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Accounting and Game Theory: A Systematic Literature Review

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Master's in Accounting and Management Control

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BUSINESS
SCHOOL

Department of Accounting

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Resumo

A investigação contemporânea em contabilidade é cada vez mais influenciada por desenvolvimentos económicos, políticos, sociais e tecnológicos, com tendências atuais dando particular destaque à sustentabilidade, especialmente a questões relacionadas com ESG, e a utilização de abordagens interdisciplinares. A integração de tecnologias de última geração, como inteligência artificial, blockchain e análise de dados, é outra importante tendência, uma vez que estas estão a transformar os desafios na contabilidade através da automatização de processos, do desenvolvimento da deteção de fraudes e da melhoria da qualidade dos relatórios de sustentabilidade. Dentro deste contexto de evolução, a contabilidade deixa de estar limitada ao tradicional *bookkeeping* e passa a ser reconhecida como uma atividade estratégica que influencia e é influenciada por diversos stakeholders. A teoria de jogos surge como uma importante estrutura analítica para compreender as interações estratégicas entre diferentes stakeholders na contabilidade, fornecendo insights sobre como os incentivos, informação assimétrica e concorrência afetam a tomada de decisão. A presente dissertação é uma revisão sistemática de literatura baseada na metodologia PRISMA atualizada de Page et al. (2021), que analisa 45 artigos publicados nos últimos 30 anos de forma a perceber a evolução da aplicação da teoria de jogos em estudos da área de contabilidade. A revisão revela que existe uma crescente aplicação desta teoria, tanto cronologicamente como geograficamente. No entanto, a limitação da aplicação de modelos teóricos em contextos reais foi identificada enquanto sendo o principal gap na literatura. A principal contribuição deste estudo será clarificar a interseção entre teoria de jogos e contabilidade, destacando como modelos estratégicos de tomada de decisão têm sido utilizados para resolver desafios na área da contabilidade, assim como delinear propostas para futura investigação.

Palavras-chave: Teoria de Jogos, Contabilidade, Auditoria, Contabilidade de Custos; Revisão Sistemática de Literatura

Classificação JEL: C70, M40

Abstract

Contemporary accounting research is increasingly influenced by economic, political, social, and technological developments, with recent trends emphasizing sustainability, particularly environmental, social, and governance (ESG) issues, and the adoption of interdisciplinary approaches. The integration of advanced technologies such as artificial intelligence, blockchain, and data analytics is another key trend, which is transforming accounting issues by automating processes, enhancing fraud detection, and improving the quality and timeliness of sustainability reporting. Within this evolving context, accounting is no longer limited to bookkeeping but is recognized as a strategic activity that influences and is influenced by a wide array of stakeholders. Game theory has emerged as a powerful analytical framework for understanding the strategic interactions among diverse accounting stakeholders, providing insights into how incentives, information asymmetry, and competition shape decision-making and outcomes. This study employs a systematic literature review (SLR) based on Page et al.'s (2021) updated PRISMA methodology, analyzing 45 articles published over the past 30 years to understand the evolution of the application of game theory in accounting. The review reveals a clear and growing trend in the use of game-theoretic models, both chronologically and geographically. However, a key limitation was identified regarding the gap between theoretical models and their real-world applicability. The main contribution of this review is to clarify the intersection of game theory and accounting, highlighting how strategic decision-making models have been used to address complex accounting issues and providing a foundation for future research.

Keywords: Game Theory; Accounting; Auditing; Cost Accounting, Systematic Literature Review
JEL classification: C70, M40

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Glossary of acronyms

SLR	Systematic Literature Review
ESG	Environmental, Social and Governance
AI	Artificial Intelligence
SDGs	Sustainable Development Goals
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
QUOROM	Quality of Reporting of Meta-Analysis
US/USA	United States of America
AAA	American Accounting Association
MCDM	Multi-criteria Decision Making
SEC	Securities and Exchange Commission
GAAP	Generally Accepted Accounting Principles
AICPA	American Institute of Certified Public Accountants
IFRS	International Financial Reporting Standards
SJR	SCImago Journal Rank

1. Introduction

Contemporary accounting research is increasingly influenced by economic, political, social, and technological developments. Recent trends highlight the growing significance of sustainability, particularly environmental, social, and governance (ESG) issues, and a shift toward interdisciplinary approaches that draw from fields such as sociology, psychology, and law (Albuquerque & Santos, 2023). Another key trend regards technology-driven methods, including artificial intelligence, blockchain, and data analytics, which are transforming accounting issues by automating processes, enhancing fraud detection, and improving both the quality and timeliness of sustainability reporting. These innovations facilitate real-time data analysis, predictive modeling, and anomaly detection, but also raise new ethical challenges, such as algorithmic bias and data privacy concerns (Djeffal & Khaldi, 2024).

Within this evolving context, accounting is no longer limited to bookkeeping but is recognized as a strategic activity that influences and is influenced by a wide array of stakeholders. The complexity of modern business environments, coupled with the need for transparency and accountability, has led to a broader, multidimensional approach to accounting. This approach considers not only financial outcomes but also the social and moral dimensions of accounting practices (Carnegie et al., 2024).

Game theory has emerged as a powerful analytical framework for understanding the strategic interactions and decision-making processes that characterize these complex accounting environments. By modeling the interdependencies and potential conflicts among managers, auditors, investors, and regulators, game theory provides valuable insights into how incentives, information asymmetry, and competition shape behavior and outcomes in accounting contexts. Recent literature reviews emphasize that game theory is particularly useful for analyzing situations involving multiple stakeholders with conflicting interests, guiding the design of mechanisms and policies to mitigate conflicts and improve decision-making (Soyinka et al., 2024; Kanodia, 2014; Migdalas, 2002).

The integration of game-theoretic models into accounting research has expanded both theoretical understanding and practical applications. These models help explain how accounting information and strategic decisions mutually influence each other, offering a structured way to analyze and predict the outcomes of complex interactions. As accounting continues to evolve in response to technological and societal changes, game theory is expected to play an increasingly important role in informing accounting practices, regulatory policies, and standard setting (Soyinka et al., 2024).

Based on Page et al.'s (2021) Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) updated guideline for systematic reviews, this SLR analyses 45 articles from different journals, with the purpose of obtaining an overview of the application of game theory in accounting studies over the last 30 years. Within accounting, game theory helps explain how different actors, such as managers, auditors, investors, and regulators, make strategic choices based on the available information and expected actions of others.

By systematically reviewing and categorizing existing studies, this SLR aims to reveal dominant themes, identify research gaps, and offer insights into the theoretical and practical applications of game theory within accounting. Therefore, the proposed research questions are as follows:

RQ1: How has the application of game theory in accounting evolved throughout the years?

RQ2: In which areas of accounting research have game-theoretic models mostly been applied to?

RQ3: What gaps were found in the literature of game theory applied to accounting studies?

Main findings show a clear growing trend in the application of game theory in accounting studies, both chronologically and geographically. Nevertheless, authors still identify limitations in this scope, with the main identified gap being the real-life applicability of results.

A significant contribution of this paper will be to clarify the intersection of game theory and accounting, outlining how strategic decision-making models from game theory have been used to better understand various accounting issues. It stands out from previous literature reviews on the topic, namely Soyinka et al.'s (2024), as it follows a systematic review of articles published between 1994 and 2024, and identifies trends in the identified literature. Consequently, this SLR can be quite promising for future research agenda. By demonstrating how the game-theoretic perspective has been applied so far, it can provide a basis for further research not only within different accounting fields, but also in other areas of study.

This dissertation is structured as follows. Firstly, a theoretical framework is presented, introducing game theory, its history, and general applications, contextualizing it within the accounting field in order to establish the relevance of the study. Secondly, the applied methodology is described. Next, chapter 4 consists of the analysis of the selected articles, with a descriptive analysis as well as a content analysis. Lastly, a summary of conclusions, debate, and future research recommendations drawn from the analysis is presented.

2. Theoretical Framework

2.1 Game Theory

Game theory is the formal study of strategic behavior, which involves analyzing situations where the decisions of individuals or groups are mutually interdependent (Webster, 2009). It provides a mathematical framework for understanding how rational decision-makers interact in competitive or cooperative situations. The core of game theory lies in analyzing these strategic interactions, where the outcome for each participant depends on the choices made by all involved parties (Migdalas, 2002).

Game theory can be broadly categorized into cooperative and non-cooperative games. Non-cooperative game theory focuses on situations where players with differing goals cannot make binding agreements, leading to an analysis of strategic behavior and decisions. Cooperative game theory, on the other hand, assumes players have common goals and can commit to agreements, often focusing on how to distribute joint outcomes fairly (Keiding, 2015).

Other key concepts in game theory include players, strategies, payoffs, rational behavior, and Nash equilibrium (Webster, 2009). Players are the decision-making entities within a game, which can be individuals, companies, or even nations. A strategy is a complete plan of action for a player, outlining their moves in every possible situation that might arise during the game. Payoffs represent the outcomes or rewards that players receive based on the combination of strategies chosen by all players. These can be financial gains, utility, or any other measure, depending on the scenario being analyzed. Regarding rational behavior, game theory typically assumes that players are rational, meaning they aim to maximize their own payoffs and make decisions logically based on the available information. Lastly, Nash equilibrium is a state in a game where no player can improve their payoff by unilaterally changing their strategy, assuming other players' strategies remain unchanged. It represents a stable outcome where each player's chosen strategy is the best response to the strategies of the other players (Webster, 2009).

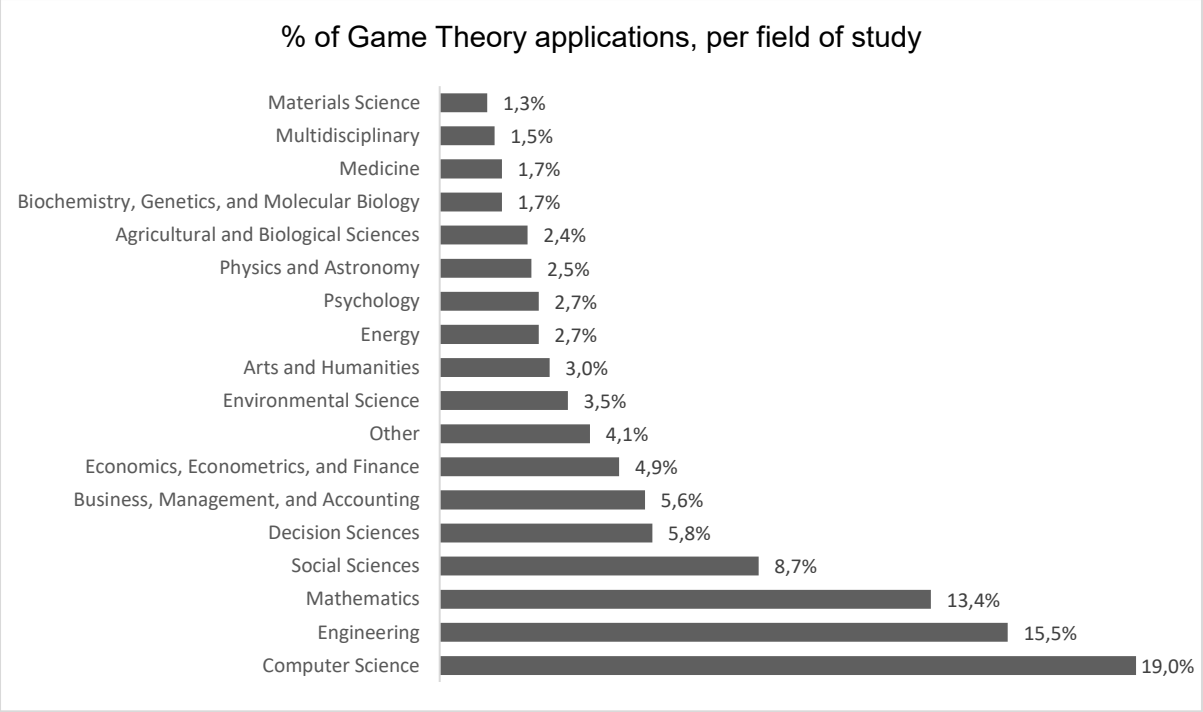
The roots of game theory can be traced back to the early 19th century, with mathematician Augustin Cournot's work in 1838 on the production decisions of duopolies, which laid the groundwork for understanding strategic behavior in economic contexts. Joseph Bertrand further developed these ideas in 1883, focusing on strategic pricing. In the early 20th century, Émile Borel also made contributions to the theme, particularly in exploring bluffing and mixed

strategies in poker, and suggested a minimax[1] equilibrium for certain games. However, it is John von Neumann who is widely credited with developing and popularizing game theory as a formal field of study. His 1928 paper established the minimax theorem and introduced the concept of the extensive form game. Collaborating with Oskar Morgenstern, von Neumann published the seminal work *Theory of Games and Economic Behavior* in 1944, which is considered the birth of modern game theory (Webster, 2009).

The field expanded significantly with John Nash's work in the early 1950s, where he introduced the concept of the Nash equilibrium for noncooperative games, a cornerstone of contemporary game theory. His contributions earned him the Economic Sciences Nobel Prize in 1994 (Nobel Prize Outreach 2025) as they revolutionized the understanding of strategic interactions, demonstrating that even in rivalrous situations, stable outcomes could be identified (Webster, 2009).

Game theory has found wide-ranging applications in fields such as economics, business, politics, psychology, and accounting, offering insights into complex decision-making processes and conflict resolution (Migdalas, 2002). This diversity of applications demonstrates the interdisciplinary nature of game theory, and the distribution of research output across fields is illustrated in the following graph based on Scopus data.

Graph 2.1.1 - Game Theory applications per field of study



Source: Elaborated by author

[1] In a zero-sum game, meaning the gain of one of the players is identical to the loss of the other, the minimax equilibrium is the optimal strategy for a player to minimize the maximum loss in a worst-case scenario (Ferreira et al., 2012).

From the 63.378 articles found in Scopus, the areas of Computer Science, Engineering, and Mathematics alone account for nearly half (47.9%) of all applications, establishing them as the primary domains for game theory application. Following this top tier, there is a pronounced and gradual decline in application frequency across other disciplines, indicating a more specialized or emerging use in those fields. The broad tail of applications across nearly every other sector, from medicine to the humanities, underscores Game Theory's power not just as a mathematical tool, but as a versatile framework for thinking strategically about any situation involving interdependent decision-makers.

2.2 Game Theory and Accounting

Accounting research is evolving to address contemporary economic, political, social, and technological developments. Recent research trends include the increasing relevance of sustainability matters, such as environmental, social, and governance (ESG) issues, and linking accounting with other social scientific areas like sociology (Albuquerque & Santos, 2023). There is also a growing emphasis on interdisciplinary approaches, incorporating insights from fields like psychology, law, and information technology (Djeffal & Khaldi, 2024).

A notable trend is the focus on technology-driven methods for fraud detection and prevention, particularly using data analytics, artificial intelligence (AI), and blockchain technologies. Studies are exploring the use of AI and machine learning for tasks such as anomaly detection, predictive modeling, and evidence analysis, while also addressing the ethical questions raised by these technologies, including algorithmic bias and potential misuse (Djeffal & Khaldi, 2024).

Another significant area of focus is the human element in fraud, with studies examining the behavioral and psychological aspects of fraudulent activities. This includes exploring personality traits, cognitive biases, and organizational culture to develop targeted interventions like ethics training programs and corporate governance reforms (Djeffal & Khaldi, 2024).

Moreover, stakeholder behavior is increasingly considered in accounting research, particularly in relation to ESG matters and the UN Sustainable Development Goals (SDGs). The impact of accounting practices on organizations, people, and nature is a key focus, with calls for a broader, multidimensional approach to accounting that considers its social and moral dimensions. This includes the need for accounting to serve the public interest and contribute to a fairer and more sustainable economy (Carnegie et al., 2024).

Game theory has emerged as a powerful analytical framework for understanding strategic interactions and decision-making across a wide range of disciplines. Literature reviews in

recent years have systematically explored its applications in fields as diverse as defense, energy management, entrepreneurship, and safety management, among others.

In defense, game theory has been extensively used to model scenarios involving intelligent agents, such as adversaries in warfare, resource allocation, information warfare, and adversary monitoring (Ho et al., 2022). In the energy sector, comprehensive reviews have documented the use of game theory in modern power grids, energy trading, and decentralized energy management (Yarar, et al, 2024). Entrepreneurship and international trade are other fields where literature reviews have mapped the application of game-theoretic models. In entrepreneurship, game theory has been used to analyze policy impacts, inter-firm competition, and the dynamics of entrepreneurial ecosystems (AlOmari, 2024). Lastly, safety management reviews have focused on the use of game theory to understand and influence stakeholder behavior in areas such as traffic, food, construction, and electrical safety (Meng et al., 2020). These studies show that game-theoretic approaches are valuable for identifying the causes of unsafe behaviors and guiding decision-making to improve safety outcomes.

In accounting, game theory can also offer a valuable framework for analyzing strategic interactions and decision-making processes, providing insights into stakeholder behavior and outcomes of different strategies. Soyinka et al. (2024) in their review of literature on game theory and accounting, emphasize that, by incorporating game theory models, researchers can study strategic decision-making situations in accounting contexts, capturing interdependencies and strategic interactions among managers, auditors, investors, and regulators. Accounting often involves conflicts of interest, and game theory helps analyze these conflicts and identify strategic behavior, guiding the design of mechanisms and policies to mitigate conflicts. Kanodia (2014) also highlighted this in his chapter *Game Theory Models in Accounting* (part of the book *Game Theory in Business Applications*), in which he sampled literature within this scope to show “why strategic interaction is important to the study of accounting phenomena” (p. 49), focusing on management accounting issues, such as budgeting and transfer-pricing, auditor hiring and pricing, and the principal-agent paradigm.

Agency theory explains a common situation where conflicts of interest may arise in accounting contexts, as it focuses on the relationship between agents and principals, more specifically, on the situations when the principal delegates decision-making authority to an agent, and the conflicts and consequences that can emerge in these situations when there’s information asymmetry and divergent interests. In these situations, game theory can be useful as it can model and analyze these interactions. Yuan and Tao (2021) adopted this approach, by modeling the principal-agent relationship as a strategic game where both the principal and the agent are rational decision-makers who choose strategies to maximize their own payoffs. This approach allowed the authors to analyze how information asymmetry and conflicting interests influence the choices of both parties, predict equilibrium outcomes under different

scenarios, and identify the conditions that lead to cooperation or opportunistic behavior. Kanodia (2014) also addresses the principal-agent framework, using game theory to model issues such as design of contracts, performance measurement and incentive problems.

Additionally, stakeholder theory in accounting settings can emphasize the need to account for the interests of various stakeholders, such as employees, customers, and suppliers, as well as shareholders, which can also lead to conflicts of interest. Bekius and Gomes (2023) used game theory in their work on strategic analysis of real-world problems with stakeholders, to represent their actions, choices, and payoffs, allowing stable and optimal outcomes to be identified. Their framework was specifically designed to support stakeholders' decision-making, learning, and problem-solving needs as it helped clarify how different stakeholders' choices interact and influence results.

Migdalas (2002) argued that "it was recognized that accounting data and strategic decisions within and across firms mutually affect each other" (p.210) and that game theoretic models have a very important role in studies involving strategic interaction. As such, by incorporating game-theoretic principles, the field of accounting has moved toward a more substantial understanding of how accounting information influences, and is influenced by, the strategic behavior of various agents. This integration has not only expanded theoretical understanding but has also provided practical insights into accounting practices, regulatory policies, and standard setting (Kanodia, 2014).

Game theory has proven to be a powerful analytical tool across diverse fields, where it models strategic interactions among multiple stakeholders and informs optimal decision-making in complex, competitive environments. As previously mentioned, similar dynamics exist in accounting, with auditors, managers, regulators, and other parties often having conflicting interests, where they must make interdependent decisions. Recent literature demonstrates that game theory can illuminate these strategic relationships in accounting contexts, including auditing, financial reporting, managerial decision-making, and stakeholder negotiations, offering insights into how incentives, information asymmetry, and competition can shape outcomes (Soyinka et al., 2024; Migdalas, 2002).

Game theory has also been applied to some of the previously mentioned more recent trends in accounting research, namely AI and technology-driven methods. O'Doherty (2014) applied game theory to model the strategic behavior of tax authorities and taxpayers, focusing on audit strategies and tax evasion. Through predictive analytics and machine learning, audit targets were selected, and the strategies were adapted based on past data. The study demonstrates that adaptive, data-driven audit strategies guided by game-theoretic insights, are more effective at detecting fraud and reducing the tax gap than random audits. On a different perspective, Siladjaja et al. (2022) investigate how management's manipulation of financial reports and tax strategies affects future market value, using AI to simulate decision-

making dynamics between management and investors. Game theory is used to frame the interactions between management and investors as a strategic game while the AI models simulate these strategies, showing how high-quality, transparent reporting leads to better market outcomes and reduces manipulation.

Despite these promising applications, the accounting literature remains fragmented, with gaps in understanding how game-theoretic models can be systematically integrated to enhance accounting practices and policy. Across all the mentioned fields, literature reviews consistently highlight the strengths of game theory in modeling strategic behavior, predicting outcomes, and informing policy and practice. They also point to ongoing challenges, such as the need for more dynamic, data-driven models and greater interdisciplinary integration. Therefore, a comprehensive literature review will allow to synthesize existing research and highlight future research avenues where game theory can further be useful in accounting research (Soyinka et al., 2024; Kanodia, 2014; Migdalas, 2002).

3. Methodology

3.1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

The methodological approach adopted to systematically review the existing literature on the intersection of accounting and game theory was Page et al.'s (2021) Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) updated guideline for reporting systematic reviews.

The PRISMA methodology is the international standard for reporting systematic reviews and meta-analyses across disciplines. Its origins trace back to the recognition that systematic reviews, while essential for evidence-based practice, were often reported with insufficient transparency and detail, limiting their reproducibility and utility. The PRISMA Statement was first published in 2009 as an evolution of the earlier Quality of Reporting of Meta-Analysis (QUOROM)[2] guidelines, and it has since undergone significant updates, most notably with the release of PRISMA 2020, to reflect advances in review methodology, digital tools, and the expanding scope of systematic reviews.

While widely used in health and medical research, PRISMA methodology has demonstrated its versatility and value across numerous disciplines, including accounting and finance (Liberato et al., 2024; Nyakuwanika & Paniker, 2025) as well as game theory (Sanz-Martín et al., 2025; Khalid et al., 2023).

The application of this systematic methodology allows researchers to map the existing literature, identify knowledge gaps, and provide a solid foundation for future research. Given its successful application in structuring complex literature reviews, the PRISMA framework was the ideal choice for this dissertation. This rigorous methodology facilitated a complete analysis of the primary concepts and applications of game theory within accounting research, ultimately allowing for a clear synthesis of the state of the field.

3.2 Data collection

The PRISMA framework defines specific phases for the data collection process. *Identification* is the initial stage where potential studies were gathered through a comprehensive search. The process began by searching the academic databases *Scopus* and *Web of Science*, using a predefined search strategy. The keyword combinations (shown in Table 3.2.1, as well as the justification for the combinations) were used searched for in the topic, keywords in title, abstract and keywords of the articles in the databases. Further search criteria (Table 3.2.2)

[2] QUOROM is a set of guidelines developed in 1996 to improve the reporting quality and transparency of meta-analyses of randomized controlled trials (Moher et al., 2009).

included a limitation to peer-reviewed journal articles, published between 1994 and 2024 within the Business, Management, and Accounting subject area.

Table 3.2.1 - Keywords used for research and justification

Keyword	Justification
Game Theory AND Accounting	General keyword to understand the extent of the application of game theory in accounting literature
Game Theory AND Audit OR Tax Evasion OR Depreciation OR Financial Reporting OR ESG Reporting OR Financial Accounting OR Fiscal	Keywords that help understanding in which accounting studies areas game theory has been applied

Source: Elaborated by author

Table 3.2.2 - Search engine criteria and justification.

Criteria	Justification
1. Topic + Keywords in Title, Abstract and Keywords	To obtain more substantial results
2. Journal Articles	To guarantee the scientific relevance of the study
3. Subject Area: Business, Management, Accounting	To guarantee the results obtained are limited to the relevant area of study
4. Published between 1994 and 2024	To facilitate a trend analysis by decade and allow for a more significant number of articles to analyze

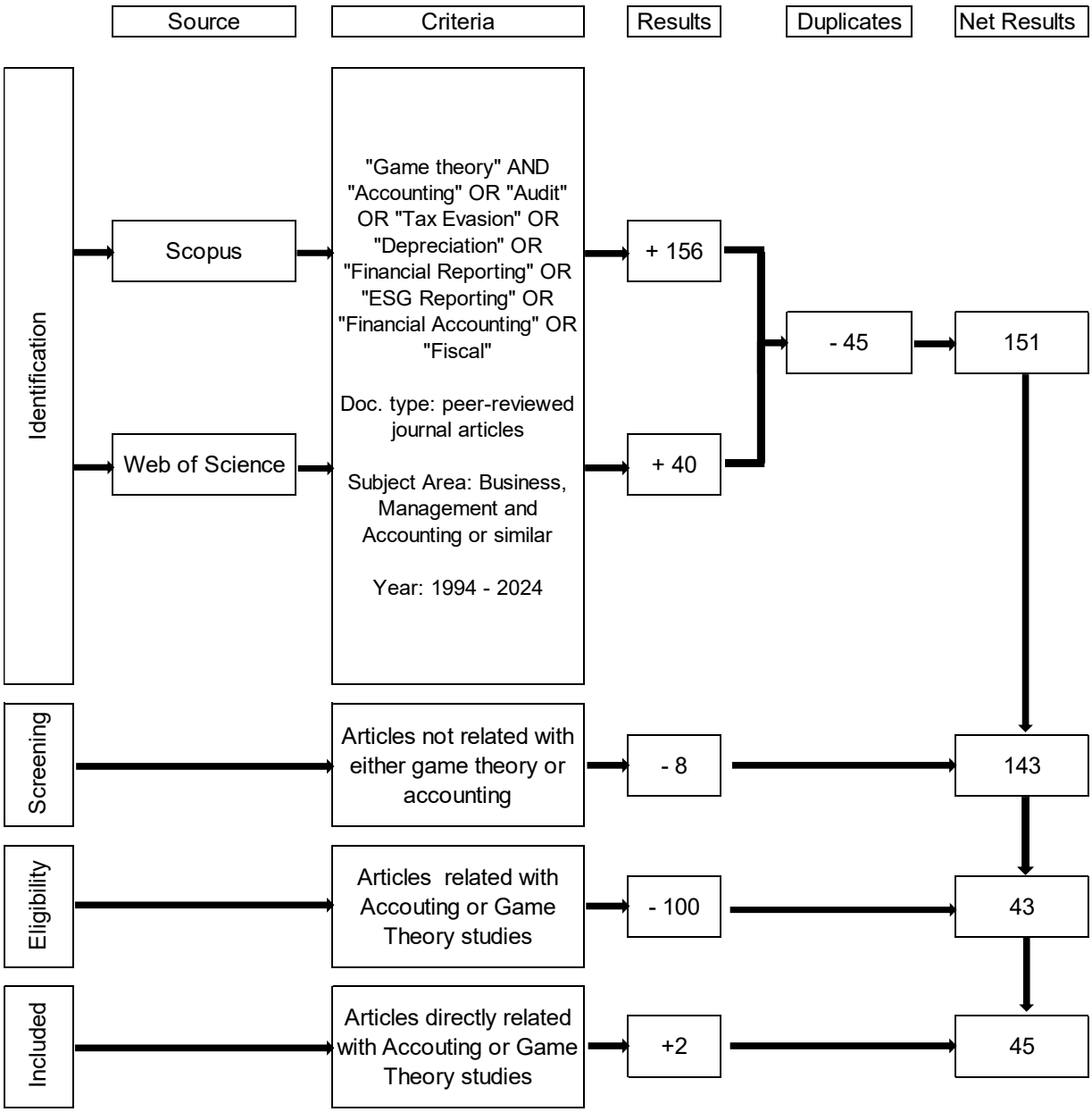
Source: Elaborated by author

In the following phase, *Screening*, the identified records were screened for relevance, by reviewing their titles and abstracts. Records that were clearly not relevant to the review's research questions were excluded (e.g., CVs). For *Eligibility*, a more detailed assessment of the full-text articles for the records that passed the screening stage was conducted. Two

exclusion criteria were considered: articles not directly related or focused on accounting studies and articles not directly related to game theory.

Two more articles were added that matched the defined criteria, which were found while researching for the theoretical framework chapter. After gathering and selecting the articles to be *Included* in the SLR, we got to this final stage with 45 articles which will be analyzed in the following chapter. This process is translated into the PRISMA flowchart below.

Figure 3.2.1 - PRISMA flowchart



Source: Elaborated by author

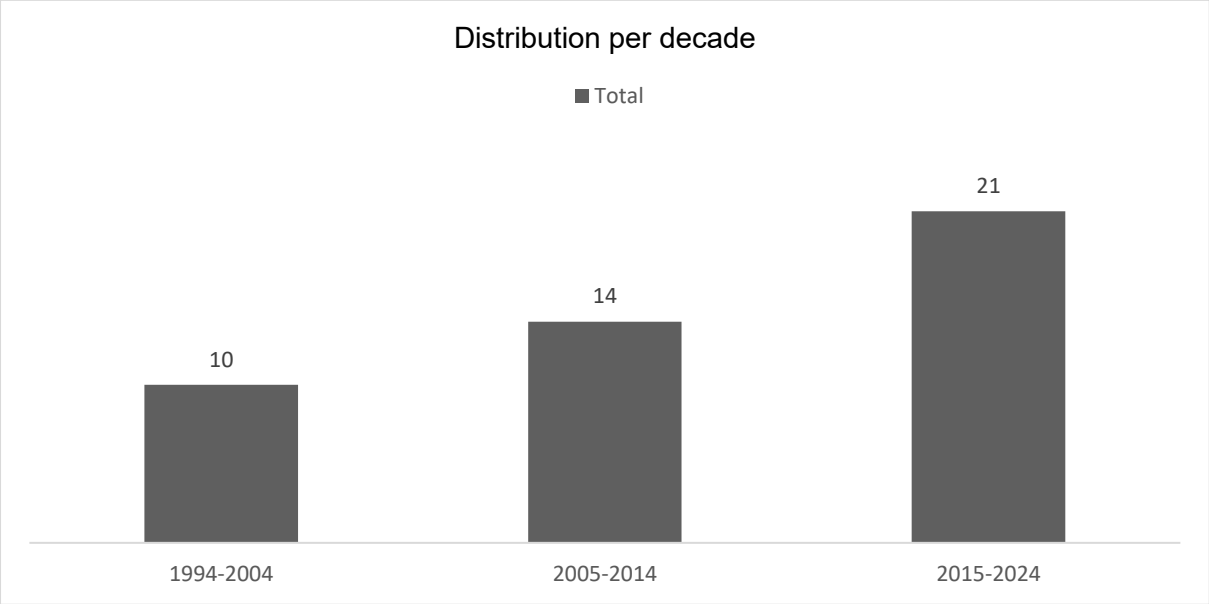
4. Results

4.1 Descriptive Statistics

4.1.1 Timeline of the articles

Analyzing the articles' distribution per decade (Graph 4.1.1.1), a clear upward trend is identified, making it possible to understand the growing interest on the application of game theory to accounting studies throughout the decades, with the 2015-2024 period having almost half (46.6%) of the total number of articles. The growing interest in the application of game theory to accounting studies is justified by the increasing complexity and strategic nature of interactions among key stakeholders in modern accounting environments. As game theory continues to be applied to more complex situations, and being integrated into emerging topics in accounting research, such as technology-driven methods and the use of AI in decision-making, it has become a more recognized tool to tackle accounting issues (Siladjaja et al., 2022).

Graph 4.1.1 – Distribution of articles per decade of publication

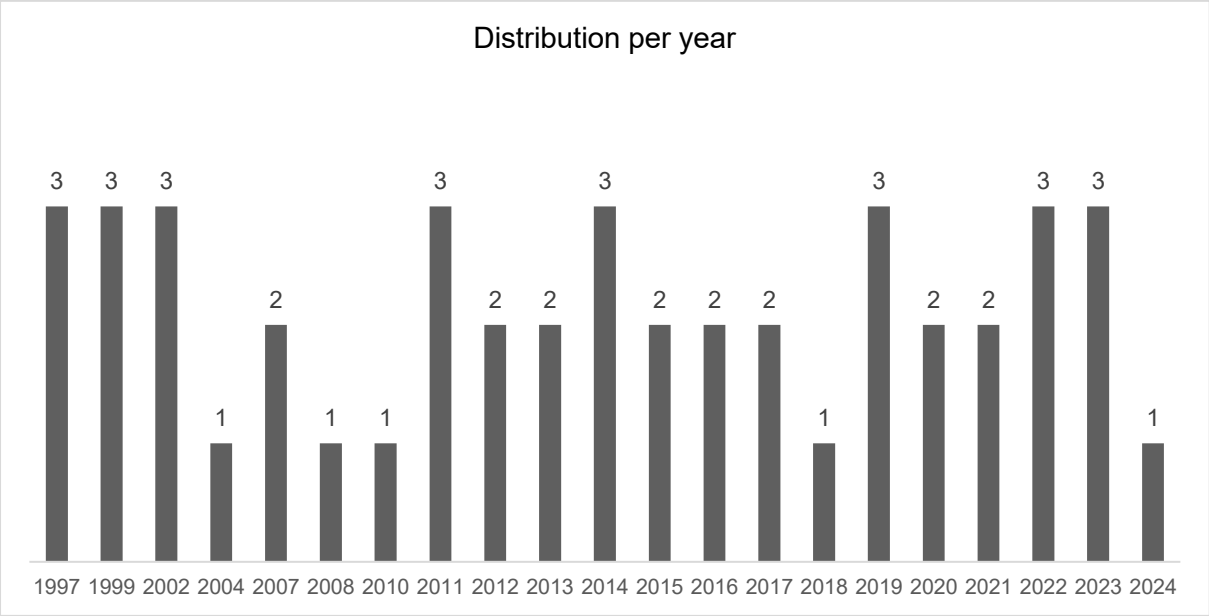


Source: Elaborated by author

When analyzing by year, the distribution is uneven, not showing a clear trend. Nevertheless, Graph 4.1.1.2 shows some gap years with zero publications, mostly in the first two decades, with 5 years between 1994 and 2004 (namely, 1994, 1998, 2000, 2001, and 2003) and 3 years between 2005 and 2014 (namely, 2005, 2006, and 2009) without

publications, while the latest decade has no gap years, which aligns with the distribution per decade. Overall, for the last 14 years, there has been at least one publication per year, while the first 16 years in analysis don't have any publications in half of them, which also shows a growing trend in the research of these applications.

Graph 4.1.1.2. – Distribution of articles per year of publication

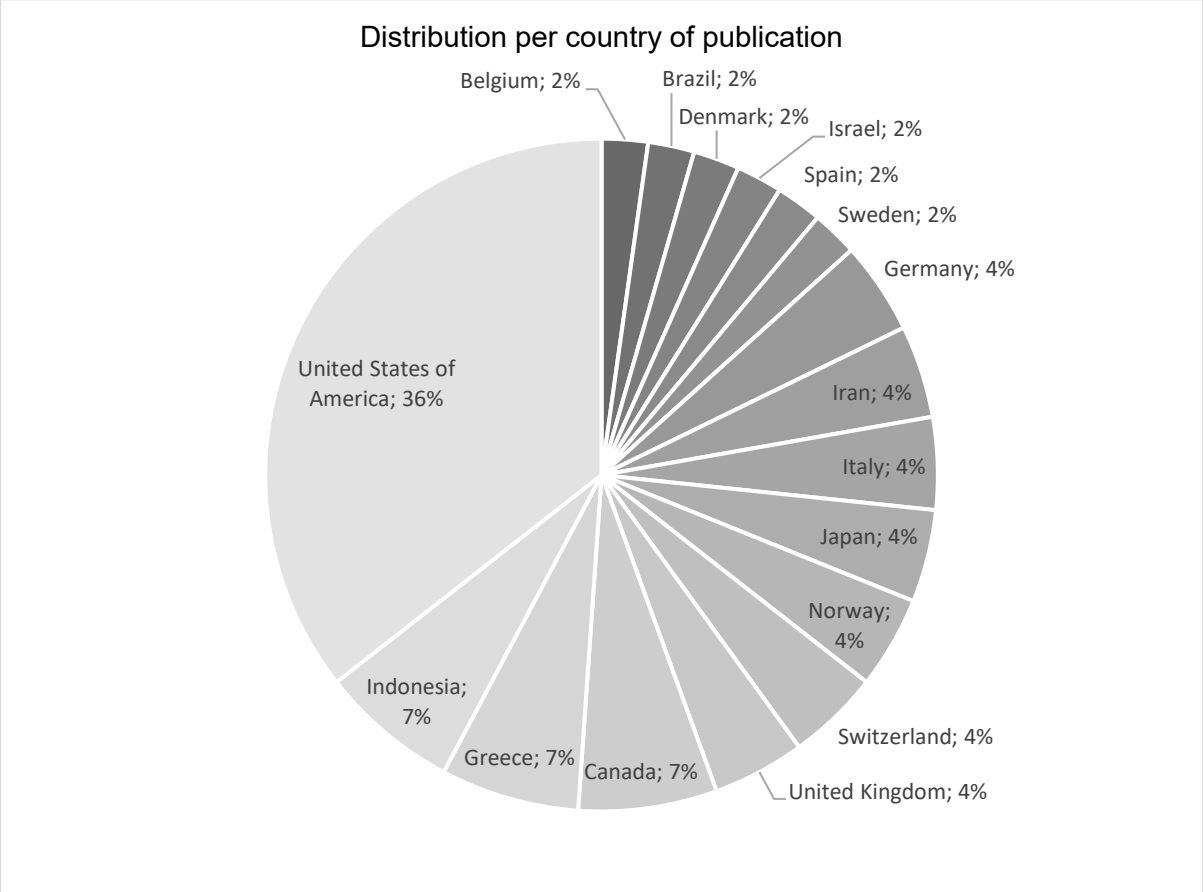


Source: Elaborated by author

4.1.2 Locus of studies

As per the distribution of the articles per locus of studies, Graph 4.1.2.1 shows that 36% of all publications included in this study were published in the USA, corresponding to a total of 16 articles, followed by Indonesia, Greece, and Canada, all with 7% of total publications. The remaining articles include another 13 countries. A notable trend is noticed, with North America having the most published articles (42%), followed by Europe (40%), Asia (8,9%), the Middle East (6,7%) and finally South America (2,2%).

Graph 4.1.2 - Distribution of articles per country of publication.

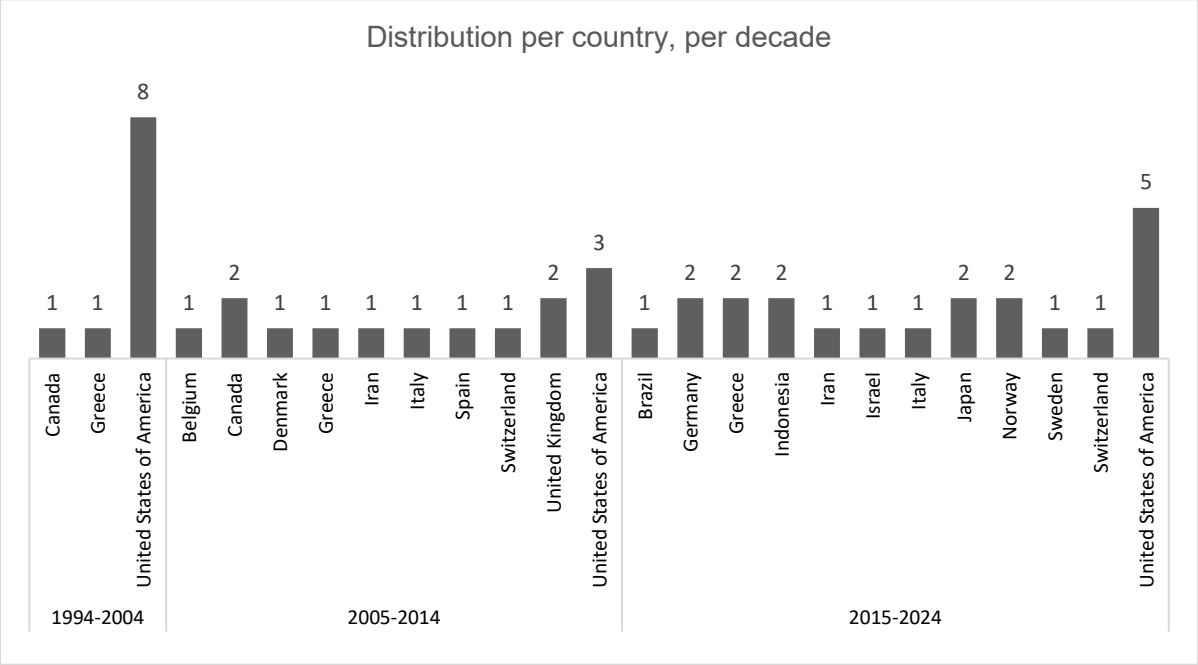


Source: Elaborated by author

When analyzing the publications per decade per country (Graph 4.1.2.2), it's also possible to verify this trend, with the first decade having mostly articles published in North America. Nevertheless, in 2002 it started expanding to Europe, with one article published in Greece, which jumpstarted the application of game theory in accounting studies in more European countries in the following years, with 57% of all articles published in the decade of 2005-2014. In 2011, the first article within this scope was published in the Middle East, and the last decade analyzed, 2015-2024, shows a growth in this geographical region, with two more articles published in 2016 and 2023. In this last decade it's also possible to see the growth into the Asian and South American continents, with 4 and 1 published articles respectively.

These numbers show that, although having started in North America, the research on the application of game theory in accounting studies has expanded geographically, with Europe having almost the same number of articles in a shorter period of time, with 19 studies in 27 years and 18 studies in 21 years, respectively. It's also possible to note a growing interest in other continents, with the topic having expanded to the Middle East, Asia and South America in more recent years.

Graph 4.1.3 - Distribution of articles per decade and per country of publication.



Source: Elaborated by author

4.1.3 Journal of publication

The articles included in the analysis are distributed among 37 journals. The most informative journal in the sample is *Accounting Review*, with four studies, followed by *Auditing*, *Advances in Accounting*, *Management Science*, *ACRN Journal of Finance and Risk Perspectives*, and *Operational Research*, all with two publications. Journals with only one published article are under “Others”, in the table below.

Accounting Review is an American Accounting Association (AAA) journal, with topical areas of interest including accounting information systems, auditing and assurance services, financial accounting, management accounting, taxation, among. Secondly, *Auditing*, also an AAA journal focuses on original research regarding improvements in auditing theory or auditing methodology. Next, *Advances in Accounting* and *Management Science* also focus on areas such as financial and managerial accounting, taxation and auditing, among others. Then, *ACRN Journal of Finance and Risk Perspectives* is a peer-reviewed journal dedicated to interdisciplinary research perspectives in the fields of Finance, Risk and. Lastly, *Operational Research* focuses on advancing operational research/management science and analytics through theoretical insights, developments and real-world case studies.

Table 4.1.3.1 also shows the ranking of each article of SCImago Journal Rank (SJR) in 2024, based on Scopus data as of March 2025. Regarding the ranking, the journal *Management Science* is also highlighted, having the highest ranking amongst all 37 articles,

evaluated in 5,72, followed by *Information Systems Research*, evaluated in 4,85. *Management Science* includes not only relevant contributions to accounting and finance but also to business strategy, decision analysis, and information systems, among others. *Information Systems Research* is a leading peer-reviewed, international journal focusing on theory, research, and intellectual development for information systems in organizations, institutions, the economy, and society. It is dedicated to furthering knowledge in the application of information technologies to human organizations and their management and, more broadly, to improving economic and social welfare.

More than half of the total list of journals (54%) has rankings within the first quartile, making them high-impact sources. The SJR indicator calculates the average number of weighted citations a journal receives in a selected year, in this case 2024, for documents published in that journal during the previous three years. The journals are then ranked according to their SJR and divided into four equal quartiles, with Q1 representing the highest value and Q4 the lowest.

Table 4.1.1 - Distribution of articles per journal of publication.

Journal	Total	Ranking	Quartile
Accounting Review	4	4,05	Q1
Auditing	2	2,08	Q1
Advances in Accounting	2	0,46	Q2
Management Science	2	5,72	Q1
ACRN Journal of Finance and Risk Perspectives	2	0,13	Q4
Operational Research	2	0,66	Q2
Others (1 article each)	31	1,33	
Total/Average	**45**	**2,06**	

Source: Elaborated by author

4.1.4 Citations

Lastly, analyzing the authors and articles by number of citations, Guajardo and Rönnqvist (2016) (2015) accumulate the most citations on their work on cost allocation, followed by Audy et al. (2011). It's important to note that some more recent publications might have had less time to accumulate citations. For example, Wong et al.'s study, *Cost allocation in spare parts inventory pooling* (2007), despite having more citations than Wilks and Zimberman's *Using game theory and strategic reasoning concepts to prevent and detect fraud* (2004), it has a lower citation per year ratio, with an average of 3,5 and 3,71 citations per year, respectively.

Table 4.1.2 - Number of citations per authors per article

Author(s)	Year	Article Title	Citations
Guajardo, Mario; Rönnqvist, Mikael	2015	*Cost allocation in inventory pools of spare parts with service-differentiated demand classes*	30
	2016	*A review on cost allocation methods in collaborative transportation*	236
Audy, Jean François; D'Amours, Sophie; Rousseau, Louis Martin	2011	*Cost allocation in the establishment of a collaborative transportation agreement-an application in the furniture industry*	100
Jeffrey Wilks, T.; Zimbelman, Mark F.	2004	*Using game theory and strategic reasoning concepts to prevent and detect fraud*	78
Wong, Hartanto Wijaya; Oudheusden, Dirk Van; Cattrysse, Dirk G.	2007	*Cost allocation in spare parts inventory pooling*	63
Bowlin, Kendall O.; Hobson, Jessen L.; David Piercey, M.	2015	*The effects of auditor rotation, professional skepticism, and interactions with managers on audit quality*	60
Bloomfield, Robert J.	1997	*Strategic dependence and the assessment of fraud risk: A laboratory study*	49
Vanovermeire, Christine; Sörensen, Kenneth	2014	*Integration of the cost allocation in the optimization of collaborative bundling*	44
Rowe, Casey; Shields, Michael D.; Birnberg, Jacob G.	2012	*Hardening soft accounting information: Games for planning organizational change*	37
Corona, Carlos; Randhawa, Ramandeep Singh	2010	*The auditor's slippery slope: An analysis of reputational incentives*	36
Anastasopoulos, NP; Anastasopoulos, MP	2012	*The evolutionary dynamics of audit*	26
Fischbacher, Urs; Stefani, Ulrike	2007	*Strategic errors and audit quality: An experimental investigation*	24
Rhoades, Shelley C.	1999	*The impact of multiple component reporting on tax compliance and audit strategies*	23
Hansen, Stephen C.; Watts, John S.	1997	Two models of the auditor - Client interaction: Tests with United Kingdom data	20
Migdalas, Athanasios	2002	*Applications of game theory in finance and managerial accounting*	17

Source: Elaborated by author

4.2 Content Analysis

For the content analysis, as one of the objectives of this dissertation is to analyze which areas of accounting research have game-theoretic models been applied to, the included articles were divided and grouped into categories, based on the focal topic of the research. The identified topics were Management Accounting, Auditing, Cost Accounting, Tax and Compliance, Ethics in Accounting, Management Control, and Accounting and Conceptualization. Out of the 45 articles, 40% are focused on auditing issues, followed by 27% focusing on cost accounting matters and 11% in ethics in accounting. Management Accounting and Tax and Compliance both account for 9%, followed by Accounting and Conceptualization with 4% and, lastly, Management Control, with 2%. A complete list, with the articles included in each category, can be found in Table 4.2.2.

Table 4.2.1 - Number of articles per category

Category	Total
Management Accounting	4
Auditing	18
Cost Accounting	12
Tax and Compliance	4
Ethics in Accounting	5
Management Control	1
Accounting and conceptualization	2

Source: Elaborated by author

Table 4.2.2 - List of articles per category

Category	Article Title
Management Accounting	*Allocating fixed costs using multi-coalition epsilon equilibrium*
	Applications of game theory in finance and managerial accounting
	Hardening soft accounting information: Games for planning organizational change
	Using game theory and fuzzy Multi-criteria Decision Making (MCDM) to choose strategic orientation in uphold of private sector by approach balanced scorecard: Iranian industries
Auditing	*A Stackelberg game for the Italian tax evasion problem*
	A survey of models for determining optimal audit strategies
	Audit firms-clients relationships: A socio-economic theory perspective
	Audit policies under the sentinel effect: Deterrence- driven algorithms
	Financial statement audits, a game of chicken?
	Has the lack of use of the qualified audit opinion turned it into the "Rotten Kid" threat?
	Optimal dynamic auditing based on game theory

	Regulating the Market for Audit Services: A Game Theoretic Approach
	Strategic analysis of securities litigation against independent auditors
	Strategic dependence and the assessment of fraud risk: A laboratory study
	Strategic errors and audit quality: An experimental investigation
	The auditor's slippery slope: An analysis of reputational incentives
	The effects of auditor rotation, professional skepticism, and interactions with managers on audit quality
	The evolutionary dynamics of audit
	The impact of multiple component reporting on tax compliance and audit strategies
	Thinking and learning in the tax evasion game
	Two models of the auditor - Client interaction: Tests with United Kingdom data
	Using game theory and strategic reasoning concepts to prevent and detect fraud
Cost Accounting	*...and justice for all - Cost fairness in Volkswagen's product family*
	A review on cost allocation methods in collaborative transportation
	An Experimental Investigation into Reputation Effects and the Demand for Auditing Services
	Cooperative games in facility location situations with regional fixed costs
	Cost allocation in inventory pools of spare parts with service-differentiated demand classes
	Cost allocation in spare parts inventory pooling
	Cost allocation in the establishment of a collaborative transportation agreement-an application in the furniture industry
	Cost-based transfer pricing with the existence of a direct channel in an integrated supply chain
	Depreciation games
	Integration of the cost allocation in the optimization of collaborative bundling
	Second-partner review: An experimental economics investigation
	The Basic Core of a Parallel Machines Scheduling Game
Tax and Compliance	*A Theoretical Model to Discuss Tax Avoidance Based on Game Theory*
	Population dynamics of tax avoidance with crowding effects
	The impact of supply chain strategy on real earnings quality and market added value
	The impact of multiple component reporting on tax compliance and audit strategies
Ethics in Accounting	*Do regulatory policies on auditing affect executive pay?*
	Economic analysis of accountants' ethical standards: The case of audit opinion shopping
	Market exit through divestment-the effect of accounting bias on competition
	The Impact of Real Manipulation and Tax Management on Future Market Value: An Artificial Intelligence Simulation of High Earnings Quality
	Yuji Ijiri's Fairness Question in Accounting: A Deontological Game Theoretic Approach

Management Control	*Unobservable transfer price exceeds marginal cost when the manager is evaluated using a balanced scorecard*
Accounting and conceptualization	*An essay on conceptualization of issues in empirical accounting research*
	Quality in qualitative management accounting research

Source: Elaborated by author

4.2.1 Management Accounting

Management accounting has traditionally focused on interpreting past performance, but according to recent studies, the discipline has increasingly incorporated the strategic interactions among the actors who produce, interpret and act on accounting information. Game-theoretic models provide a formal language for describing these interactions, allowing scholars to analyze how incentives, information, and collaboration shape managerial decisions. The four papers examined within this scope illustrate distinct ways in which game theory is applied to management-accounting problems (Kanodia, 2014).

Firstly, Migdalas' *Applications of Game Theory in Finance and Managerial Accounting* (2002), offers an overview of how game theory, and especially the principal-agent model, has become fundamental to managerial accounting. The author's approach is to model the interactions between principals (such as owners or upper management) and agents (such as managers or employees) who may have conflicting interests and access to different information. By modeling these relationships as games, the article shows how incentive structures and contracts can be designed to ensure these interests are both aligned and more efficient. The findings highlight that game theory has brought better solutions to issues like performance measurement, compensation, and resource allocation, making it a foundational tool for addressing complex organizational problems in accounting.

The second article found within the Management Accounting scope is *Hardening soft accounting information: Games for planning organizational change* (2012), which discusses the challenge of making subjective, or *soft*, accounting information more reliable for organizational planning. The authors use applied game theory and social psychology to identify four types of multi-person games that organizations play to *harden* this information. Their methodology consists of analyzing field evidence and characterizing these games by their payoffs, the players involved, and the comparability of the information. The findings reveal that the effectiveness of these games depends on the participants and the nature of the information they bring. The rules for improving information quality emerge from social interactions, and organizations learn through trial and error how to adjust these rules and participants to achieve more credible accounting data. This work shows that game theory can

model the social processes that underpin the credibility and usefulness of accounting information in practice.

Thirdly, is Jafari-Eskandari et al.'s article *Using game theory and fuzzy MCDM to choose strategic orientation in up hold of private sector by approach balanced scorecard: Iranian industries* (2011), which integrates game theory with the balanced scorecard (BSC) framework, a popular tool in strategic management and managerial accounting. The methodology treats different strategic agents, such as departments or managers, as players in a game, and proposes an interaction method to foster collaboration and reduce inconsistencies in strategic objectives. By modeling these interactions, this approach helps align the actions of various parts of the organization, making strategic management more coherent and effective. The findings suggest that this game-theoretic approach can address some of the drawbacks of the traditional BSC by improving coordination and reducing conflicting objectives among different organizational units.

The last article to be included in this group is Pendharkar's *Allocating Fixed Costs Using Multi-Coalition Epsilon Equilibrium* (2021). The author addresses the challenge of allocating fixed costs among different groups within an organization. The methodology involves formulating the cost allocation problem as a game among coalitions, where each coalition has its own objectives. The problem is solved using the epsilon equilibrium concept (a generalization of Nash equilibrium) and a genetic algorithm, with real-world datasets used for testing. The findings indicate that this approach generates multiple, statistically similar solutions around the epsilon equilibrium, allowing managers to choose among them based on subjective preferences. This flexibility is particularly valuable in situations where there are competing interests and no single best solution, demonstrating how game theory can support fair and adaptable cost allocation in complex organizations.

4.2.1.1 Future research directions

Based on the methodologies and results of the articles included in the Management Accounting category, it's possible to identify several promising directions for future research in the application of game theory to management accounting. One key area is the further development and empirical testing of principal-agent models in more complex organizational contexts. These models contribute to an understanding of the impacts of information asymmetries and incentive structures on managerial behavior (e.g., through budgeting, transfer pricing and performance evaluation). However, their practical application is often limited by strong assumptions like complete contracting and costless communication, which rarely hold in real organizations. Future research should focus on developing models that better reflect the complexity of real-world organizations and using advanced mathematical

programming techniques to analyze and solve these more realistic models, thereby enhancing the relevance and effectiveness of game-theoretic approaches in management accounting (Migdalas, 2002).

Another recommendation is to expand the research of *hardening* subjective accounting information. Future studies could investigate how different organizational cultures, leadership styles, as well as technological tools can influence the effectiveness of the multi-person games that demonstrated improvements on information reliability. Additional cross-industry studies could offer deeper insights into how organizations learn and adjust these social processes over time, and how these adaptations impact planning and change management (Rowe et al., 2012). Overall, future research should focus on empirical validation, cross-disciplinary integration, and adaptation of game-theoretic models to the evolving realities of management accounting practice.

4.2.2 Auditing

The intersection of auditing and game theory has become a growing field for both theoretical innovation and empirical discovery. Across the articles analyzed below, scholars have used strategic interaction models to explain how auditors, taxpayers, firms and regulators anticipate one another's moves, and they have tested those models with experiments, field data, simulations and surveys. The articles will be analyzed in four categories, namely, audit-client relationships, audit strategies, audit quality and fraud-risk assessment.

Firstly, starting with audit-client relationships, Coates et al. (2002) introduced the game of chicken (meaning, a zero-sum game with multiple equilibria) to model the client's decision to misstate versus the auditor's decision to intensify effort. The mixed-strategy equilibrium yields a low probability of audit failure but also shows that higher auditor ethics raises the probability of extended audits even when the client reports fairly.

Corona and Randhawa (2010) examined a two-period reputational game in which the auditor's decision to report detected fraud affects future fees. Reputational incentives are often thought to improve the quality of auditing, but this article challenges that assumption by analyzing how reputation can sometimes encourage auditors to misreport. Using a two-period game model between a manager and an auditor, the study shows that when reputation is the auditor's only motivator, strategic managers can exploit this to gradually increase fraud over time. As the auditor's tenure continues, the likelihood of the auditor reporting fraud actually decreases, creating a *slippery slope* where both managerial fraud and auditor misreporting worsen as their relationship progresses.

Mahdavi and Daryaei's *Audit firms-clients relationships: A socio-economic theory perspective* (2016) looks at how auditors and their clients interact, treating them as two rational players whose main issue is the audit fee (the price the client pays for the audit). It builds a model that mixes market-equilibrium ideas with game-theoretic concepts such as sequential rationality and signaling games, showing how each side's information and signals affect the fee-setting process. By solving the resulting mathematical equations and a payoff-matrix game, the authors find that the balanced audit fee depends on factors like client size, complexity, ownership structure, and inflation, and that an optimal fee level can be calculated from the strategies of both auditor and client.

Hansen and Watts (1997) examine the audit-client relationship by comparing two models of auditor-manager interaction: the game-theoretic model, where the auditor actively considers how their testing strategy influences the manager's reporting, and the decision-theoretic model, where the auditor passively assumes the manager's reporting is fixed. Using United Kingdom data, the authors empirically estimate both models and apply nested hypothesis tests to assess their validity. The findings show that the active, game-theoretic model more accurately reflects the real dynamics between auditors and managers, providing the first empirical support for this approach with archival accounting data.

Lastly within this scope, Cipriano et al.'s (2017) work argues that the US Securities and Exchange Commission's (SEC) rigorous stance, which treats any financial statement filed with a qualified audit opinion as a securities violation, has rendered the threat of qualification a non-credible threat. Using game theory to model auditor-client negotiations and archival data from 2000 to 2015, the authors found that qualified opinions are extremely rare (only 11 issued to US registrants) and often result in severe client consequences like delisting. The core finding is that, because issuing a qualified opinion results in negative utility for the auditor (due to consequences like lost clients or lawsuits), the client anticipates the auditor will avoid issuing it. This lack of auditor leverage limits the ability to negotiate Generally Accepted Accounting Principles (GAAP) compliance, potentially reducing financial reporting quality. The paper suggests relaxing the SEC ban could improve audit quality by making the threat of qualification credible.

The second group of articles focuses on the study of audit strategies. Rhoades (1999) investigates how requiring taxpayers to report multiple components of taxable income, rather than just a single net figure, affects both taxpayer compliance and tax authority audit strategies. Using a model that allows the tax authority to audit different components of a tax return sequentially, where the decision to audit one part depends on the findings from another, the study finds that multi-component reporting generally reduces overall tax evasion and increases net revenue for the tax authority compared to single-report systems. However, the effect is not uniform: while some taxpayers become more compliant, others with more

opportunities to misreport may actually increase their evasion under the multi-component system.

O'Doherty (2014) explores how tax authorities and taxpayers interact in the context of tax evasion, using game theory and behavioral economics. The author critiques traditional models for not reflecting true equilibrium behavior and instead examines scenarios with heterogeneous taxpayers, imperfect information, and evolving taxpayer strategies. The study finds that, under these realistic conditions, tax authorities adopt adaptive learning strategies, constantly updating their audit approaches based on observed taxpayer behavior, rather than following fixed audit rules. This adaptive approach aligns with the predictive analytics methods currently used by many tax administrations, and the research suggests that in environments with abundant information, adaptive learning becomes the dominant strategy over abstract, fixed-rule thinking.

Gambarelli et al. (2022) present a Stackelberg game model to help the Italian tax authority allocate its limited audit budget across different business clusters, classified by size, to combat tax evasion more effectively. The methodology segments taxpayers into classes and models the tax authority as the leader who optimally distributes fiscal controls, while potential evaders act independently as followers. Using real data from Italy from 2015, the study finds that the model recommends increasing audits for larger businesses and reducing them for smaller ones, differing from the actual audit distribution performed by the authority. The results suggest that a more targeted allocation of audit resources could improve tax compliance and the effectiveness of anti-evasion efforts.

Bouayad et al. (2019) introduce a new audit algorithm that incorporates both the direct impact of audits on fraudulent individuals and the broader *sentinel effect*, where the presence of audits deters others from committing fraud. Focusing on healthcare, the study demonstrates that using deterrence-driven audit policies that account for the sentinel effect can significantly reduce excess costs due to fraud, waste, and abuse, while also maintaining fairness in the selection of audit targets.

Eleftheriou et al.'s (2023) article uses game theory to analyze how different mandatory audit firm rotation policies influence the relationship between auditors and their clients, focusing on detection risk and auditor skepticism. The study finds that both short-term and long-term mandatory rotation reduce the risk of compromised auditor skepticism compared to no rotation but lead to higher audit fees and lower detection risk. Short-term rotation, however, results in lower fees but higher detection risk than long-term rotation due to increased informational frictions. The research also suggests that additional regulatory measures, such as heightened scrutiny of auditors or clients, can further reduce detection risk and improve audit quality.

Cushing and Gilbertson's *Strategic analysis of securities litigation against independent auditors* (2002) models the interaction between an accounting firm and a plaintiff's attorney in US securities class actions. The authors conclude that the way lawyers are compensated makes settlement the dominant outcome of these lawsuits, and only a binding, credible commitment can effectively discourage costly litigation for auditors.

Applegren's (2020) survey of audit-strategy models reviews frameworks for optimizing how auditors allocate their resources across a population, considering that some individuals are inherently honest while others may commit fraud. It compares strategies where the audit approach is either announced in advance or kept secret and finds that models including a mix of honest and dishonest auditees better reflect real-world situations. The study concludes that when it is possible to pre-announce the audit strategy, as is often the case in tax and benefit audits, this approach is generally preferred by auditors because it leads to more effective outcomes and greater external validity.

The last article to be analyzed within the scope of auditing strategies, is the study by Anastasopoulos and Asteriou (2021) which uses a dynamic game-theory model to address the critical policy issue in auditing of how long an auditor should remain with a single client. Their model addresses the trade-off between familiarity, which states that a longer tenure can lead to better audit quality as the auditor gains experience with the client, and interdependence, which says long-term relationships can create sympathy or a lack of skepticism, potentially compromising auditor independence. The model provides a closed-form solution for optimal auditor replacement, suggesting that auditors with less independence should be replaced sooner, while highly independent auditors could have tenures extending beyond eight periods.

Thirdly, articles related to audit quality will be analyzed. Fischbacher and Stefani's (2007) experimental study used a game-theoretic approach to simulate interactions between managers and auditors, focusing on whether increasing the proportion of perfectly honest, high-effort auditors would improve the quality of audited financial statements. The findings revealed that audit quality was indeed higher when more auditors consistently applied high effort and honesty, a result that diverged from traditional Nash equilibrium predictions but was supported by models that account for bounded rationality. This suggests that the presence of diligent and ethical auditors plays a crucial role in enhancing audit quality, regardless of the specific incentives or payoff structures in place.

Another laboratory experiment is analyzed within this scope, with Bowlin et al.'s (2015) test on whether the impact of mandatory auditor-rotation on audit quality depends on the auditor's mental frame when evaluating a manager's statements. When auditors approached the manager's representations with an honesty frame, forcing a rotation improved audit quality; but when they adopted a skeptical frame, the same rotation actually lowered audit quality. This

pattern held regardless of whether the auditor had a high or low level of informal interaction with the manager.

The work by Wilks and Zimbelman (2004) argues that the core application of game theory in auditing is to improve an auditor's strategic reasoning. Instead of viewing an audit as a procedural checklist, game theory encourages auditors to anticipate the strategic behavior of the auditee. This application is broken down into three key audit tasks: fraud risk assessment, audit planning and audit plan implementation. Firstly, by recognizing that fraud is a strategic act, auditors can use game theory concepts to better assess risks beyond static checklists, which may dilute the effectiveness of the assessment. Secondly, by designing more effective and unpredictable audit plans, they increase the likelihood of detecting fraud, as the auditee cannot easily anticipate and conceal their actions. Thirdly, strategic reasoning helps auditors better anticipate how a client might respond to certain audit procedures, improving the overall efficacy of the audit.

Anastapolous and Anastapolous' (2012) article uses evolutionary game theory to model the interaction between auditors and auditees as a two-player game, where the auditor seeks to detect misstatements with minimal effort and the auditee may attempt fraudulent reporting. The methodology involves analyzing the stability of the game under different information scenarios: when both parties have accurate information and when the auditor has only partial information about the auditee. The findings show that with accurate information, the game reaches a stable but not asymptotically stable equilibrium, meaning the balance can be disrupted over time. When auditors have limited information, they must perform more comprehensive audits to maintain quality. The study also analytically examines how the duration of the auditor-client relationship influences audit quality.

The last article to be analyzed within this scope is Bloomfield's *Strategic dependence and the assessment of fraud risk: A laboratory study* (1997). The paper investigates how auditors assess fraud risk in situations where their decisions are strategically dependent on those assessments. Using laboratory experiments, participants acted as auditors and were placed in scenarios with varying levels of legal liability and internal control strength. The study found that auditors had greater difficulty accurately assessing fraud risk when their optimal strategies were highly sensitive to these assessments, especially when facing high legal liability and strong internal controls. These findings suggest that in such complex environments, auditors may struggle to balance cost competitiveness with the need to avoid audit failures, and that traditional models assuming perfect risk assessment may not accurately predict auditor behavior in practice.

4.2.2.1 Future research directions

Research in audit quality, audit strategy, fraud risk assessment, and auditor-client relationships has increasingly used game theory and experimental approaches to understand the complex interactions between auditors and clients. However, several areas remain underexplored and present valuable opportunities for future investigation. One key recommendation is to extend current models beyond single-period or static frameworks. Most existing research focuses on one-off interactions between auditors and clients. Future research should develop multi-period or dynamic models to better capture how audit-client relationships evolve over time, especially considering factors like auditor turnover, auditor rotation, and repeated interactions. Such models could provide deeper insights into how strategies and ethical behaviors change as relationships mature or as reputational incentives accumulate (Coate et al., 2002).

Another area for future research is the impact of audit strategy transparency. Studies indicate that pre-announcing audit strategies, especially when some auditees are inherently honest, can lead to better compliance outcomes than random or undisclosed audit selection. More research is needed to determine how different levels of transparency and communication affect both honest and dishonest auditees, and whether these findings hold across various regulatory environments and audit types (Appelgren, 2020). Additionally, there is a need to investigate the regulatory and policy implications of audit strategy design, such as the effects of mandatory audit firm rotation, increased scrutiny, and resource allocation across different auditee groups. These factors can influence audit quality, detection risk, and the overall effectiveness of audit strategies, and should be studied using both theoretical models and real-world data (Gambarelli et al., 2022).

Lastly, future research should examine how the presence of auditors who consistently apply high audit effort, such as computerized or automated auditors, affects overall audit quality. Experimental evidence suggests that audit quality improves when such auditors are present, even more than traditional game theory would predict. Further studies could explore the integration of technology and automation in auditing, and how these changes influence both auditor and client behavior in real-world settings (Fischbacher & Stefani, 2007). There is also a need for research on how auditors can better use strategic reasoning to detect and prevent fraud. This includes developing new approaches for fraud risk assessment, audit planning, and audit plan implementation. Studies should also investigate how changes in auditing standards and the use of game theory concepts can enhance auditors' ability to anticipate and respond to fraudulent behavior (Wilks & Zimbelman, 2004).

4.2.3 Cost Accounting

The first paper that will be analyzed in the cost accounting scope investigates how costs should be allocated among manufacturers collaborating in a parallel machine scheduling game, where each manufacturer aims to minimize the total completion time of jobs on their machines. Using a cooperative game theory approach, Alon and Anily (2023) develop a linear-complexity methodology to analyze the *core*, a set of stable cost allocations where no subgroup of manufacturers would benefit by leaving the coalition. They prove that the core is not only nonempty but infinitely large, ensuring that there are always fair and stable ways to split costs among all participants. The findings emphasize that with core-based cost allocation, collaboration remains profitable and stable, as no group of manufacturers has an incentive to break away, supporting both fair accounting and long-term cooperation in manufacturing or distributed computing partnerships.

Wong et al.'s (2007) study on cost allocation in spare parts inventory pooling by applying game-theoretic models considers both fully cooperative scenarios, where all members act without self-interest, and competitive situations, where each participant seeks to maximize their own benefit. The core concept from cooperative game theory is used to design fair cost allocations in the cooperative case, while the Nash equilibrium is used to analyze how cost allocation policies influence inventory decisions in competitive settings. Another paper focuses on inventory pools with members that have different service level requirements, representing various demand classes. Guajardo and Rönnqvist (2015) explore how these differences affect the stability of cost allocation, using cooperative game theory to analyze the problem. Computational experiments reveal that the stability of allocations can be sensitive to the diversity of service level targets.

In the context of transportation, a case study in the Canadian furniture industry demonstrates that collaborative logistics can lead to substantial cost savings and reduced delivery times. Audy et al.'s (2011) study proposes and validates a new cost allocation method that accounts for the heterogeneous requirements of each company, showing that practical application and sensitivity analysis are crucial for real-world success. Guajardo and Rönnqvist's (2016) comprehensive review of over 40 cost allocation methods in collaborative transportation highlights the diversity of approaches, ranging from simple proportional rules to advanced game-theoretic models. The review also reports on industrial savings achieved through these collaborations and discusses the theoretical foundations and application contexts of the main methods.

Finally, another study integrates cost allocation directly into the operational planning of collaborative bundling, using the Shapley value[3] from game theory. Vanovermeire and Sörensen's (2014) integrated approach, as opposed to planning first and dividing costs later, is shown to increase partner satisfaction and further enhance the benefits of collaboration.

Two experimental economics papers examine audit-related behavior. Firstly, Finley et al.'s (1999) paper examines how reputation impacts cost accounting in the context of auditing and agency relationships. Using an experimental market model with risk-neutral owners and risk-averse managers, the study simulates scenarios where managers may misreport income due to information asymmetry, and auditing is a costly service that can be requested by either party. The findings show that strong reputation effects lower total agency costs by increasing honest reporting from managers and reducing the demand for costly audits by owners. This means that reputation serves as a cost-effective mechanism for controlling agency costs, leading to more efficient cost allocation and accounting within organizations. Secondly, Tucker and Matsumura's (1997) study treats the audit process as a cost-allocation problem in which an engagement partner and a second-partner reviewer share the cost of producing an unbiased audit opinion. The authors model the partners as economically rational agents who receive a monetary penalty when a biased report is issued and a bonus when the client-preferred, aggressive accounting method is accepted, therefore creating explicit cost incentives for bias. Using a laboratory experiment with 152 students, the key finding is that a second-partner reviewer dramatically lowers the average rate of biased reporting, demonstrating that adding a reviewer reduces the expected cost of bias for the engagement partner.

On the matter of fairness and efficiency in cost allocation, Muller's (2017) paper examines cost sharing within Volkswagen's product family, where multiple autonomous firms collaborate to achieve economies of scale and scope. The study critiques the traditional average cost assignment method, finding it neither fair nor stable for participating firms. Instead, it applies a cooperative game theory framework to model each firm as a player in a cost reduction game. This approach enables the calculation of cost shares that are considered fair by all parties, ensuring that each firm has an incentive to join and remain in the coalition.

Secondly, Hamamura (2022) explores transfer pricing in a vertically integrated supply chain that includes a direct sales channel. It analytically compares two common accounting methods for transfer pricing: full-cost and variable-cost pricing. Using a non-cooperative game theoretical model, the study finds that full-cost pricing can be more profitable than variable-

[3] The Shapley value is a solution concept used in game theory that involves fairly distributing both gains and costs to several actors working in a coalition. It is primarily applied in situations when the contributions of each actor are unequal, but each player works in cooperation with each other to obtain the gain or payoff (Kenton, 2025).

cost pricing when the allocation of fixed costs to the marketing division is low. This result challenges established accounting assumptions and suggests that the way fixed costs are allocated within internal accounting systems can have a significant impact on overall firm profitability.

Lastly, Mallozi's (2011) article addresses the allocation of installation costs in facility location problems where fixed costs vary by region. Using cooperative game theory, it proposes solutions for distributing total costs among participants, ensuring that the allocation is stable and fair from an accounting standpoint. The study provides sufficient conditions for cost allocation solutions that no subgroup of participants would have an incentive to reject.

On a very different perspective, Aparicio and Sanchéz-Soriano (2007), in their paper *Depreciation Games* critique traditional depreciation methods such as the straight-line method. While simple, these methods are often arbitrary and may not accurately represent the pattern in which an asset actually contributes to a company's revenue. This can be a problem under modern accounting standards like International Financial Reporting Standards (IFRS), which mandate that the depreciation method should reflect the pattern of expected economic benefits. To solve this, the authors frame depreciation as a cooperative game. They define the players as being the individual years in the asset's useful life (e.g.: year 1, year 2, year 3, etc.) that cooperate by working together to generate the total economic benefits from the asset over its entire life. The central challenge is to fairly and systematically allocate the total cost of the asset (the depreciable amount) among the individual years (the players).

Aparicio and Sanchéz-Soriano (2007) apply Shapley value to solve this allocation problem. This concept is used to allocate costs among participants based on their contribution to the total cost. It ensures a fair distribution of costs, reflecting each participant's impact on the system. In this context, it calculates the depreciation amount for each specific year based on that year's contribution to the overall value generated by the asset. This results in a depreciation schedule that is directly tied to the asset's expected productivity over its life. This approach offers several advantages over traditional methods as it aligns the depreciation expense with the actual consumption of the asset's economic benefits, leading to more relevant and reliable financial statements and helps companies comply with IFRS requirements to match the depreciation method to the benefit pattern. The developed framework is not rigid. The paper introduces a delta parameter, which allows managers to systematically make adjustments to reflect different patterns of economic benefit (e.g., higher depreciation in early years for an asset that is most productive when new). This makes the choice of depreciation schedule more transparent and defensible to stakeholders.

4.2.3.1 Future research directions

Future research in cost accounting should prioritize the development of fair and stable cost allocation mechanisms that are practical for real-world collaborative environments. The use of cooperative game theory has demonstrated potential for ensuring fairness and stability in cost sharing, as seen in the analysis of Volkswagen's product family (Mueller, 2017), where traditional average cost assignment was found to be neither fair nor stable, while game-theoretic solutions provided equitable and motivating cost shares for all partners. However, future studies should address the challenges of estimating coalition benefits, managing incomplete information, and implementing binding agreements and side payments, as these are practical limitations of current models (Mueller, 2017).

Additionally, integrating game-theoretic approaches into traditional accounting practices, such as depreciation and inventory pooling, offers opportunities for new methods that improve fairness and efficiency. For example, cooperative game theory has been used to introduce new depreciation methods that enhance the properties of traditional approaches (Aparicio & Sánchez-Soriano, 2007). Similarly, game-theoretic models have been applied to cost allocation in spare parts inventory pooling, showing that allocation policies can influence inventory decisions and cooperation among firms (Wong et al., 2007).

Finally, as reputation and agency costs are important in the demand for auditing and honest reporting, future research could investigate how accounting systems and cost allocation mechanisms can be designed to reinforce positive reputation effects, reduce agency costs, and align incentives for transparency and cooperation among stakeholders (Finley et al., 1999).

4.2.4 Tax and Compliance

Firstly, regarding tax systems, Gomes et al. (2023) address tax aggressiveness in Brazil, where due to high tax complexity, tax avoidance is facilitated by special installments, a gap not covered by prior research. In fact, the model shows that the Nash equilibrium occurs when the rule is for the taxpayer to disobey and for the inspection to inspect or charge, and therefore, it offers positive compensation to both (with null returns for compliance). This equilibrium is held because the taxpayer's opportunity cost can outweigh the penalty structure, most particularly when special installments reduce the actual tax value owed. Finally, the proposal suggests tax reforms to reduce complexity and enhance the efficiency of special installments.

Still within the tax systems scope, Lorenz (2019) analyzes taxpayer behavior in which each taxpayer can choose one of three strategies: legal tax optimization, illegal tax evasion or no optimization (just paying the statutory tax). The study shows that when many people start

exploiting tax loopholes or evading taxes, the government's reaction makes those strategies less attractive, leading to a shifting mix of behaviors. The authors conclude that, to avoid a permanently shifting tax code (which is costly for legislators and creates legal uncertainty for taxpayers), the legislative process should be sped up so that the government can react quickly to these changes in taxpayer behavior.

Focusing now on tax compliance, Rhoades' (1999) paper examines the impact of requiring taxpayers to report multiple components of taxable income rather than a single net number, on tax compliance. Applying a theoretical framework, the research investigates taxpayers' incentives for misreporting their tax liability within this multi-component reporting system. The approach enables sequential auditing, where the tax authority can audit one component and then decide whether to audit another based on the initial findings. The findings reveal that by decomposing taxable income into a set of reported components, tax evasion can be substantially minimized, and the government can earn higher revenues than under a single-report system. However, the impact on compliance is not uniform. As some payers become more compliant, others with more opportunities to misreport may in fact engage in more evasion when presented with multiple reports to make.

Mixing tax compliance with tax management, Siladjaja et al. (2022) examine the impact of tax management on the future market value of companies by analyzing how management's compliance with tax regulations and efforts to minimize tax costs influence investor perceptions and market outcomes. The methodology involves a causal research design using multiple regression analysis on data from 384 observations of Indonesian industrial manufacturing companies between 2015 and 2020. The findings indicate that high compliance with tax regulations and prudent tax management, where management seeks legitimate tax savings without violating rules, are critical for maintaining investor trust and ensuring stable, predictable future returns. The research highlights that investors have no tolerance for violations of tax regulations, and that transparent, compliant tax management practices contribute to higher earnings quality and a more stable market value for companies.

4.2.4.1 Future research directions

Research with an empirical dimension in different real-world contexts to validate and refine predictions are needed in the future by extending the articles to include and empirically test theoretical and simulation-based models. For instance, they could analyze the impact of various aspects of multi-component tax reporting on taxpayer compliance among different tax groups and jurisdictions, using field studies and large data analysis. Moreover, research could expand its theoretical analysis to examine the effect of tax system complexity, special installment programs, and corporate tax avoidance in other countries, utilizing the game theory

approach used in the Brazilian context to compare the generalizability of results (Gomes A.P. et al., 2023). Further research should be conducted to integrate advanced statistical and AI methods, as suggested by Siladjaja et al. (2022) to better predict future market values and investors' behavior. Finally, research is needed to examine the effects of the speed and frequency of tax law updates on legal tax optimization and illegal evasion as well as the associated costs and uncertainties for taxpayers and governments, to inform more adaptive and effective tax policy (Lorenz, 2019).

4.2.5 Ethics in Accounting

The paper by Kim et al. (2024) is a revival of Yuji Ijiri's (1983, cited by Kim et al., 2024) fundamental question of what fairness is in accountancy. The authors place the fairness debates within historical and current accounting thought. Their approach focuses on theoretical approaches, using deontological ethical theory, focused on duties and principles, and the generalization principle to develop a framework for fair information flow in accounting. To test this framework, the authors present a counterexample from game theory, specifically the case of signal jamming, which challenges the generalization principle. In tackling that problem, the writers specify how and when the generalization principle should be applied within accounting ethics and, as such, improve the conceptual understanding of fairness in accounting.

The second paper, Chen's *Market Exit Through Divestment —The Effect of Accounting Bias on Competition* (2015), takes a theoretical modeling approach to the problem and determines how accounting bias, which is built into mandatory reporting systems, alters competition and market structure. The model takes into account firms' interim accounting reports about investment projects, which may be either conservatively or aggressively biased. The authors contrast scenarios in which investors can or can't abandon projects midstream. Without the divestment process accounting bias decreases earnings by the firm. Yet, where divestment is possible, a conservative accounting regime may lead to increased project discontinuation (e.g., market exit), therefore permitting other firms to secure larger market share. Such softening of the market's competitive process might generate higher investment returns, greater consumer surplus, and increased social welfare. The study also investigates the best level of industry-wide accounting bias for investor payoffs, especially when investors are able to synchronize their behavior. Comparatives in terms of production volume and profits with a neutral, conservative and aggressive accounting regime show subtle effects on market returns.

Thirdly, the paper *Economic analysis of accountants' ethical standards: The case of audit opinion shopping* (Cushing, Economic analysis of accountants' ethical standards: The case of

audit opinion shopping, 1999) questions why public faith in the profession has fallen and whether the existing ethical standards for audit are the most effective and efficient way to restore that confidence. It adopts a utilitarian ethical framework, “this is the view that a person's action is right or moral if its consequences result in the greatest good for everyone concerned”, arguing that professional conduct should be judged by the consequences for the greatest number of stakeholders, a view that aligns with the American Institute of Certified Public Accountants’ (AICPA) public-interest mandate (1994, cited by Cushing (1999)). The author illustrates a typical moral dilemma known as *opinion shopping*. A client may ask the auditor to endorse a questionable accounting method. The auditor who refuses risks losing the audit fee if the client moves to a more compliant but less scrupulous accounting organization, while the one conforming keeps the fee but damages the collective professional reputation, credibility, and potential earning-based returns to all future auditors.

Lastly, Siladjaja and Markonah’s (2020) empirical study investigates the impact of supply chain management strategies on real earnings quality and market value among manufacturing companies. Leveraging raw data through a moderated multiple regression model on companies listed in the manufacturing industry between 2015 and 2017, the study concludes that good supply chain policies also enhance earnings quality and market value, and lead to more accurate future-oriented investor investment decisions. In addition, the study finds that supply chain strategies reduce opportunistic managerial behavior, a common factor associated with unethical earnings management practices. The research places these findings within the framework of game theory by demonstrating that transparent financial reporting and high-quality earnings information align with ethical standards, thereby enhancing the ability of investors to make better decisions.

4.2.5.1 Future research directions

Further ethical research in accounting should investigate how different theoretical backgrounds and their applicability to accounting conflicts are derived, for example from deontological or consequentialist theories, particularly in the context of evolving digital reporting and complex financial instruments. Also, there is an area of interest for empirical investigations of accounting bias and mandatory reporting standards on market structure, investors' behavior, and social welfare of participants across industries and regulatory environments in the long run (Chen, 2015). Moreover, it is necessary to investigate the effectiveness of existing ethical standards and to create interventions that could mitigate unethical behaviors in auditing and financial reporting (Cushing, 1999).

4.2.6 Management Control

In *Unobservable transfer price exceeds marginal cost when the manager is evaluated using a balanced scorecard* (2019), Hamamura explores how managers in divisionalized firms (meaning in a company divided into separate divisions, each typically responsible for its own products, markets, or geographic areas) set transfer prices when evaluated with a balanced scorecard, especially in competitive markets. Utilizing an analytical model in which transfer prices are concealed from competitors, the study combines management control concepts with game theory and applies them to strategic pricing. The main finding is that managers operating in divisionalized firms set transfer prices above marginal cost when using a balanced scorecard, even though these prices are not observable by competitors. This happens because managers consider both their own and competitors' profits to maximize long-term firm performance. The study further challenges previous research by demonstrating that unobservable transfer prices can still be strategically set high in price-competitive market environments.

4.2.6.1 Future research directions

Future research could test the findings from Hamamura's (2019) study with real-world data, compare different evaluation systems, and explore other market types or behavioral factors. This work highlights how management control systems and game theory together shape internal pricing and competitive strategy.

4.2.7 Accounting and conceptualization

Recent trends in accounting research have revealed that conceptual frameworks, specifically game theory-based conceptual theories, are essential for empirical and qualitative research. The first article included in this scope is Srinidhi's *An essay on conceptualization of issues in empirical accounting research* (2013). This paper criticizes present-day trends in empirical accounting research. It notes that the most complex statistical/econometric methodologies often take focus away from the important first step of defining the research problem. It claims that significant empirical research needs to strike the right balance between methods and theory. Moreover, it presents two overarching perspectives on how research can be conducted: a single-entity approach, that focuses on the viewpoint of a single entity (or group), and a game-theoretic approach that explains interactions between different parties involved

in accounting scenarios. These frameworks provide clarity around research issues, and this has ensured that statistical analysis is anchored in clearly understood issues.

The second article, Norreklit's *Quality in qualitative management accounting research* (2014), discusses how to provide high-quality qualitative management accounting research by conceptualizing knowledge that is relevant and useful to real management practice. It employs language game theory and pragmatic constructivism to examine case studies of organizations and buyer-supplier relationships. The analysis shows that putting facts, possibilities, values and communication together can lead to actionable knowledge on managing costs between organizations. The article provides a framework for evaluating the practice relevance of qualitative research, emphasizing that conceptual rigor and practical application are both essential for producing research that is useful for practitioners.

4.2.7.1 Future research directions

Both articles emphasize the need for conceptualization in order to get meaningful and relevant accounting research. One is critical of statistical method overemphasis, while also advocating for theoretical balance, while the other shows how conceptual rigor in qualitative research leads to practical, actionable knowledge. They argue for research methods that combine strong conceptual foundations with real-world applicability. Future research should focus more on the conceptualization of research issues, not just on statistical and econometric methods. This includes developing and applying methods such as single-entity research and game-theoretic approaches in order to better structure research questions and interpret findings (Srinidhi, 2013).

5. Conclusions and Recommendations

This dissertation analyzed 45 articles selected from various journals, allowing a general overview of the state of the literature on the application of game theory in accounting studies. Overall, the obtained results were able to provide answers to the proposed research questions. Firstly, the descriptive analysis showed clear trends on how game theory application in accounting studies has evolved throughout the years, with the last decade having almost half (46,6%) of all articles included in the analysis. When analyzing per year, although the growth is not consistent, with an uneven distribution, the last 14 years all have at least one published article, while the first 16 years in analysis show some gaps, with half of these years having no publications in the field. It was also possible to conclude that the intersection of these topics has been expanding geographically throughout the years, having started in North America and expanding into Europe in 2002, the Middle East in 2011, Asia in 2019, and South America in 2023. It's possible to conclude that there has been a growing interest in using game-theoretic models to solve accounting issues, with the number of publications increasing both in number and in location of studies.

The journals of publication were also analyzed, based of SCImago (2024) Journal Rankings. It was found that most journals present high rankings, with 54% being in the 1st quartile of the ranking. Lastly, the articles and authors were ordered per number of citations, with Guajardo and Rönnqvist (2016) (2015) accumulating the most citations on their works on cost allocation.

Secondly, the content analysis of the included articles allowed for a clearer answer to which areas of accounting research have game-theoretic models mostly been applied to. The articles were divided into categories based on the accounting research area of focus. In total, seven different areas were identified, namely Management Accounting, Auditing, Cost Accounting, Tax and Compliance, Ethics in Accounting, Management Control and Accounting and Conceptualization.

Out of the 45 articles, 18 were identified to be related to auditing issues, 12 to cost accounting, 5 to ethics in accounting, 4 to both Tax and Compliance and Management Accounting, 2 to Accounting and conceptualization and 1 to management control. These results allow for the conclusion that authors have resorted to game-theoretic models mostly for audit-related issues which is coherent with the overall scope of game theory. As previously explained, game theory has proven to be a powerful tool in modeling situations where information asymmetry, incentives, conflicts of interest and competition can shape outcomes. As such, it's quite plausible that it has been applied mostly to audit-related issues such as the ones found on the included articles, namely audit-client relationships, audit strategies and audit quality, considering that audit contexts do encounter these situations frequently.

The last proposed research question regards the gaps found in the literature of game theory applied to accounting studies. The main gap identified, which constitutes a central theme in the debate of game theory applications, is its foundation on assumptions that do not always hold in real-world accounting and business scenarios. Game theory is built on the premise that players are rational actors who consistently make decisions to maximize their own utility. However, this assumption is often challenged, as individuals can behave irrationally or use simplistic algorithms that lead to suboptimal outcomes (Migdalas, 2002). As such, although game theory provides a powerful framework for analyzing strategic interactions, its application in accounting is criticized for its strong assumptions, practical complexity, and the limited, often ambiguous, nature of its conclusions. These limitations suggest that while game theory can offer valuable insights, its models must be applied with caution and adapted to account for the complexities of real-world accounting environments (Migdalas, 2002).

Additionally, authors emphasize the need for more rigorous analytical underpinnings and for the development of solution concepts that go beyond static Nash equilibria (Anastasopoulos & Anastasopoulos, 2012). Future work must incorporate dynamic and evolutionary modelling, as studies highlight the limitation of single-period analyses and call for frameworks that capture learning, diffusion of information, and changing incentives over time (Bouayad et al., 2019). Extending static formulations to multi-period or evolutionary settings would allow researchers to examine how deterrence, reputation effects, and audit quality evolve as agents change beliefs and strategies (Anastasopoulos & Anastasopoulos, 2012).

Lastly, a key recommendation is to deepen the integration of game theory with AI and machine learning in accounting contexts. As technology advances, especially with the rise of AI, new research opportunities are emerging in this field. Future research should focus on integrating AI and advanced analytics with game-theoretic models to better understand and predict decision-making in accounting. This approach allows for more accurate predictions of market behavior and can reveal how both parties adjust their strategies in response to each other's action. Another important direction for research is to use AI simulations to test the impact of different accounting policies and regulatory interventions. By modeling scenarios where management either adheres to or manipulates accounting standards, researchers can assess how these choices affect market value, investor trust, and regulatory compliance. This can help regulators design more effective policies that encourage high-quality financial reporting and discourage manipulation. Additionally, future studies should explore how AI-driven game-theoretic models can be used to measure and enhance the quality of accounting information, especially in environments with high uncertainty or potential for manipulation. This includes developing new variables and predictive models that capture the dynamic and interactive nature of accounting decisions (Siladjaja et al., 2022).

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