

Original Article

Forest management and FSC certification: a systematic review

Manejo florestal e a certificação FSC: uma revisão sistemática

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ABSTRACT

Objective and Methodology: Many studies have been published since the creation of the Forest Stewardship Council (FSC) to better understand this certification. Through a systematic review of the literature in 2022, this article aims to identify business entities motivations, benefits, and challenges of FSC certification. Through the definition of some inclusion criteria (Scientific Articles; Specific subject areas; FSC, or Forest Stewardship Council, appears in the title, abstract, and/or keywords; FSC means “Forest Stewardship Council”; FSC benefits and challenges), this study reviews a total of 74 publications from 2005 to 2022 from five different data bases (Scopus, Science Direct, Wiley Online Library; Springer Link; Web of Science). More than one author helped with the selection of papers to remove the risk of bias.

Results: As main results, the motivations for deployments of the FSC certification are linked to economic issues as well as potential benefits. However, FSC still has several challenges to overcome, such as: high cost, lack of price premium, investment return, and financial dependency in the case of small producers. Social benefits and challenges were also mapped. Such results are directly linked to the type of methodology used in each paper.

Originality: As a conclusion, many field studies still need to be developed due to the superiority of documentary research based on audit reports. Although this kind of document has several advantages, some disadvantages are also detected. This paper provides an overview of the FSC directing future research interested in the theme.

Keywords: Forest stewardship council (FSC); Systematic literature review; Forest management

RESUMO

Objetivo e Metodologia: Muitos estudos foram publicados desde a criação do Forest Stewardship Council (FSC) para entender melhor esta certificação. Através de uma revisão sistemática da literatura realizada em 2022, este artigo teve como objetivo identificar as motivações, benefícios e desafios das entidades empresariais em adotar a Certificação FSC. Através da definição de alguns critérios de inclusão

(Artigos Científicos; Áreas temáticas específicas; FSC ou Forest Stewardship Council aparecer no título, resumo e/ou palavras-chave; FSC significar “Forest Stewardship Council”; benefícios e desafios do FSC) este estudo revisou um total de 74 publicações de 2005 a 2022 de cinco bases de dados diferentes (Scopus, Science Direct, Wiley Online Library; Springer Link; Web of Science). Mais de um autor ajudou na seleção do artigo para remover o risco de viés.

Resultados: Como principais resultados, as motivações para implantações da certificação FSC estão ligadas a questões econômicas, bem como potenciais benefícios. No entanto, o FSC ainda tem vários desafios a serem superados, como: alto custo, falta de preço prêmio, retorno do investimento e dependência financeira no caso de pequenos produtores. Benefícios e desafios sociais também foram mapeados. Tais resultados estão diretamente ligados ao tipo de metodologia utilizada em cada artigo.

Originalidade: Como conclusão, muitos estudos de campo ainda precisam ser desenvolvidos devido à superioridade da pesquisa documental baseada em relatórios de auditoria. Embora este tipo de documentos tenha várias vantagens, algumas desvantagens também são detectadas. Este artigo fornece uma visão geral do FSC, direcionando futuras pesquisas na área.

Palavras-chave: Forest stewardship council (FSC); Revisão sistemática da literatura; Manejo florestal

1 INTRODUCTION

Forests are vital for human survival, whether through the provision of ecosystem services, recreational areas, carbon stocks, provision of clean air and water or through its impact on local, regional and even global economic development, namely due to economic benefits gained from wood and non-wood products (Blumroeder et al., 2019; Hermudananto et al., 2018; Rana & Sills, 2018).

Commercial timber extraction has profound impacts on forest ecosystems by causing a deterioration in forests structure and function. Which inevitably affects the provision of ecosystem services and raises the question about the proper balance between this economic activity essential for many countries and the continuous loss of forest areas (Blumröder et al., 2020). The forestry sector has therefore been under pressure to demonstrate that it does not use illegal and predatory practices (e.g. deforestation, degradation and disrespect for the rights of indigenous people); certifying their commitment to society and the environment to continue competing in the market (Alves et al., 2019; Basso et al., 2018; Chen et al., 2020; Espinoza et al., 2012).

Forest certification is defined as an independent assessment method with the objective of evaluating social, economic and environmental performance

of an organization (Espinoza et al., 2012; Palus & Kaputa, 2009). It is an important communication system between firm and consumers to address the sustainability of forests products especially when considering the growing number of consumers who are concerned about purchasing products that do not harm the environment.

Among the most varied existing types of certifications Programme for the Endorsement of Forest Certification (PEFC) and Forest Stewardship Council (FSC) dominate the world (Xu & Lu, 2021). The FSC is the most accepted by organizations, civil society and the most widely used to certify forest management (Cerutti et al., 2017; Garzon et al., 2020; Hermudananto et al., 2018; Piketty & Garcia Drigo, 2018; Sánchez-Almendro et al., 2018). Furthermore, it is considered the most rigorous approach to sustainable forest management since its creation in 1993 with the aim of promoting environmentally appropriate, socially beneficial and economically viable management practices (Hoang et al., 2019). In addition to certifying forest management, the FSC can also certify chain of custody, wood controlled and ecosystem services being the most recent incorporation of the FSC (FSC, 2021).

Since its creation in 1993 many studies have been published to better understand how it works, the main motivations behind its adoption, as well as the benefits and challenges of this certification (de Paiva et al., 2015; Fagundes et al., 2021; Malovrh et al., 2019; Rana & Sills, 2018; Sugiura & Oki, 2018; Nunes et al., 2024; Fagundes et al., 2023; Fagundes et al., 2022). However, those individual studies focus on different cases, use different methodologies and may even present different results or conclusions. Isolated reading becomes painful and tiring for most managers and professionals who are at risk of being influenced by one or more studies that are not represented in the subject under discussion.

Through a systematic review of the literature, this article aims to identify the main motivation as well as social, economic benefits and challenges of the FSC certification around the world. To achieve the proposed objective, the current paper is organized as follows: After the present introduction, the main characteristics of the

FSC and its benefits and challenges are briefly described in the next section. After that, the methodology used to pursue the systematic literature review is demonstrated, as well as the main characteristics of the publications selected to be part of this study. The next (fourth) section presents and discusses the results achieved and finally, the paper closes presenting its final considerations and conclusions.

2 METHODOLOGY

This chapter provides a detailed description of the methodology used for the preparation of the referred document. Initially, the planning conducted for the review's development is presented. Next, the steps for identifying the scientific articles are described. Finally, the methods used for analyzing the results are explained.

2.1 Research design

Systematic literature reviews result from the application of a detailed, replicable and transparent scientific method of data collection, which allows the audit of the collected data, thus providing a reliable database (Donato & Donato, 2019; Page et al., 2021; Tranfield et al., 2003). As shown on Table 1, there are some essential stages for conducting a systematic review (Tranfield et al. 2003; Donato and Donato, 2019). Firstly, it is essential that researchers plan the study demonstrating the need for the research and structure a protocol (plan the review).

After having developed the research question and the protocol, the literature search begins (second stage, "Conduct the review"). A key part of a systematic review is an exhaustive search of the literature to find all relevant studies on the subject (Tranfield et al. 2003 Donato and Donato, 2019; Page et al., 2021). It is important to mention that the systematic review usually generates many potentially eligible references, whose inclusion needs to be assessed according to predefined criteria. For this task, the use of some software to manage these references is recommended (Donato & Donato, 2019; Tranfield et al., 2003). For this evaluation title, abstract and keywords are read to

determine the relevance of these papers to the topic under analysis and thus eliminate those which are not clearly related to the theme.

Table 1– Steps of a systematic review research

Stage	Step
Plan the review	Identify the need for revision
	Prepare the proposal
	Develop a protocol
Conduct the review	Identify the research
	Select the studies
	Evaluate the quality of the studies
	Extracting the data and monitoring the progress
	Synthesize the data
Report and disseminate	Report and recommend
	Putting the evidence into practice

Source: Tranfield et al. (2003) and Donato (2019)

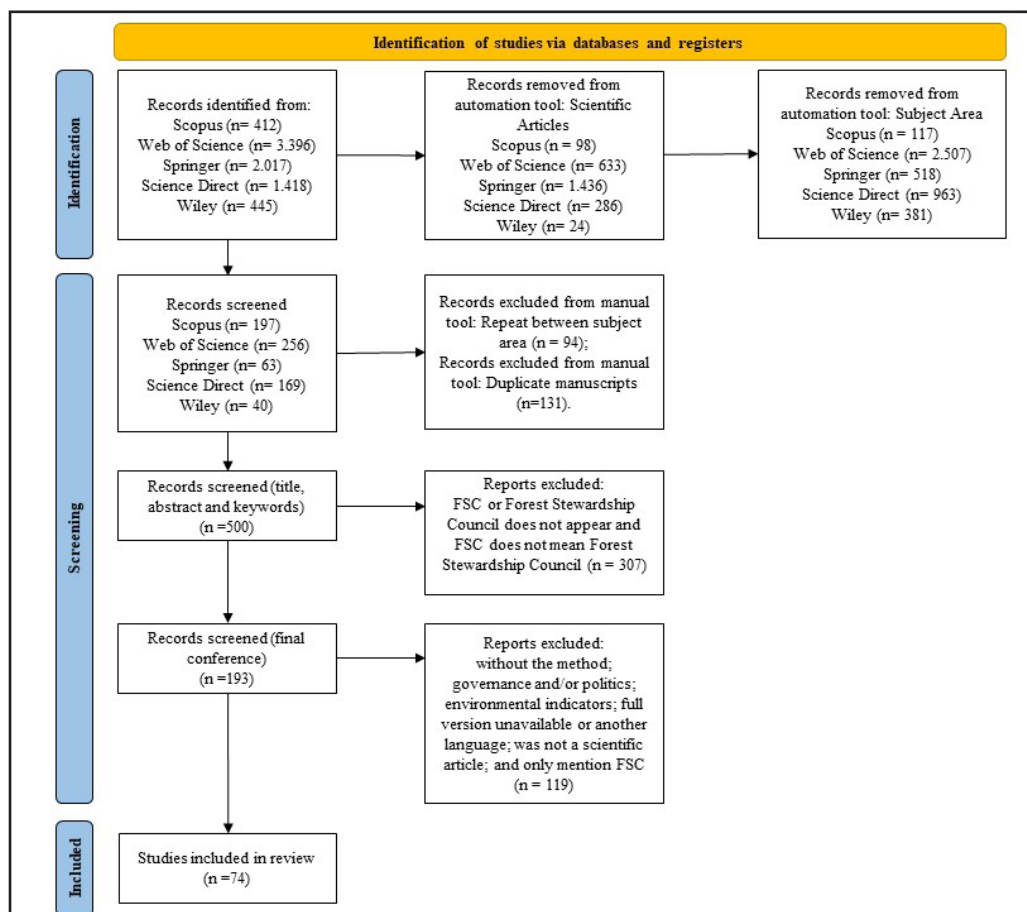
Once the most relevant articles have been selected, they are read and critically analyzed to extract the relevant information to answer the previously established research question. Extracted data must be summarized to lead to valid and logical conclusions and only after that, the systematic review article can be written and published so that other people interested in the subject can understand the results achieved (“Report and disseminate” stage).

2.2 Data collection

The initial part of identifying studies took place with the insertion of keywords (“*sustainable forestry*” OR “*forest certification*” AND “Forest Stewardship Council” OR “FSC”) in the 5 databases in January of 2022. The review was based on peer-reviewed literature published in international scientific journals. This process generated a total of 7.683 results (Wiley= 445; Science Direct= 1,418; Scopus=412; Springer Link= 2,017; Web of Science= 3,396;). After analyzing the general panorama of publications, the

articles selection process began according to the inclusion and exclusion criteria defined for this review. The step-by-step process can be seen in Figure 1.

Figure 1 – Flow chart



Source: Prisma Diagram (2021)

In all individual databases we first used refinement options (filters) such as relevant document types (i.e., research articles) and limiting the sample to specific areas to reach the studies that most interested us. Institutional reports, conference paper and graduate theses were not considered for this paper and the refinement limited to social and economic science. Thus, several areas were excluded such as: Material, Medical, Engineering, Education, Political, Computing and others. In these two processes publications 2.477 and 4.486 were excluded respectively. The areas and the number of studies that remained in each one can be viewed in Table 2.

Table 2 – Areas of interest

Areas/Databases	Scopus	Science	Springer	Wiley	Web
Social Sciences	126	169	40	7	17
Economics, Econometrics and Finance	47				
Business, Management and Accounting	23				
(Other) Multidisciplinary	1				55
Economics			13	12	87
Business and Management			9	8	65
Finance			1		
Business and Finance					7
Development Studies				13	19
Business Economics					
Behavioral Science					6
Total	197	169	63	40	256
Duplicated	49	None	None	21	24
Total	148	169	63	19	232

Source: Databases (2022)

After the studies identification in the screening stage (n= 725), we proceeded with the exclusion of articles. Manuscripts which were double listed were filtered and removed. This process resulted in the exclusion of 225 articles. We proceeded with the eligibility stage (n=500), along the criteria defined in the planning phase. By analyzing the content of the title, abstracts and keywords we excluded 307 more articles as they did not mention the Forest Stewardship Council (FSC) and the acronym had a different meaning. The other meanings identified for the acronym FSC were: Food Supply Chain; Financial Services Company; Family Social Capital; Fiber Supercapacitors; Full-Service Carriers; Fractional Snow Cover; Finite-State Controllers and others.

Before starting with the qualitative phase of the studies, a final conference was held in front of the 193 remaining articles. At this stage, another 119 articles were excluded for reasons such as: without detailing the method makes it impossible to reproduce the study (44); main theme was governance and/or politics (21); the article does not talk about motivations, benefits and/or challenges (14); research with environmental indicators (17); pay wall (authors were contacted, but no response) (10); only mentions

the FSC, but does not study the certification itself (7); full version of the article in another language (6). Ultimately, we conducted a qualitative screening of 74 articles.

2.3 Research data analysis

The results achieved went through a process of content analysis using the qualitative data analysis software MAXQDA 2020. For the synthesis of our research, we decided to do both quantitative and qualitative analyses of the 74 articles. Digital papers were full reading which permitted more rigorous interpretation. The collected data was based on a coding framework developed through an inductive approach. Coded texts in MAXQDA were converted into an Excel database, whereas insights from a non-digital literature were entered directly into the Excel database. With Excel it was possible to create graphs and tables to facilitate the presentation of results. Quantitative analysis was performed using the IBM SPSS Statistics Software using descriptive statistics tools linear regression and multivariate statistics (Mann-Whitney test). Also following the Tranfield et al. (2003), Donato and Donato (2019) and Page et al., (2021) recommendations, Mendeley was used for reference management.

3 RESULTS

The objectives outlined in the studies were to identify the main reasons why organizations choose the FSC and what benefits and challenges it can achieve in the economic and social dimension of sustainability. In Table 03 we summarized the main motivation to adopt the FSC certification found in the systematic review. The results were organized based on Araújo et al., (2009), Faggi et al., (2014) and Galati et al., (2017) studies, where the authors systematize the reasons into 5 categories which are: Signaling (Reducing pressure in social conflicts demonstrating corporate social responsibility); Market (Access market and financial gain); Legal (Compliance with mandatory regulation); Moral (Ethical beliefs and personal values); and Learning (Generation of science and technical knowledge).

Table 3 – Motivation to adopt the FSC certification

Motivation to adopt the FSC Signaling	Authors
Image improvements	(A. Galati et al., 2017; Tuppara et al., 2016)
Competing certification programs	(van der Loos et al., 2018)
Timber traceability	(A. Galati et al., 2017)
Market	Authors
Market requirements	(Basso et al., 2018, 2020; Carlsen et al., 2012; A. Galati et al., 2017; Johansson, 2014; A. Tolunay & Türkoglu, 2014; Tuppara et al., 2016)
Market access	(Araujo et al., 2009; Carlsen et al., 2012; A. Galati et al., 2017; Johansson, 2012; Pinto & McDermott, 2013; A. Tolunay & Türkoglu, 2014; Tricallotis et al., 2019; van der Loos et al., 2018; van Kooten et al., 2005)
Price premium	(van der Loos et al., 2018)
Profitability	(Tuppara et al., 2016)
Legal	Authors
Government requirements	(Basso et al., 2018; A. Galati et al., 2017; Tuppara et al., 2016; van der Loos et al., 2018)
Moral	Authors
Ensure sustainable forest management	(Basso et al., 2018; Berock & Ongolo, 2019; A. Galati et al., 2017; Shvarts et al., 2015)
Environmental benefits	(Basso et al., 2020; Cashore et al., 2005; A. Galati et al., 2017)
Employee satisfaction	(A. Galati et al., 2017)
Risk management	(Tuppara et al., 2016)
Learning	Authors
Product quality	(A. Galati et al., 2017)
Productivity	(Carlsen et al., 2012)
Improve management system	(A. Galati et al., 2017)
Increase internal control	(Tuppara et al., 2016)

Source: adapted from (Araujo et al., 2009; Faggi et al., 2014; Antonino Galati et al., 2017)

According to Table 3, we found in the literature several motivations to implement the FSC certification. Most of them are related to the benefits it can generate such as market category. In addition to this motivation, moral issues were also highlighted. Although these two categories present a greater number of results, it was also possible

to perceive motivations in the categories “signaling, legal and learning” demonstrating the variety of reasons that companies have for adopting the FSC.

Table 4 – Social and economic FSC benefits

Benefits	Authors
Employees	
Environmental awareness	(Bieri & Nygren, 2011; Hain & Ahas, 2011; Paluš et al., 2017, 2018; Sansalvador & Brotons, 2020)
Safety and health care	(Bieri & Nygren, 2011; Cerutti et al., 2017; Hain & Ahas, 2011; Tricallotis et al., 2018)
Local communities	Authors
Stakeholders communication and participation	(Araujo et al., 2009; Bieri & Nygren, 2011; Guillaume, 2017; Hain & Ahas, 2007; Johansson, 2012; Kulyasova, 2013; Lescuyer et al., 2021; Quaedvlieg et al., 2014; Teitelbaum & Wyatt, 2013; Tricallotis et al., 2018; Tulaeva, 2013b)
Infrastructure and social services improvement	(Cerutti et al., 2017; Degnet et al., 2020; Kalonga & Kulindwa, 2017; Miteva et al., 2015; Tricallotis et al., 2018)
Job generation	(Bieri & Nygren, 2011; Degnet et al., 2020; Miteva et al., 2015)
Customary resource rights	(Bieri & Nygren, 2011; Teitelbaum & Wyatt, 2013; Tricallotis et al., 2018)
Consumers	Authors
Responsible purchasing products	(Michal et al., 2019; Panico et al., 2022)
Producers/companies	Authors
Public confidence and image improvements	(Berock & Ongolo, 2019; Castka & Corbett, 2016; Cabbage et al., 2009; Hain & Ahas, 2007; Kulyasova, 2013; Narasimhan et al., 2015; Paluš et al., 2018; Sansalvador & Brotons, 2020; Ahmet Tolunay & Türkoglu, 2014; Tricallotis et al., 2019; Wibowo et al., 2019)
Law compliance	(Bieri & Nygren, 2011; Cerutti et al., 2017; Kalonga & Kulindwa, 2017; Tricallotis et al., 2018; Tsanga et al., 2014)
New markets and sales increase	(Araujo et al., 2009; Berock & Ongolo, 2019; Carlson & Palmer, 2016; A. Galati et al., 2017; Narasimhan et al., 2015; Paluš et al., 2018; A. Tolunay & Türkoglu, 2014; Tricallotis et al., 2018)
Price premium	(Araujo et al., 2009; Duchelle et al., 2014; S. Eriksson & Hammer, 2006; Kalonga & Kulindwa, 2017; Nebel et al., 2005; Paluš et al., 2018; Tham et al., 2021)
Profitability	(Araujo et al., 2009)
Timber traceability	(Lescuyer et al., 2021; Paluš et al., 2017)
Forest management and practices improvement	(Berock & Ongolo, 2019; Cabbage et al., 2009, 2010; Duchelle et al., 2014; Paluš et al., 2018; Quaedvlieg et al., 2014; Tricallotis et al., 2019)

As said before, the motivations for adopting a certification are directly linked to the possible benefits. In Table 4, we demonstrate the concrete FSC-benefits found in the systematic review. They were organized into 4 subcategories: employees, local communities (including indigenous people), consumers and producers'/companies' benefits.

Some of the social and economic benefits are related to the motivation to adopt the certification, especially the economic ones like new markets, profitability, image improvements and price premium. Furthermore, other economic benefits were also identified, such as: sales increase, household income and job creation. Thus, not only does the organization/producer that has the certification are impacted, but also the local community.

Social benefits are also perceived for employees and local communities, including indigenous people. For employees specifically, safety and healthcare and environmental awareness increase are highlighted. With respect to local communities the benefits linked to the opening of a dialogue between the parties, as well as the participation of all in the decision-making process, stand out. Moreover, customary resources rights are also highlighted.

Although the FSC has many benefits, some social and economic challenges were also identified. Table 5 lists those found throughout the systematic review which are separated into 4 subcategories: employees, local communities, consumers and producers'/companies' challenges.

A variety of FSC challenges were found in the literature. High cost is the most cited followed by financial dependency. Furthermore, complex procedures, lack of investment return and price premiums are also other major concerns. According to the selected studies the certification also presented several societal challenges. Regarding the employees, there is a lack of knowledge about the FSC standards. Public awareness and seal acceptance are challenges of the FSC in relation to consumers. And finally, local communities, specifically indigenous, they suffer with food insecurity and malnutrition.

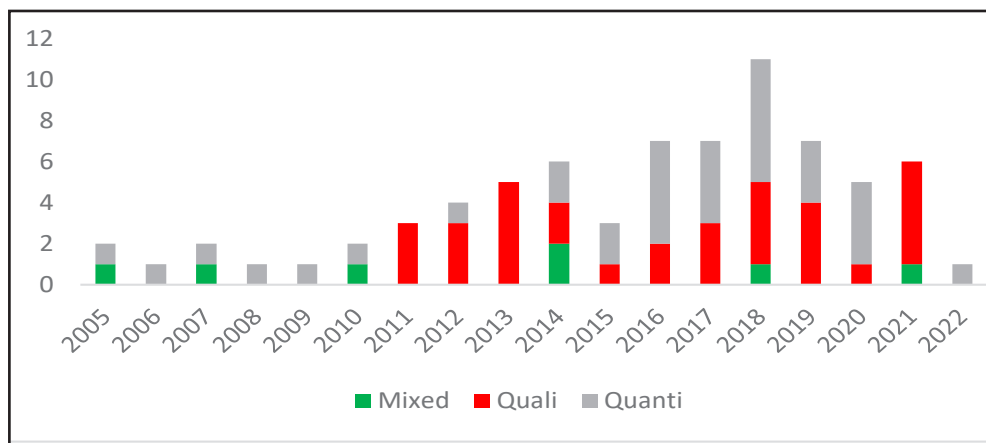
Table 5 – Social and economic FSC challenges

Challenges	Authors
Employees	
Standard knowledge and complex procedures	(Carlsen et al., 2012; Duchelle et al., 2014; Hermudananto et al., 2018; Kongmanee et al., 2020; Paluš et al., 2018; Piketty & Garcia Drigo, 2018; Rafael et al., 2018; Tsanga et al., 2014; Wibowo et al., 2019; Xu & Lu, 2021)
Safety and health care	(Hermudananto et al., 2018; Rafael et al., 2018)
Local Communities	Authors
Conflicts	(Cerutti et al., 2017; Doremus, 2019; Hermudananto et al., 2018; Miteva et al., 2015; Niedziałkowski & Shkaruba, 2018; Tricallotis et al., 2018; Xu & Lu, 2021)
Gender equality employed	(Cerutti et al., 2017; Guillaume, 2017; Hain & Ahas, 2007)
Consumers	Authors
Public awareness and seal acceptance	(McDermott, 2012; Michal et al., 2019; Xu & Lu, 2021)
Gaps between willingness-to-buy and actual purchases	(Panico et al., 2022; Xu & Lu, 2021)
Producers/companies	Authors
High costs	(Berock & Ongolo, 2019; Bieri & Nygren, 2011; Carlsen et al., 2012; Carlson & Palmer, 2016; Gregory E. Frey et al., 2021; A. Galati et al., 2017; Kongmanee et al., 2020; Michal et al., 2019; Quaedvlieg et al., 2014; Tricallotis et al., 2018; Tysiachniouk & McDermott, 2016; Xu & Lu, 2021)
External support and lack of equity	(Bieri & Nygren, 2011; Carlson & Palmer, 2016; Duchelle et al., 2014; G. E. Frey et al., 2018; Niedziałkowski & Shkaruba, 2018; Pinto & McDermott, 2013; Scudder et al., 2018; Tysiachniouk & McDermott, 2016; Xu & Lu, 2021)
Investment return	(Bouslah et al., 2010; Espinoza et al., 2012; Foster et al., 2008)
Price premium	(Paluš et al., 2017; Tricallotis et al., 2018; Xu & Lu, 2021)
Auditor's professionalism	(Cook et al., 2021)
Annual allowable cut and low income	(Bieri & Nygren, 2011; Cerutti et al., 2011; L. O. Eriksson et al., 2007; Xu & Lu, 2021)
Low net present value	(Foster et al., 2008)
Low margin	(Paluš et al., 2017)
Material input insufficient and overpriced	(Paluš et al., 2017)
Demand in domestic market	(Basso et al., 2018; G. E. Frey et al., 2018; Xu & Lu, 2021)

To reach the results related to the companies' motivation to adopt the FSC, as well as the identification of benefits and challenges, several methodologies were identified while reading the papers. The methodologies used in the studies were classified according to the definition stipulated by Yin (2010).

Of the 74 articles in total, 67 studies presented only one methodology, qualitative (33) or quantitative (34). Only 7 studies had a combination of the two approaches (Quali and Quanti). The distribution of studies over the years can be consulted in Figure 2.

Figure 2 – Methodological approach over the years



Source: The authors (2023)

There is no standardization of data as can be seen in Figure 2. In the first half of the time frame, between the years 2005 and 2013, qualitative studies were majority of the focus. In the second half of the time frame, between the years 2014 and 2022, quantitative studies became the preferred methodology.

Among the 33 qualitative studies, 11 had only one method of data collection (documents or interviews). The other 22 had a combination of two or even 3 procedures (interviews, documents, participant observation, focus group). The quantitative studies presented, for the most part, only had a method of surveys. And finally, the studies that presented the combination of the two procedures, reconciled interviews and documental research.

4 DISCUSSION

Following the results, the discussion of the economic and social benefits found throughout the selected articles is presented below.

4.1 Economic benefits

Although its standards are considered to have the best quality, it is not an easy task to implement the certification in view of the principles and criteria extension and complexity (Alves et al., 2019; Garzon et al., 2020; Wibowo et al., 2019). A series of organizational investments are essential to achieve certification and companies are not always willing invest in it (Basso et al., 2018; Espinoza et al., 2012).

This study's results indicate that the company's motivation to adopt forest certification are more often external rather than internal reasons, and more market driven than regulation driven. Organizations seem to be more interested in the possible economic and financial gain that certification can generate. They look for concrete results to introduce the FSC, especially due to the possibility of operating in new markets or remaining in existing ones, but now require certification (Araujo et al., 2009; Basso et al., 2018, 2020; Carlsen et al., 2012; A. Galati et al., 2017; A. Tolunay & Türkoglu, 2014; Tuppara et al., 2016; van Kooten et al., 2005). In this sense, companies envision the possibility of increasing their profit and gaining a competitive advantage over their competitors that do not have the certification.

The expectations generated by the implementation of the FSC are not always met. Nevertheless, in this specific study, the results show that some companies are accessing new markets and increasing their sales as expected (Berock & Ongolo, 2019; Carlson & Palmer, 2016; A. Galati et al., 2017; Johansson, 2012; Paluš et al., 2018). In view of the growing presence of consumers concerned about their consumption habits, the FSC seal is an important communication system between companies and consumers to address the sustainability of forest products (Espinoza et al., 2012). However, not all consumers are aware of the cause and recognize the FSC seal. To overcome this

challenge, Michal et al., (2019) suggests building reliable communication between the company and consumers which is something that does not happen quickly. Attitudes of consumers are highly dependent on the knowledge of basic information about products. As knowledge increases, positive attitude can also increase.

In addition to access new markets and increase sales, other economic benefits are also perceived, such as: price premium, company reputation and value increase (Nebel et al., 2005; Eriksson et al., 2007; Hain and Ahas, 2007; Kulyasova, 2013; Berock and Ongolo, 2019; Sansalvador and Brotons, 2020; Tham et al., 2021). Demonstrating a companies' commitment to society and the environment has gained a lot attention over the years.

The FSC economic benefits are not always manifested in the same way around the 80 countries that it is present in (FSC, 2021). There are some possible explanations for these facts, such as: weak forest governance; high rates of illegal logging; unsupportive socioeconomic structures; corruption; diverse of forests ecosystems; multifaceted interests toward forest resources; lack of recognition and interest of certified products (Bieri & Nygren, 2011; Carlsen et al., 2012; Michal et al., 2019; Tricallotis et al., 2019).

The difference in economic benefits can also depend on the time of certification. Companies that have been certified the longest tend to feel the benefits first (Nebel et al., 2005). This could be related to the establishment of the companies on the market with certified products followed by an increase in the economic indicators. Economic effects of the certification depend on a long-term monitoring of the selected indicators (Michal et al., 2019; Nebel et al., 2005).

In addition, other FSC-challenges were also encountered. The most cited was the high costs to meet the certification requirements (Berock & Ongolo, 2019; Bieri & Nygren, 2011; Carlsen et al., 2012; Carlson & Palmer, 2016; Gregory E. Frey et al., 2021; A. Galati et al., 2017; Michal et al., 2019; Tricallotis et al., 2018; Tysiachniouk & McDermott, 2016). The closer the organizational processes are to the sustainability concept; less investment is needed to achieve FSC certification. Otherwise, a greater allocation of resources is necessary (Newsom et al., 2006). High costs are directly linked

to the discouragement of joining the FSC. Small-scale land managers end up not joining the FSC due to lack of external support for the implementation and maintenance of the certification due to the unavailable resources to invest on it. Among the main limitations, there is: lack of time, skills, capabilities, flexibility, strategic thinking, external networking among others (Bieri & Nygren, 2011; Carlsen et al., 2012; Duchelle et al., 2014; Gregory E. Frey et al., 2021; Nebel et al., 2005; Scudder et al., 2018; Xu & Lu, 2021). Such issues demonstrate the lack of equity that the system presents unlike large companies that have more available resources to overcome the FSC challenges.

4.2 Social benefits

Companies also seek certification to demonstrate the social corporate responsibility, implement sustainable forest management practices and generate environmental benefits. Ethical beliefs and individual values seem to be also present in these kinds of companies.

As well as economic issues, social aspects are also present in the FSC principles and criteria, but more expressively because require companies to comply with national laws and international conventions related to the social well-being of workers and communities surrounding forest including indigenous people (FSC, 2021).

Better working and living conditions of logging companies' employees and their families include: individual home showers; provision of safety gear; health- and life-insurance; local medical facilities; written procedures for waste collection and treatment; active associative bodies; wages and proper holidays; stability and among others benefits (Bieri & Nygren, 2011; Cerutti et al., 2017; Hain & Ahas, 2007; Tricallotis et al., 2019).

However, such improvements do not always happen everywhere. Such difficulties are found in companies located in developing countries where the problem lies in the weak implementation of existing laws (Alves et al., 2019; Bieri & Nygren, 2011; Cerutti et al., 2017). Communities in these countries are concerned that certification omits the local analysis. In this sense, as in other countries, the FSC

is limited in relation to social benefits (Carlsen et al., 2012). On the other hand, this kind of improvement becomes more evident when compared to business as usual on developing and tropical countries (Pinto & McDermott, 2013).

As already mentioned, one of the main costs of implementing the certification is the employee training to follow the FSC standard due to the high complexity (A. Galati et al., 2017; Paluš et al., 2018). Training and the obligation to follow the standards may justify the increase of employee's environmental awareness (Bieri & Nygren, 2011; Hain & Ahas, 2007; Palus et al., 2017).

The FSC has also demonstrated a strong commitment to local communities. There have been some important benefits to forest dwellers and forest communities from forest certification. FSC-certified companies make local investments in infrastructure and social services to guarantee the community well-being. Among the main local investments, infrastructure and social services stand out, such as: health center, roads and bridges constructions; more access to basic education; water-supply catchments; impact mitigation of forest operations; firewood donation; authorization to collect non-timber forest products among others (Cerutti et al., 2017; Degnet et al., 2020; Miteva et al., 2015; Tricallotis et al., 2019).

Many of the company investments arise from the integration of the wider community into the decision-making process. Gaining a voice may therefore help build a trust relationship between the parties which gradually makes everyone adopt new rules and values (Kulyasova, 2013; Tulaeva, 2013a).

In addition, other ramifications well beyond the certification process happens. In some cases, stronger community claims to land and resources, also fostering new market relationships are an important role in the mitigation of rural poverty (Bieri & Nygren, 2011) and less conflict relations (Tsanga et al., 2014). However, this mechanism also can be questioned. In some cases, the certification can generate food insecurity, malnutrition and disease incidence which can create conflict and decrease the local community's well-being (Doremus, 2019; Miteva et al., 2015; Tricallotis et al., 2019).

Despite some limitations, the market has been perceiving and highlighting companies that are committed to sustainability (Alves et al., 2019; Basso et al., 2018; Chen et al., 2020; Espinoza et al., 2012). This is still not enough to increase their knowledge and acceptance of the FSC seal and raise awareness of them in order to make a more responsible purchase.

5 FINAL REMARKS

This article aimed to identify the main motivation, benefits and challenges of the FSC certification in the social and economic sustainability sphere. Through a systematic review of the literature, it is believed to have achieved the proposed objective.

Companies or communities opt for FSC certification for several reasons. Despite moral, signaling, legal and learning motivation, market reasons still prevail. Forests are vital for humanity's survival, despite presenting their implementation of certification through a market requirement, companies automatically assume their commitment to the environment which can be an extremely positive point as many illegal practices are left behind.

The results achieved in this study are directly linked to the methodological procedures adopted by each article individually. Studies on the motivation, benefits and challenges of the FSC did not have a standardization regarding the methodology used. Generally, when knowledge of a specific phenomenon is under construction, qualitative studies are indicated, as they provide a deep, systemic view of existing relationships (Yin, 2010).

Although qualitative studies gained more attention in the early years (2005-2013), the difference over quantitative studies is low in comparison with only 3. Documental research which dominates the sample, is based on audit reports. In addition to being available for online consultation, certification and recertification reports provide a view of how management practices have been improving over time (Foster et al., 2008). These documents are important not only to those directly involved in the certification process but also for those interested in evaluating the FSC challenges (Rafael et al., 2018). The availability of online data may justify the number of quantitative studies.

However, such documents do not explicitly demonstrate the causal pathways and the reported changes are unclear. Furthermore, the lack of standards in defining the essential characteristics of auditors and the audit time in relation to the size of the company can influence the quality of the processes. The field results are shaped by the differences in knowledge, skill and attitude of the auditors and the accreditor which can justify the “auditor professionalism challenge”. These things, for example, may lead to the non-identification of some non-conformities or even their misinterpretation (Teitelbaum e Wyatt, 2013; Romero and Putz, 2018; Basso et al., 2018; Hermudananto et al., 2018; Rafael et al., 2018; Doremus, 2019; Basso et al., 2020). In addition to documental research, the main limitation presented by the articles is the small sample, which makes it difficult to implement rigorous statistical (do you mean statistics?) and consequently impossible to generalize the data (Tuppura et al., 2016; Kalonga and Kulindwa, 2017; Galati et al., 2017; Van der Loos et al., 2018; Doremus, 2019).

To overcome this obstacle, it is necessary to explore more case studies (in-depth) with expertise participant observation and interviews with representatives of the parties in a qualitative method (Teitelbaum & Wyatt, 2013; Duchelle et al., 2014; Narasimhan et al., 2015; Romero & Putz, 2018; Alves et al., 2019; Ehrenberg-Azcárate & Peña-Claros, 2020). Qualitative case study approaches are perfect for gaining a good understanding of the system because they provide a detailed description of research results. This type of data collection represents a way of capturing opinions on a given subject through different actors (do you mean factors?), as the phenomenon is not yet known in depth (Yin, 2010). As studies on the FSC get deeper, more quantitative research can be developed. Otherwise, qualitative studies are still the best option to maintain and increase the FSC credibility through empirical evaluation; the certification is still a work in progress.

Although the certification presents a series of challenges, the FSC is pushing forest managers to make progress on a wide variety of fronts whether in employees, local communities, consumers and/or companies/producers. Although certification generates significant costs, companies that want to promote a good image of its

operations consolidate their business model or position itself in new markets in order to limit the ecological print of products produced. This initiative should encourage others to invest in certification (Berock and Ongolo, 2019; Kongmanee et al., 2020).

Finally, it is also necessary to highlight the need for further studies, both social and economic dimensions. Prominently environmental studies are still gaining more attention. This can be explained by the fact that certification is directly related to the environmental dimension and its principles containing this issue predominantly. Within this aspect a great doubt arises in evidence: Does the FSC really embrace the three dimensions of sustainability equally?

The motivations, benefits and challenges found in this study can serve as a basis for future research in the area, whether in qualitative or quantitative format. The increase in research in the area can directly contribute to overcoming the various challenges listed in this study, as well as strengthening the benefits.

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1. Definition of research problem	√	√	√	√
2. Development of hypotheses or research questions (empirical studies)				
3. Development of theoretical propositions (theoretical work)				
4. Theoretical foundation / Literature review				
5. Definition of methodological procedures				
6. Data collection				
7. Statistical analysis				
8. Analysis and interpretation of data				
9. Critical revision of the manuscript				
10. Manuscript writing				
11. Other (please specify)				

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