Accounting Standard Codification (ASC) nº 830.

2.2 ASC 830

ASC 830 is the predecessor of well know Statement of Financial Accounting Standards (SFAS) nº 8 and 52 issued by the Financial Accounting Standard Board (FASB) and dealt with "Foreign Currency Matters" (Castillo R. 2020); (Deloitte 2020); (Flood 2020); (Kallianiotis and Kallianiotis 2013) and (Rashty and O'Shaughnessy 2010).

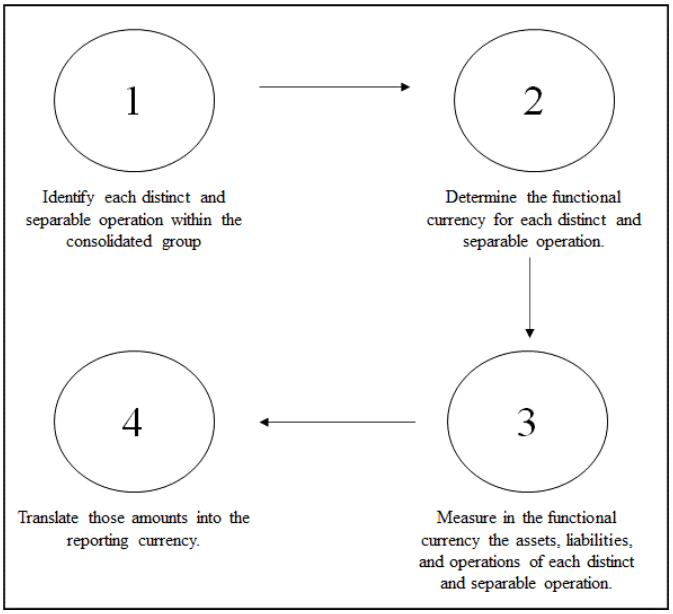
ASC 830 provides the rules for the conversion of financial statements for the purpose of providing information that is compatible with the economic effects expected from the variation in the type of exchange on the cash flows and assets of a company and, at the same time, reflecting in consolidated financial states, financial results as measured in the functional currency in which each foreign entity included in the consolidation effectively records its transactions and conducts its business (Deloitte 2020) and (Flood 2020).

Since the issuance of FASB Statement 52 in 1981, domestic and international economies have become increasingly interdependent. As a result, international operations have become more complex and generally represent a much larger portion of a company's overall financial results. At the same time, through both international expansion and corporate reorganization, the structures of many multinational corporations have become much more intricate. For example, many corporations are now organized as a series of holding companies that have no significant operations and only hold investments in other entities within the group. In addition, certain significant global functions (e.g., treasury) may now be performed entirely outside the United States and may transact in many different currencies (Deloitte 2020) and (Flood 2020).

The primary objective of ASC 830 is for reporting entities to present their consolidated financial statements as though they are the financial statements of a single entity. Therefore, if a reporting entity operates in more than one currency environment; it must translate the financial results of those operations into a single currency (referred to as the reporting currency). However, this process should not affect the financial results and relationships that were created in the economic environment of those operations. In accordance with the primary objective of ASC 830, a reporting entity must use a "functional-currency approach" according to Figure 3, where all transactions are first measured in the currency of the primary economic environment in which the reporting

entity operates (i.e., the functional currency) and then translated into the reporting currency.

Figure 3: The "functional-currency approach"



Source: Adapted from ASC 830 and Deloite, 2020, p. 3

It should be noted that even though several countries are converging to the IFRS accounting standards, there is a still a 'political and economic dispute' between the organs, especially in the continued tentative in harmonize the principles. The ASC 830 ("Foreign Currency") clearly is one of this complex examples. It is possible to affirm that the IFRS has been consolidating as the international accounting standard, however the United States has not yet adhered to this new scenario, which indicates that there are a lot opportunities to be discussed around the topic.

3 METHOD

This paper can be classified essentially as a quantitative research, to the extent that bibliometrics will be used as a technique for surveying and analyzing data.

Bibliometrics, as its name implies, is a technique used to measure scientific production. According to (Vanti 2002), in the 1930's people started to speak about bibliometrics, replacing the term statistical bibliography, however, it was only at a Seminar in 1969 that examples of practical application of bibliometric were presented.

The bibliometric laws, which are most used and related to scientific production are: Bradford's Law, (productivity of journals), Lotka's Law (scientific productivity of authors) and Zipf's Laws (frequency of words). This research focuses on the first two and will not evaluate the frequency of words.

According to (Cunha, 1985): law of concentration and dispersion of scientific literature was studied by Bradford in 1934. According to this author, only a small number of journals (the so-called nuclear or essential ones) are necessary to provide the most important articles of a subject.

What this law establishes, in fact, is that the main articles are those published in essential journals, as these are the ones that will have greater visibility and, therefore, will have a greater number of citations. In turn, this law also indicates that the journals that producing the largest number of articles on a subject are those supposedly most relevant to that area.

Lotka's Law, also known as Inverse Square Law, considers that some researchers, supposedly of greater prestige in a certain area of knowledge, produce a lot and many researchers, supposedly of lesser prestige, produce little.

According to (CHUNG and COX 1990) and (Pereira Câmara Leal et al. 2003), this law predicts that the number of authors who produce “n” articles is equal to $1/n^2$, in such a way that it can be said that the number of authors who produce two articles is equal to 1/4 of the number of authors who produce an article, that is, the number of authors who publish three articles is equal to 1/9 of the number of authors who publish an article, and so on.

This law suggests that the greater the prestige or influence of the author in each subject, the greater the number of publications. In turn, (Hirsch 2005) asserts that the total number of articles published it measures the author's productivity, but it does not measure the importance or impact of his publications. The impact of publications is measured by the number of citations each receives.

(CHUNG and COX 1990) also demonstrated that, according to Lotka's Law, the number of authors with only one article results in a constant equal to 60.8% of the authors, the number of authors with two papers would be equal to 1/4 of this frequency, that is, 15.2%, in turn the number of authors with three papers would be equal to 1/9 of the referred frequency, that is, 6.8%, and so on.

There are several possibilities for applying bibliometric, scient metric and info metric techniques, among which stand out those related to the interest of the present research (Vanti 2002):

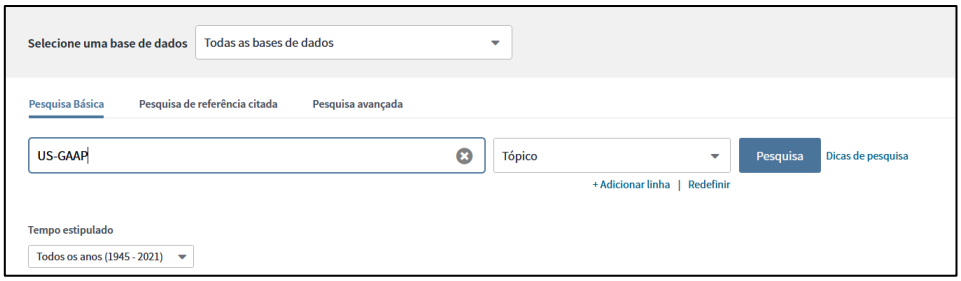
- identify trends and the growth of knowledge in an area.
- identify the papers and journals at the core of a discipline.
- identify users of a discipline.
- study the dispersion and obsolescence of scientific literature.
- predict the productivity of individual authors, organizations and countries.
- measure the growth of certain areas and the emergence of new themes

The collection of information used in this research was carried out through the Web of Science (*WoS*) system of the Institute for Scientific Information- ISI Citation Indexes, the first database in this model, which currently includes access to multidisciplinary information from around twelve thousand more prestigious journals, with high impact in the research world (Aksnes and Sivertsen 2019).

(Bar-Ilan 2008) points out that until 2004 *WoS* was the only database that contained the information needed for bibliometric research. From then on, the Scopus database also existed, with citations data from 1996 and Google Scholar, a database with free access and free of charge, but which does not have an apparent delimitation of the data period that covers.

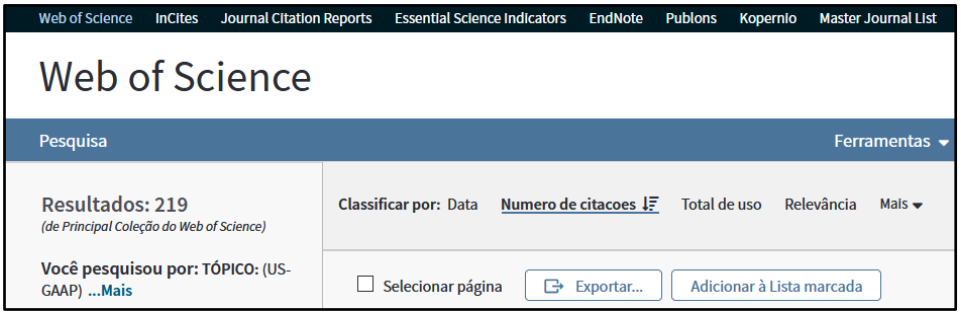
As demonstrated in the Figure 4, the research was divided into five stages. Initially, the terms “US-GAAP” was inserted as a topic in the research field without delimiting dates, so that the research period, as pointed out by the website, was initiated in 1945 until 2021, that is, the research covered all the material in the database, with no period restriction. The non-restriction of dates was mainly since there are not many articles on the subject, as well as that it is a relatively new subject, more precisely it was founded 219 published papers in all database provided by *WoS* (Figure 5).

Figure 4: Research of papers published using the wording “US-GAAP” as topic reference



Source: Prepared by the authors, using *WoS*

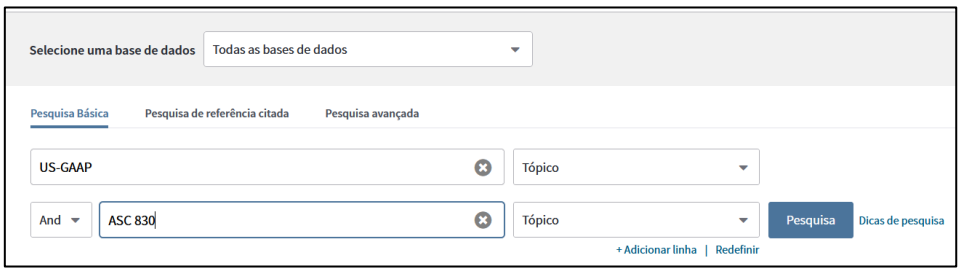
Figure 5: Number of papers published using the wording "US-GAAP" as topic reference



Source: Prepared by the authors, using *WoS*

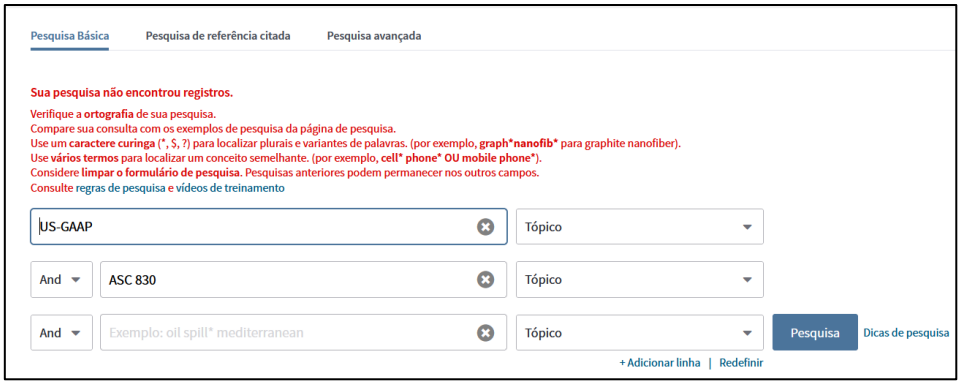
In addition to the research objective, it was also analyzed the quantity of published papers using the combined words "US-GAAP" and "ASC 830". This has demonstrated a very impactful finding: *WoS* has not find a single article published that focused on "Foreign Currency Matters" according to the US-GAAP pronouncement ASC 830 (Figure 6 and Figure 7).

Figure 6: Research of papers published using the combined words "US-GAAP" and "ASC 830" as topic reference



Source: Prepared by the authors, using *WoS*

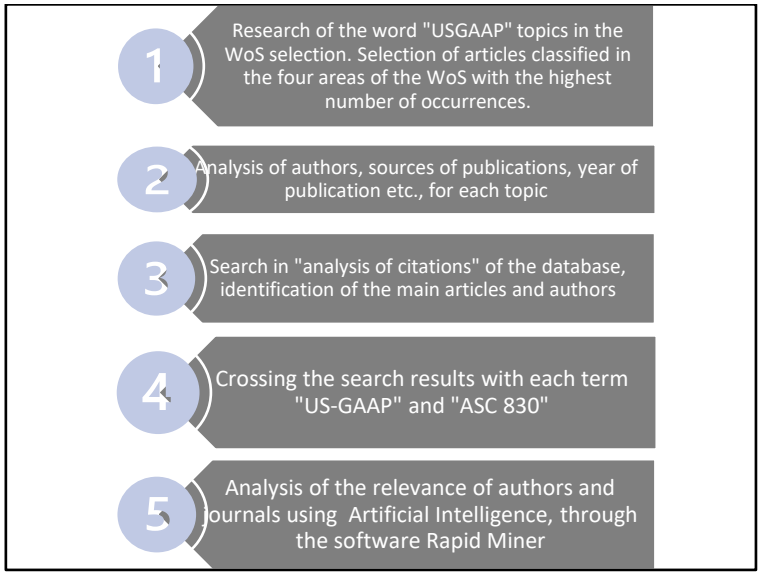
Figure 7: Number of papers published using the combined word "US-GAAP" and "ASC 830" as topic reference



Source: Prepared by the authors, using *WoS*

In continuity of the study, Figure 8 demonstrates the five stage of the applied research:

Figure 8: Stages of the applied research



Source: Prepared by the authors

4 RESULTS AND DISUSSIONS

4.1 Quantitative Analysis

The research was initiated by appending the terms “US-GAAP Standards” and “ASC 830” to the topical criterion in *WoS*, in April 2021.

When the term used was the first, the search returned 219 papers, while when the term used was the second, the return was **0 (zero) paper**. This lack of publication simple already shows an important absence of focus of research on a term considered complex in the international accounting environment.

In this initial survey, in addition to including all *WoS* categories, without delimiting the areas related to the matter of interest, there are articles presented in Congresses, reviews and books. Table 1 presents the 219 papers divided in categories, such as: business economics, computer science, public administration, social sciences other topics, engineering, metallurgy, metallurgical engineering, agriculture, instruments and instrumentation, operations research management science and government law. Out of 219 papers, the majority concentration are 155 papers in business economics.

Table 1: Published papers divided by area of concentration

Area of concentration	**Count of register**	**% out of 219**
Business finance	155	70,8%
Economics	44	20,1%
Management	37	16,9%
Business	29	13,2%
Public administration	6	2,7%
Agricultural economics policy	3	1,4%
Social sciences interdisciplinary	3	1,4%
Computer science information systems	2	0,9%
Computer science interdisciplinary applications	2	0,9%
International relations	2	0,9%
Metallurgy metallurgical engineering	2	0,9%
Operations research management science	2	0,9%
Computer science artificial intelligence	1	0,5%
Education educational research	1	0,5%
Engineering multidisciplinary	1	0,5%
Geography	1	0,5%
Hospitality leisure sport tourism	1	0,5%
Humanities multidisciplinary	1	0,5%
Law	1	0,5%
Mathematics applied	1	0,5%

Political science	1	0,5%
Regional urban planning	1	0,5%
Sociology	1	0,5%

Source: Prepared by the authors, using *WoS*

It was observed that the results for the search term "US-GAAP" and "ASC 830" were very dissonant. This may be due to the different key terms that each author assigns to their studies, while some authors point "US-GAAP" only as a general term to discuss complex accounting issues and pronouncements such as "Foreign Currency Matters", or even other authors consider both terms as key words.

We tried to solve this problem through more advanced searches in the database, however, after several attempts it was observed that the apposition of the "or" connective to the research did not solve the problem, which is why it was decided to carry out the analysis of the two researches separately. It was also observed the 219 papers, separated in type of published document. Out of 219 documents, 166 are related to articles (Table 2).

Table 2: Published papers divided by type of published document

Type of document	**Count of register**	**% out of 219**
Article	166	75,8%
Proceedings paper	44	20,1%
Review	8	3,7%
Editorial material	5	2,3%
Book review	2	0,9%
Early access	2	0,9%

Source: Prepared by the authors, using *WoS*

In addition, Table 3 below shows the Top 20 most productive authors in concordance of the term "US-GAAP" used:

Table 3: Top 20 most productive authors in concordance of the term "US-GAAP" used

Authors	**Count of register**	**% out of 219**
LEUZ C	5	2,3%
SVOBODA P	5	2,3%

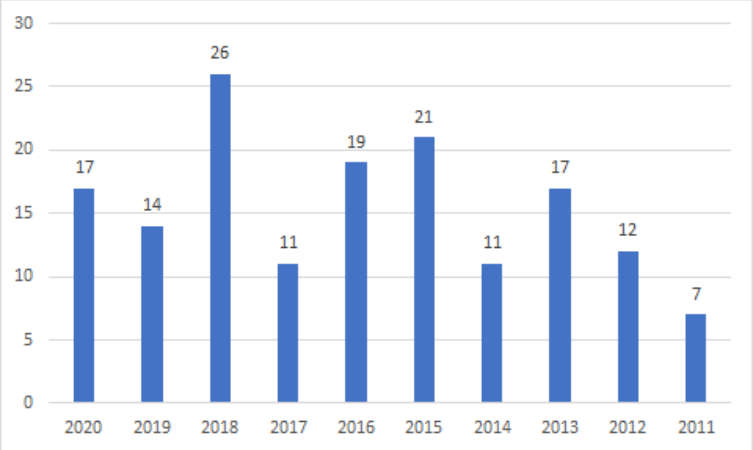
KRIZOVA Z	4	1,8%
BARTH ME	3	1,4%
BRAD L	3	1,4%
CIOBANU R	3	1,4%
CORMIER D	3	1,4%
DOBRE F	3	1,4%
LANDSMAN WR	3	1,4%
LANG M	3	1,4%
LIN S	3	1,4%
LINTHICUM CL	3	1,4%
SAMI H	3	1,4%
STROUHAL J	3	1,4%
AERTS W	2	0,9%
ALI A	2	0,9%
BAZAZ MS	2	0,9%
BOHUSOVA HBONACI CG	2	0,9%
BOUJELBENE Y	2	0,9%

Source: Prepared by the authors, using *WoS*

It was identified that two most productive authors in decreasing order produced 5 articles each. According to Lotka's Law, the greater the prestige or influence of the author in subject, the greater the number of publications, in this case, the authors mentioned above should appear on the list of the most cited as well. Furthermore, according to the theoretical frequency developed by (CHUNG and COX 1990), about 60% of the authors should present only one article, about 15% of the authors should present two articles and so on.

Regarding the year of paper's publication, we can notice that they are slight pulverized over the analysis comprehended between the years 2020 back to 2011 (10 years). The year of 2020 has increased the publications in 21% in comparison with 2019, but with important reduction when comparing with the prior year of 2018, which was published 26 papers (by far highest number of publications for the selected analyzed period). We believe that this important increase was due to the economy challenges that the US economy faced in 2018, which may increase the discussions about international accounting environment. The exception is the year 2021, that the publications are in progress and was not considered in the statistical analysis (Graphic 1).

Graphic 1: paper's publication per year of concentration



Source: Prepared by the authors, using *WoS*

Analyzing the profile of the most productive authors, it appears that almost all are linked to some University in the United States with 88 papers or 40,2%, Czech Republic with 20 papers or 9,1% and closer disputing the second place, we find 19 papers in Germany, corresponded by 8,7%. The fourth place we find England with 15 papers, representing 6,8% and in the fifth place, Romania with 14 papers or 6,4%. The remaining papers are Australia well distributed between with 9, Canada with 9, Italy with 7, Spain with 6, Brazil, France, China with 4 papers and so on (Table 4).

This generates an interesting reflection, specially that Czech Republic is in the second place in number of publications, even though the subjected topic is directly related within the United States accounting environment. No less important, it has called our attention that Brazil has 4 published papers only. Indeed, this subject is so contemporaneous and has repercussions in the markets that even those who are not connected to the academy have been urged to write and express themselves on the subject.

Table 4: Profile of the Top 20 most productive authors by Country

Country/region	**Count of register**	**% out of 219**
USA	88	40,2%
Czech republic	20	9,1%
Germany	19	8,7%
England	15	6,8%
Romania	14	6,4%

Australia	9	4,1%
Canada	9	4,1%
Italy	7	3,2%
Spain	6	2,7%
Brazil	4	1,8%
France	4	1,8%
Peoples R China	4	1,8%
Slovakia	4	1,8%
Switzerland	4	1,8%
Tunisia	4	1,8%
U Arab Emirates	4	1,8%
Belgium	3	1,4%
Croatia	3	1,4%
Egypt	3	1,4%
Greece	3	1,4%

Source: Prepared by the authors, using *WoS*

As for the titles of the sources, there is also a divergence of results according to the search term used "US-GAAP".

There was an almost even concentration of papers that were published between the United States (Journal of Business Finance Accounting) and European (International Journal of Accounting and Information Management), according to the Table 5.

Table 5: Top 25 journals with the highest number of publications - "US-GAAP"

Country/region	**Count of register**	**% out of 219**
Journal of Business Finance Accounting	11	5,0%
International Journal Of Accounting And Information Management	8	3,7%
Journal Of Accounting Economics	7	3,2%
Accounting Horizons	6	2,7%
Accounting Review	6	2,7%
Australian Accounting Review	6	2,7%
Betriebswirtschaftliche Forschung Und Praxis	6	2,7%
Journal Of Accounting Research	6	2,7%

European Accounting Review	5	2,3%
Journal Of Accounting And Public Policy	5	2,3%
Journal Of Financial Reporting And Accounting	5	2,3%
Journal Of International Accounting Research	5	2,3%
Procedia Economics And Finance	5	2,3%
Proceedings Of The International Conference Accounting And Management Information Systems	5	2,3%
Review Of Accounting Studies	5	2,3%
Business Horizons	4	1,4%
Contemporary Accounting Research	4	1,4%
International Review Of Financial Analysis	4	1,4%
Abacus A Journal Of Accounting Finance And Business Studies	3	1,4%
Accounting And Business Research	3	1,4%
Accounting Auditing Accountability Journal	3	1,4%
Agricultural Economics Zemedelska Ekonomika	3	1,4%
Proceedings Of The 10Th International Conference Accounting And Management Information Systems Amis 2015	3	1,4%
Accounting And Finance	2	0,9%
Accounting Perspectives	2	0,9%

Source: Prepared by the authors, using *WoS*

In more details, Table 6 below presents a sample of 112 papers published papers filtered by institutions. This represents 51% of the sample analysis.

Table 6: Journals published by type of institutions

Institutions	**Register count**	**Country**	**% out of 219 papers**
Bucharest University of Economic Studies	8	Romania	3,23%
Masaryk University Brno	6	Czech Republic	2,42%
State University System of Florida	6	United States	2,42%
University Of North Carolina	6	United States	2,42%
University Of Texas System	6	United States	2,42%
Florida International University	5	United States	2,02%
Mendel University In Brno	5	Czech Republic	2,02%
University Of North Carolina Chapel Hill	5	United States	2,02%

Babes Bolyai University from Cluj	4	Romania	1,61%
California State University System	4	United States	1,61%
Florida Int Univ	4	United States	1,61%
Goethe University Frankfurt	4	Germany	1,61%
Pennsylvania Commonwealth System of Higher Education Pcshe	4	United States	1,61%
Stanford University	4	United States	1,61%
Univ Chicago	4	United States	1,61%
Univ N Carolina	4	United States	1,61%
Universite De Sfax	4	United States	1,61%
University Of Chicago	4	United States	1,61%
University Of Economics Bratislava	4	Slovakia.	1,61%
University Of Pennsylvania	4	United States	1,61%
University System Of Georgia	4	United States	1,61%
Utah System of Higher Education	4	United States	1,61%
Edhec Business School	3	France	1,21%
Indiana Univ	3	United States	1,21%
Indiana University Bloomington	3	United States	1,21%
Total	**112**		**51,1%**

Source: Prepared by the authors, using *WoS*

The Table 6 presents a total of 112 papers or 51,1% of the 219 sampled analysis. By far the United Stated leads the research about US-GAAP with 78 papers published, followed by 12 papers in Romania, 11 in Czech Republic, 4 papers in Germany, 4 papers in Slovakia and 3 papers in France, from the selected sample according the table 1.

Besides, the most impactful finding was Bucharest University of Economic Studies in Romania is the most representative institution with 8 published papers.

It sounds interesting having a European university as the lead representative when US-GAAP topic is the subject of discussion. Probably because the continued discussion about the GAAP's conversion with the IFRS.

As for the top 30 most cited articles, that is, those that had the greatest repercussion, they are listed in table 7, in decreasing order of the annual average of citations:

Table 7: Top 30 most cited articles

Authors	**Top 30 most cited articles**	**Year of publication**	**Nº citations/ annual average**
Barth, Mary E.; Landsman, Wayne R.; Lang, Mark H.	International accounting standards and accounting quality	2008	868/62
Reese, WA; Weisbach, MS	Protection of minority shareholder interests, cross-listings in the United States, and subsequent equity offerings	2002	338/16,9
Li, Siqi	Does Mandatory Adoption of International Financial Reporting Standards in the European Union Reduce the Cost of Equity Capital?	2010	309/25,75
Lang, Mark; Raedy, Jana Smith; Wilson, Wendy	Earnings management and cross listing: Are reconciled earnings comparable to US earnings?	2006	288/18
Laux, Christian; Leuz, Christian	The crisis of fair-value accounting: Making sense of the recent debate	2009	275/21,15
Soderstrom, Naomi S.; Sun, Kevin Jialin	IFRS adoption and accounting quality: A review	2007	263/17,53
Leuz, C	IAS versus US GAAP: Information asymmetry-based evidence from Germany's new market	2005	247/13
Daske, Holger; Hail, Luzi; Leuz, Christian; Verdi, Rodrigo	Adopting a Label: Heterogeneity in the Economic Consequences Around IAS/IFRS Adoptions	2013	245/27,22
Hung, Mingyi; Subramanyam, K. R.	Financial statement effects of adopting international accounting standards: the case of Germany	2007	245/16,33
Barth, Mary E.; Landsman, Wayne R.; Lang, Mark; Williams, Christopher	Are IFRS-based and US GAAP-based accounting amounts comparable?	2012	232/23,2
Horton, Joanne; Serafeim, George; Serafeim, Ioanna	Does Mandatory IFRS Adoption Improve the Information Environment?	2013	189/21
Lang, Mark; Lins, Karl V.; Maffett, Mark	Transparency, Liquidity, and Valuation: International Evidence on When Transparency Matters Most	2012	189/18,9
Daske, Holger	Economic benefits of adopting IFRS or US-GAAP - Have the expected cost of equity capital really decreased?	2006	164/10,25
Leuz, Christian	Different approaches to corporate reporting regulation: how jurisdictions differ and why	2010	157/13,08
Harris, MS; Muller, KA	The market valuation of IAS versus US-GAAP accounting measures using Form 20-F reconciliations	1999	111/4,83
De George, Emmanuel T.; Li, Xi; Shivakumar, Lakshmanan	A review of the IFRS adoption literature	2016	96/16

Leuz, Christian	Cross listing, bonding and firms' reporting incentives: A discussion of Lang, Raedy and Wilson (2006)	2006	77/4,81
Orens, Raf; Aerts, Walter; Cormier, Denis	Web-Based Non-Financial Disclosure and Cost of Finance	2010	59/4,92
Kim, Yongtae; Li, Haidan; Li, Siqi	Does eliminating the Form 20-F reconciliation from IFRS to U.S. GAAP have capital market consequences?	2012	50/5
Ashbaugh, H; Olsson, P	An exploratory study of the valuation properties of cross-listed firms' IAS and US GAAP earnings and book values	2002	47/2,35
Lin, Steve; Riccardi, William; Wang, Changjiang	Does accounting quality change following a switch from US GAAP to IFRS? Evidence from Germany	2012	46/4,6
Henry, Elaine; Lin, Stephen; Yang, Ya-wen	The European-US GAAP Gap: IFRS to US GAAP Form 20-F Reconciliations	2009	45/3,46
Posner, Elliot	Sequence as explanation: The international politics of accounting standards	2010	41/3,42
Karamanou, Irene; Nishiotis, George P.	Disclosure and the Cost of Capital: Evidence from the Market's Reaction to Firm Voluntary Adoption of IAS	2009	39/3
Gassen, Joachim; Sellhorn, Thorsten	Applying IFRS in Germany - Determinants and consequences	2006	39/2,44
Chen, Lucy Huajing; Sami, Heibatollah	Trading volume reaction to the earnings reconciliation from IAS to US GAAP	2008	38/2,71
Lapointe-Antunes, Pascale; Cormier, Denis; Magnan, Michel; Gay-Angers, Sophie	On the relationship between voluntary disclosure, earnings smoothing and the value-relevance of earnings: The case of Switzerland	2006	33/2,06
Aerts, Walter; Cormier, Denis; Magnan, Michel	The association between web-based corporate performance disclosure and financial analyst behaviour under different governance regimes	2007	32/2,13
Glaum, Martin; Baetge, Joerg; Grothe, Alexander; Oberdoerster, Tatjana	Introduction of International Accounting Standards, Disclosure Quality and Accuracy of Analysts' Earnings Forecasts	2013	28/3,11
Christensen, Hans B.	Why do firms rarely adopt IFRS voluntarily? Academics find significant benefits and the costs appear to be low	2012	28/2,8

Source: Prepared by the authors, using *WoS*

Only four authors appearing in table 7, which presents the articles that had the greatest impact, given the number of citations, also appear in the list of the most productive

authors, with five of the authors appearing in table 3, inclusive Leuz C, the author with the largest number of publications is one of the most cited authors.

In this case, the most productive author did not appear on the list of the most influential, confirming the notes of (Hirsch 2005) according to which the number of published articles measures the author's productivity, but does not measure the importance or impact of his publications.

In regarding to the year of publication, the top 4 most cited articles were published in 2002, 2006, 2008 and 2010, respectively. None of these articles are related somehow to US-GAAP. Also, important to highlight that most of the impactful articles were released in the last decade, which demonstrates a scarcity in the discussions about the topic.

At this exact moment, although there were good findings presented and discussed, no conclusive analysis was provided by the *WoS* software. Questions such as (1) how many articles were indeed related to US-GAAP and ASC-830 and (2) what the relevance of each article are, analyzing from the point of view of each journal's impact factor. These questions should be addressed.

Because of the inconclusiveness, the authors went deeper into the research of each 219 papers.

To support the detailed analysis, the authors relied on the Artificial Intelligence and machine learning, using the software Rapid Miner®.

4.2 A Machine Learning Approach using RapidMiner®

RapidMiner® software (Anon 2020); (Mierswa 2016) and (Mierswa 2009) is a user interactive environment for machine learning and data mining processes. It is opensource, free project implemented in Java. It represents a modular approach to design even very complex problems - a modular operator concept which allows the design of complex nested operator chains for a huge number of learning problems. RM uses XML to describe the operator trees modeling knowledge discovery (KDD) processes (Uvidia Fassler et al. 2020); (Lounes et al. 2018); (Shastri and Mansotra 2019) and (Cisneros Barahona et al. 2021). RM has flexible operators for data input and output in different file formats. It contains more than 100 learning schemes for classification, regression, and clustering tasks.

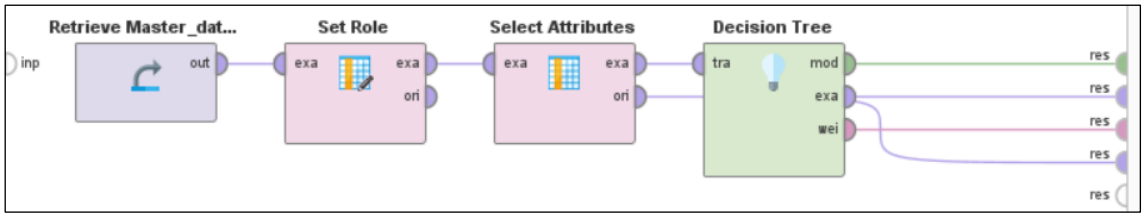
Based on the database containing the list of 219 papers, the first approach used by the authors was to identify the Impact Factor for each paper, using as reference the title of each journal. The exception founded is related to approximately 60 papers were linked somehow to Congress, Conferences and/or Proceedings (confirming the data provided in the Table 2). For those cases, it was simple applied the rate equal to zero.

First step was to separate in the database the journal impact factor (IF) into three categories, forced by simply defining by the grade defined by each title. Categories were:

1. IF with ratio <=1,5 ➔ low impact factor
2. IF with ratio >1,6 and <=3,0 ➔ medium impact factor
3. IF with ratio > 3,1 ➔ high impact factor

The technique process used was the Decision Tree (Bulac and Bulac 2016); (Fletcher and Islam 2019); (Kamiński, Jakubczyk, and Szufel 2018); (Quinlan 1986) and (Song and Lu 2015).

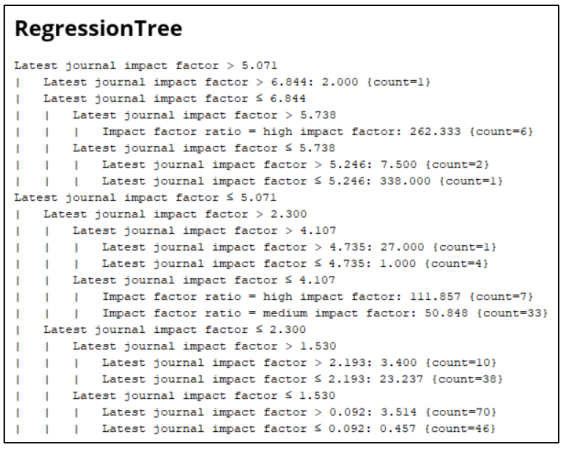
Figure 9: Process of a decision tree



Source: Prepared by the authors, using the software Rapid Miner®

The results are a Regression Tree (Hara and Chellappa 2014); (Ikonomovska et al. 2009); (Kaur, Goyal, and Lu 2012); (Sorokina, Caruana, and Riedewald 2007); (Struyf and Džeroski 2006) and (Zhu et al. 2013), according to Figure 10:

Figure 10: Regression Tree



RegressionTree

```
Latest journal impact factor > 5.071
|   Latest journal impact factor > 6.844: 2.000 {count=1}
|   Latest journal impact factor ≤ 6.844
|   |   Latest journal impact factor > 5.738
|   |   |   Impact factor ratio = high impact factor: 262.333 {count=6}
|   |   Latest journal impact factor ≤ 5.738
|   |   |   Latest journal impact factor > 5.246: 7.500 {count=2}
|   |   |   Latest journal impact factor ≤ 5.246: 338.000 {count=1}
Latest journal impact factor ≤ 5.071
|   Latest journal impact factor > 2.300
|   |   Latest journal impact factor > 4.107
|   |   |   Latest journal impact factor > 4.735: 27.000 {count=1}
|   |   |   Latest journal impact factor ≤ 4.735: 1.000 {count=4}
|   |   Latest journal impact factor ≤ 4.107
|   |   |   Impact factor ratio = high impact factor: 111.857 {count=7}
|   |   |   Impact factor ratio = medium impact factor: 50.848 {count=33}
|   Latest journal impact factor ≤ 2.300
|   |   Latest journal impact factor > 1.530
|   |   |   Latest journal impact factor > 2.193: 3.400 {count=10}
|   |   |   Latest journal impact factor ≤ 2.193: 23.237 {count=38}
|   |   Latest journal impact factor ≤ 1.530
|   |   |   Latest journal impact factor > 0.092: 3.514 {count=70}
|   |   |   Latest journal impact factor ≤ 0.092: 0.457 {count=46}
```

Source: Prepared by the authors, using the software Rapid Miner®

This Regression Tree brought interesting reflections:

1) IF with ratio > 3,1 ➔ high impact factor:

- There are 6 articles with "higher" IF >5.738, with an average of citations of 262.3 The first interested finding was that all 6 articles were published by the Journal of Accounting Research. The second finding was 2 articles out of 6 have a wording linked to "US-GAAP".
- There are 2 articles with "higher" IF >5.246, with an average of citations of 7.5. In this finding, both journals and topics are linked to the word "US-GAAP". One paper have as title *"The relational side of intellectual capital: an empirical study on brand value evaluation and financial performance",* published by the *"Journal Of Intellectual Capital"* and the second, entitled *"Assessing the quality of large-scale data standards: A case of XBRL GAAP Taxonomy",* published by the journal *"Decision Support Systems".*
- In relation to "higher" IF <= 5.246, with 338 citations we found 1 paper, also not related to "US-GAAP". The paper *"Protection of minority shareholder interests, cross-listings in the United States, and subsequent equity offerings"* was published by the *"Journal of Financial Economics".*
- For the "higher" IF > 4.735, we find the paper *"Quality of data standards: framework and illustration using XBRL taxonomy and instances"* with 27 citations, published by the journal *"Electronic Markets".* This was another example of non-US-GAAP correlation.

- Still with "higher" IF but ≤ 4.735, we found 4 papers, with an average citation of 1.0. In this case, it was found 2 papers with US-GAAP correlation, all published by the *"Business Horizons"* journal.
- Finally, with "higher" IF ≤ 4.107, we found 7 papers, with an average citation of 111.8. All 7 papers were published by the *"Journal of Accounting & Economics".* This most interested finding in this analysis was within the paper *"Cross listing, bonding and firms' reporting incentives: A discussion of Lang, Raedy and Wilson (2006)".* Although this title is not linked to US-GAAP, the article was published by *Leuz, Christian*, the author referenced in the top of the list, according to the Table 3.

2) IF with ratio >1,6 and <=3,0 ➔ medium impact factor

- There are 33 articles founded with "medium" IF ≤ 2.300 with an average of 50.8 citations. They were published by several different journals but only 5 articles were linked somehow to "US-GAAP". The article *"The crisis of fair-value accounting: Making sense of the recent debate"* with 275 citations was also published by *"Leuz, Christian".* Again, another relevant article but not related to the US-GAAP.
- With "medium" IF > 2.193 we found 10 articles within an average of 3.4 citations. Interested finding were 4 articles directly related to US-GAAP where 5 articles were published by *"Journal of Financial Reporting and Accounting.*
- Finally, with "medium" IF ≤ 2.193 we found 38 articles within an average of 23.2 citations. It was founded only 2 articles that somehow are linked to the word "US-GAAP".

3) IF with ratio <=1,5 ➔ low impact factor

- With "low" IF > 0.092, it was founded 70 papers within an average of 3.5 citations.
- With "low" IF ≤ 0.092, it was founded 46 papers within an average of 0.4 citations.

The most impactful finding was related to the paper *"Strategic Enterprise Management in SAP AG - a software company's experiences and solutions"*, published by the journal *"Wirtschaftsinformatik".* This journal has an IF of 7,631, automatically rated as "high impact factor". What caused the author's attention was both title and journal are linked somehow to a technology discussion, nothing related to the US-GAAP. This finding might be treated as an exception and probably a *"search bias"* when the *WoS* has returned the searched papers.

To conclude this discussion, besides the high level of productions published, it clearly in practical evidence that there is still a lot of opportunities in contribution within the US-GAAP arena, especially with the topic ASC 830 ("Foreign Currency Matters"), that was not found in any paper published in the *WoS* and confirmed by RapidMiner software.

5. CONCLUSION

Accounting in an international environment is still an important challenge for organizations. In this line, the US-GAAP and the accounting pronouncement ASC 830 ("Foreign Currency Matters") are still a new subject of continued study and has not received the attention as other areas in the principles adopted by the United States.

In this article, several concepts from different authors were raised, and we came to the conclusion that there is an increasing need for companies to adapt to the new accounting regulations such as the ASC 830 that is pressured by the company's management, society, regulatory bodies, audits, investors and other stakeholders.

The US-GAAP legislation has been always complex topic and overtime with a certain lack of qualified professionals yet that could correct understand, interpret and apply the pronouncements in a real business environment. Indeed, the pronouncement ASC 830 is one of these complex topics.

The results found here contribute to a greater knowledge of the profile of publications in US-GAAP.

Through this research it is possible to glimpse the articles and journals with greater repercussion in the area, as well as the most productive and influential authors. Studies of this nature are important for the knowledge and improvement of scientific production and have deserved the attention of researchers in finance and accounting arenas.

Although the results of this research have as limitations the use of journals available in only in the tool *WoS*, the authors used the artificial intelligence to address important gaps.

Also, the lack of domestic publications, example of Brazil with only 4 papers, they are relevant to the construction of scientific knowledge about US-GAAP.

No less important, we verified that the US-GAAP as well as the accounting pronouncement ASC 830 absolutely are still a subject to be deep explored by researchers.

REFERENCES

AICPA. 2002. “Statement on Auditing Standards: SAS No. 99.” *AU Section 316, Consideration of Fraud in a Financial Statement Audit*.

Aksnes, Dag W., and Gunnar Sivertsen. 2019. “A Criteria-Based Assessment of the Coverage of Scopus and Web of Science.” *Journal of Data and Information Science* 4(1). doi: 10.2478/jdis-2019-0001.

Ampofo, Akwasi A., and Robert J. Sellani. 2005. “Examining the Differences between United States Generally Accepted Accounting Principles (U.S. GAAP) and International Accounting Standards (IAS): Implications for the Harmonization of Accounting Standards.” *Accounting Forum* 29(2). doi: 10.1016/j.accfor.2004.11.002.

Anon. 1985. “Os Periódicos Em Ciência Da Informação: Uma Análise Bibliométrica.” *Ciência Da Informação* 14(1). doi: 10.18225/ci.inf..v14i1.225.

Anon. 2020. “Getting Used to RapidMiner Ingo Mierswa.” in *RapidMiner*.

Bar-Ilan, Judit. 2008. “Which H-Index? - A Comparison of WoS, Scopus and Google Scholar.” *Scientometrics* 74(2). doi: 10.1007/s11192-008-0216-y.

Bhasin, Madan Lai. 2016. “Contribution of Forensic Accounting to Corporate Governance: An Exploratory Study of an Asian Country.” *International Business Management* 10(4). doi: 10.3923/ibm.2016.479.492.

Bulac, Constantin, and Adrian Bulac. 2016. “Decision Trees.” in *Advanced Solutions in Power Systems: HVDC, FACTS, and AI Techniques*.

Castillo R., Augusto. 2020. “Exchange Rate Exposure and Optimal Hedging Strategies When Interest Rates Are Stochastic: A Simulation-Based Approach.” *Estudios de Administración* 10(1). doi: 10.5354/0719-0816.2003.56778.

CHUNG, KEE H., and RAYMOND A. K. COX. 1990. “Patterns of Productivity in the Finance Literature: A Study of the Bibliometric Distributions.” *The Journal of Finance* 45(1). doi: 10.1111/j.1540-6261.1990.tb05095.x.

CHUNG, KEE H., HONG S. PAK, and RAYMOND A. K. COX. 1992. “Patterns of Research Output in the Accounting Literature: A Study of the Bibliometric

Distributions.” *Abacus* 28(2). doi: 10.1111/j.1467-6281.1992.tb00278.x.

Cisneros Barahona, Andrés Santiago, María Isabel Uvidia Fassler, Gonzalo Nicolay Samaniego Erazo, Gabriela Jimena Dumancela Nina, and Byron Andrés Casignia Vásconez. 2021. “Complementary Admission Processes Implemented by Ecuadorian Public Universities Promote Equal Opportunities in Access: An Analysis Through Knowledge Discovery in Databases.” in *Advances in Intelligent Systems and Computing*. Vol. 1273 AISC.

Coe, Martin, and John Delaney. 2013. “Trabeck Prepares for IFRS: An IFRS Case Study.” *Journal of Accounting Education* 31(1). doi: 10.1016/j.jaccedu.2012.12.002.

Daske, Holger, and Günther Gebhardt. 2006. “International Financial Reporting Standards and Experts’ Perceptions of Disclosure Quality.” *Abacus* 42(3–4). doi: 10.1111/j.1467-6281.2006.00211.x.

Deloitte. 2020. *A Roadmap to Foreign Currency Transactions and Translations*. 1st ed. edited by D. D. LLC. Deloitte Development LLC.

Eldon S. Hendriksen. 1999. *Accounting Theory*. 5th Editio. edited by Eldon S. Hendriksen. McGraw-Hill Education.

Filho, Jorge Ribeiro de Toledo, Adriano José da Silva, and Juliana Pinto. 2009. “ANÁLISE BIBLIOMÉTRICA DOS ARTIGOS SOBRE CONTROLADORIA PUBLICADOS EM PERIÓDICOS DOS PROGRAMAS DE PÓS-GRADUAÇÃO EM CIÊNCIAS CONTÁBEIS RECOMENDADOS PELA CAPES.” *ABCustos* 4(1). doi: 10.47179/abcustos.v4i1.70.

Fletcher, Sam, and Md Zahidul Islam. 2019. “Decision Tree Classification with Differential Privacy: A Survey.” *ACM Computing Surveys* 52(4).

Flood, Joanne. 2020. “ASC 830: Foreign Currency Matters.” in *Wiley GAAP 2020*.

Hara, Kota, and Rama Chellappa. 2014. “Growing Regression Forests by Classification: Applications to Object Pose Estimation.” in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Vol. 8690 LNCS.

Hirsch, J. E. 2005. “An Index to Quantify an Individual’s Scientific Research Output.”

Proceedings of the National Academy of Sciences of the United States of America 102(46). doi: 10.1073/pnas.0507655102.

Ikonomovska, Elena, João Gama, Raquel Sebastião, and Dejan Gjorgjevik. 2009. "Regression Trees from Data Streams with Drift Detection." in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Vol. 5808 LNAI.

Kallianiotis, John N., and John N. Kallianiotis. 2013. "Foreign Currency Derivatives." in *Exchange Rates and International Financial Economics*.

Kamiński, Bogumił, Michał Jakubczyk, and Przemysław Szufel. 2018. "A Framework for Sensitivity Analysis of Decision Trees." *Central European Journal of Operations Research* 26(1). doi: 10.1007/s10100-017-0479-6.

Kaur, Preetinder, Madhu Goyal, and Jie Lu. 2012. "Pricing Analysis in Online Auctions Using Clustering and Regression Tree Approach." in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Vol. 7103 LNAI.

Levantamento, Business, P. O. R. Meio, D. a Base, and W. E. B. Of. 2010. "Panorama Internacional Das Publicações Em International Business: Levantamento Por Meio Da Base Web of Science." *Science*.

Lounes, Naima, Houria Oudghiri, Rachid Chalal, and Walid Khaled Hidouci. 2018. "From KDD to KUBD: Big Data Characteristics within the KDD Process Steps." in *Advances in Intelligent Systems and Computing*. Vol. 746.

McEnroe, John E., and Mark Sullivan. 2018. "An Empirical Analysis of an Alternative Model of Financial Accounting Standard No. 128: Earnings per Share." *Accounting Research Journal* 31(4). doi: 10.1108/ARJ-12-2016-0162.

McGee, Robert W. 2009. "The Timeliness of Financial Reporting in Developing Countries: An Overview." in *Corporate Governance in Developing Economies: Country Studies of Africa, Asia and Latin America*.

Mendonça Neto, Octávio Ribeiro de, Edson Luiz Riccio, and Marici Cristine Gramacho Sakata. 2009. "Dez Anos de Pesquisa Contábil No Brasil: Análise Dos Trabalhos Apresentados Nos ENANPADs de 1996 a 2005." *Revista de Administração de*

Empresas 49(1). doi: 10.1590/s0034-75902009000100008.

Mierswa, Ingo. 2009. “Open Source Data Mining Mit Rapidminer.” *Künstliche Intelligenz* (2).

Mierswa, Ingo. 2016. “The Wisdom of Crowds: Best Practices for Data Prep & Machine Learning Derived from Millions of Data Science Workflows.” in *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*.

Miller, Paul B. W. 2002. “Viewing the 1996 FAF Restructuring as Policy Making without a Formal Due Process.” *Accounting Horizons* 16(3). doi: 10.2308/acch.2002.16.3.199.

Pereira Câmara Leal, Ricardo, Jefferson de Oliveira, and Aline Feldman Soluri. 2003. “Perfil Da Pesquisa Em Finanças No Brasil.” *Revista de Administração de Empresas* 43(1). doi: 10.1590/s0034-75902003000100010.

Quinlan, J. R. 1986. “Induction of Decision Trees.” *Machine Learning* 1(1). doi: 10.1023/A:1022643204877.

Rashty, Josef, and John O’Shaughnessy. 2010. “Foreign Currency Forward Contracts and Cash Flow Hedging.” *CPA Journal* 80(10).

Shastri, Sourabh, and Vibhakar Mansotra. 2019. “KDD-Based Decision Making: A Conceptual Framework Model for Maternal Health and Child Immunization Databases.” in *Advances in Intelligent Systems and Computing*. Vol. 924.

Song, Yan Yan, and Ying Lu. 2015. “Decision Tree Methods: Applications for Classification and Prediction.” *Shanghai Archives of Psychiatry* 27(2). doi: 10.11919/j.issn.1002-0829.215044.

Sorokina, Daria, Rich Caruana, and Mirek Riedewald. 2007. “Additive Groves of Regression Trees.” in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Vol. 4701 LNAI.

Struyf, Jan, and Sašo Džeroski. 2006. “Constraint Based Induction of Multi-Objective Regression Trees.” in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Vol.

3933 LNCS.

Uvidia Fassler, María Isabel, Andrés Santiago Cisneros Barahona, Gabriela Jimena Dumancela Nina, Gonzalo Nicolay Samaniego Erazo, and Edison Patricio Villacrés Cevallos. 2020. “Application of Knowledge Discovery in Data Bases Analysis to Predict the Academic Performance of University Students Based on Their Admissions Test.” in *Advances in Intelligent Systems and Computing*. Vol. 1066.

Vanti, Nadia Aurora Peres. 2002. “Da Bibliometria à Webometria: Uma Exploração Conceitual Dos Mecanismos Utilizados Para Medir o Registro Da Informação e a Difusão Do Conhecimento.” *Ciência Da Informação* 31(2). doi: 10.1590/s0100-19652002000200016.

Watts, Ross L., and Jerold L. Zimmerman. 1990. “Positive Accounting Theory: A Ten Year Perspective.” *The Accounting Review* 65(1).

Zhu, Ronghang, Gaoli Sang, Ying Cai, Jian You, and Qijun Zhao. 2013. “Head Pose Estimation with Improved Random Regression Forests.” in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Vol. 8232 LNCS.

AUTHOR'S CONTRIBUTION: The contributions of the first author were the data collection, data treatment, structuring of data analysis and drafting of the text. The second author contributed to the work through the quality review about the drafting of the text, proving guidance and conducting research.

CONFLICTS OF INTEREST: The authors declare that there is no conflict of interest regarding the content of this work.