2. 2023

CORPORATE GOVERNANCE AND RESEARCH & DEVELOPMENT STUDIES

CGR&DS

OPEN ACCESS

FrancoAngeli

CORPORATE GOVERNANCE AND RESEARCH & DEVELOPMENT STUDIES

CGR&DS

OPEN ACCESS

FrancoAngeli

Segreteria di Redazione: Biancospino Antonio, Via Pietro Colletta, 12 – 80139 Napoli. Tel. 081.18814471/081.5934234 www. cgreds.it; e-mail: info@cgreds.it

Gli articoli della Rivista sono sottoposti a referaggio.
CGR&DS è accreditata dall'ANVUR quale rivista scientifica area 13

Autorizzazione n. 55 del 27-2-2019 del Tribunale di Milano – Direttore responsabile Alessandra Giordano – Semestrale – Poste Italiane Spa – Sped. in abb. post. – D.L. 353/2003 (conv. in L. 27/02/2004 n. 46) art. 1, comma 1, DCB Milano – Copyright © 2023 by Franco Angeli s.r.l. – Stampa: GECA SRL, Via Monferrato 54, 20098 San Giuliano Milanese (MI).

2/2023 – Finito di stampare nel dicembre 2023

Summary n. 2/2023

Editorial

*Salvatore Esposito De Falco**

The journal issue that concludes 2023 is truly unique as it starts from a common element, the economic and financial sustainability of businesses (a topic very dear to our journal). On one hand, it features specialized contributions on the general theme of sustainability and, on the other, it focuses on businesses in the soccer sector with a preview of the Special that we will dedicate in 2024 to "*The football industry between governance, management, and sustainability*", curated by myself and Professors Rosario Faraci (University of Catania) and Daniel Torchia (Bocconi University).

The papers received for the Special Issue, in particular, were more than thirty. The great success encountered by this topic is such that, even after the deadline, other contributions were received which, for now, we have not been able to consider. A first necessary consequence of this numerous and enthusiastic participation has been the need to distribute the selected papers over several issues. The contributions are so interesting that the Editorial Committee could not help but reward them in some way. Thus, the publication of the various interventions has been spread both in this issue and in the other two issues of 2024.

Moreover, as this is a topic that has so far been little addressed in the literature, it has been more than satisfying to verify that this gap is to the detriment of scientific journals, and not due to a lack of willingness on the part of authors to engage with this theme. Quite the contrary! In this issue, therefore, we will give a taste of what will be in the next Special Issue, starting from a more general discussion on economic and financial sustainability. This theme, on the other hand, is becoming increasingly crucial in the con-

* Full Professor of Business Management, Sapienza Università di Roma. salvatore.espositodefalco@uniroma1.it

Corporate Governance and Research & Development Studies, n. 2-2023
(ISSN 2704-8462-ISSNe 2723-9098, Doi: 10.3280/cgrds2-2023oa17143)

temporary world. In an era marked by rapid climate change, growing inequalities, and unprecedented global challenges, it is essential to rethink our approach to the economy and finance. Economic sustainability is not just about protecting the environment. It involves creating economic systems that promote social equity, financial resilience, and environmental responsibility.

In this issue, we will explore various strategies to achieve economic and financial sustainability, ranging from territorial development through research and innovation (*Marco Savastano, Irina Gorelova, Francesco Bellini, Fabrizio D'Ascenzo*), to the spread of blockchain technologies in businesses (*Huma Sikandar, Nohman Khan, Muhammad Imran Qureshi, Sabeen Bhatti*), and a more general discussion on climate policy for decarbonization in Europe (*Cristina Simone, Sara Diana, Silvia Scardini, Marcelo Enrique Conti*).

The theme of financial sustainability will then intersect with the football business sector, which moves at a breakneck pace, both on and off the field, towards a more financially sustainable and responsible future. Football, a sport loved and followed by millions of people around the world, has experienced exponential economic growth in recent decades. However, this development has brought significant challenges in terms of financial sustainability. Historic clubs have found themselves in economic difficulties, while the gap between the richest teams and the less fortunate ones has widened. In this context, the need for change emerges.

In this perspective, one of the central aspects of this issue is the adoption of sustainable business models in football. Prudent management of financial resources is crucial for ensuring the longevity and long-term success of a club. This will be explored in detail in the paper by *Francesco Laviola, Fernando Camastra, Annabella Conturso, and Roberto de Renzi*. By examining how clubs can balance sporting ambitions with financial responsibility, avoiding over-indebtedness and investing intelligently, the discussion will be broadened to a more general regulation of the football industry (*Filomeno Rocco Fimmanò*). Finally, focus will be given to the importance of financial education within the football industry, from a Risk Management perspective (*Antonio Renzi, Pietro Taragoni*).

Our hope is that the issues raised provide useful food for thought and discussion, offering an in-depth view of how businesses in general, and those in the football sector in particular, can evolve towards more sustainable and responsible practices.

Exploring the role of research and innovation institutions in regional digital development: The experience of Lazio Region

Marco Savastano[*], *Irina Gorelova*[**], *Francesco Bellini*[***], *Fabrizio D'Ascenzo*[****]

Received 22 April 2023 – Accepted 26 June 2023

Abstract

Developing a strong and vibrant economic base is one of the European Union priorities for 2019-2024. According to European policymakers, research and innovation activities have a direct impact on the level of prosperity and well-being of European society. EU regional policy is among other issues concentrated on the support of the development of SMEs and strengthening regional research and innovation activities. EU Smart Specialisation Strategy (S3) prioritizes research and innovation investment as a tool for the development of the European regions. Italy is an industrial country; its manufacturing companies represent the engine of economic growth and development, with their ability to produce wealth and job opportunities. Starting from the structure of the Italian economy characterized by widespread entrepreneurship, creating a favorable environment for businesses therefore responds to a specific public interest. For this reason, industrial policy is back at the core of the government's agenda. Knowing how to take up this challenge, however, not only concerns the government, but mainly entrepreneurs, to whom the new development and digitalization plans are providing agile and flexible tools to grow, innovate and acquire competitiveness. The development of collaborations between research and development institutions and SMEs is one of the measures to achieve these goals. By considering the representative Lazio Region case, this study seeks to understand the

[*] Dipartimento di Management. Sapienza Università di Roma. marco.savastano@uniroma1.it – Corresponding author

[**] Dipartimento di Management. Sapienza Università di Roma. irina.gorelova@uniroma1.it

[***] Dipartimento di Management. Sapienza Università di Roma. francesco.bellini@uniroma1.it

[****] Dipartimento di Management. Sapienza Università di Roma. fabrizio.dascenzo@uniroma1.it

Corporate Governance and Research & Development Studies, n. 2-2023
(ISSN 2704-8462-ISSNe 2723-9098, Doi: 10.3280/cgrds2-2023oa15789)

contribution of the joint work of these platforms to the regional development and local entrepreneurial competitiveness through an in-depth analysis of strengths, weaknesses, threats and opportunities of the ongoing smart specialization and digital transformation strategies.

Keywords: regional development, smart specialisation strategy, digital transformation, digital innovation, Industry 4.0, digital maturity.

Sommario

Lo sviluppo di una base economica solida e dinamica è una delle priorità dell'Unione europea per il periodo 2019-2024. Secondo i policymaker europei, le attività di ricerca e innovazione hanno un impatto diretto sul livello di prosperità e benessere della società negli Stati membri. La politica regionale dell'UE si concentra, tra l'altro, sul sostegno allo sviluppo delle PMI e sul rafforzamento delle attività regionali di ricerca e innovazione. La Strategia di Specializzazione Intelligente dell'UE (S3) individua gli investimenti in ricerca e innovazione come strumento prioritario per lo sviluppo delle regioni europee. L'Italia è un paese industriale; le sue imprese manifatturiere rappresentano il motore della crescita e dello sviluppo economico, con la loro capacità di produrre ricchezza e opportunità di lavoro. Partendo dalla struttura dell'economia italiana caratterizzata da un'imprenditorialità diffusa, la creazione di un ambiente favorevole alle imprese risponde quindi a uno specifico interesse pubblico. Per questo la politica industriale è tornata al centro dell'agenda del governo. Saper cogliere questa sfida, però, non riguarda solo la pubblica amministrazione, ma soprattutto gli imprenditori, ai quali i nuovi piani di sviluppo e digitalizzazione stanno fornendo strumenti agili e flessibili per crescere, innovare e acquisire competitività. Lo sviluppo di collaborazioni tra istituti di ricerca e sviluppo e PMI è una delle misure per raggiungere questi obiettivi. Considerando il caso rappresentativo della Regione Lazio, questo studio ha l'obiettivo di comprendere il contributo del lavoro congiunto di queste piattaforme allo sviluppo regionale e alla competitività imprenditoriale locale attraverso un'analisi approfondita dei punti di forza, di debolezza, delle minacce e delle opportunità che caratterizzano le strategie di specializzazione intelligente e trasformazione digitale attualmente in corso.

Parole chiave: sviluppo regionale, strategia di specializzazione intelligente, trasformazione digitale, innovazione digitale, Industria 4.0, maturità digitale.

1. Introduction

Regional development, as defined by the Economic and Social Council (ECOSOC) of the United Nations in the Resolution 1582, has two main components: social and economic. To promote and ensure regional development

initiatives, the UN centre for Regional Development (UNCRD) was established. The UNCRD serves as the training and research center, provides consulting services, promotes the exchange of research data and practical experience and plays a mediating role between the stakeholders of the process. Organization for Economic Co-operation and Development (OECD) defines regional development as a broad term, which can be seen as a general effort to improve living standards in all regions, making more sound contribution to national development and to promote the most inclusive and resilient society. The approach to regional development, of both the United Nations and the Organization for Economic Cooperation and Development, offers a useful tool for sustainable development and corresponds to the UN Sustainable Development Goals (SDGs) introduced by the Agenda 2030 in 2015. European regional development policy has its origins in the Treaty of Rome, which established the European Economic Community in 1957. It has now become the EU's main investment policy addressing all regions and cities of the European Union in order to support business competitiveness, economic growth, sustainable development and social resilience. The European Union Cohesion policy has been evolving over the years; becoming more specific, with a closer approach to social resilience. In order to boost regional development, the European Union introduced a Smart Specialisation (S3) policy, a place-based approach to regional development by means of the support and development of the regional strengths and Entrepreneurial Discovery Process (EDP) (Interreg Europe, 2020). An example of one of the instruments to promote the collaboration between European research and innovation (R&I) institutions and small and medium-sized enterprises (SMEs), according to Smart Specialisation policy, are the Digital Innovation Hubs (DIHs). DIHs are multi-partner, regional, single-window organizations; which aim to support SMEs and the public sector in their digital development and transformation. Smart Specialisation policy sees DIHs as one of the engines for regional development. An important basis for the development of the collaboration between R&I institutions and SMEs in Europe is the European innovation and digitalization policy. In 2020 following the 2014-2019 Digital Single Market Strategy, the European Commission published a series of documents that should define Europe's digital future and illustrate the European Union goal to become the world leader in the digital market. The EU innovation policy is based on 3 pillars: open innovation – in terms of making innovation a cross sectorial process; open science – in order to diffuse knowledge using digital technologies and open the world – in order to promote international cooperation in scientific process.

Italian policy documents and strategies reflect the importance of innovation and digitalization on a national level and stress the role of R&I and

SMEs cooperation in boosting regional and economic development. Industry 4.0 national plan (Piano nazionale Industria 4.0), replaced with the Enterprise 4.0 national plan (Piano nazionale Impresa 4.0) in 2020, spelled the basis for the further development of the industry in the context of 4.0 technologies development and application. The creation and development of DIHs and competence centers is one of the key objectives for the Industry 4.0 national plan (Calenda, 2017). The Enterprise 4.0 national plan provides a synergy between the regional DIHs and the Competence Centers that have a national character and are equipped with high technological skills. The Transition 4.0 national plan (Piano Nazionale Transizione 4.0) updates the Enterprise 4.0 national plan by modifying the package of measures provided. It offers greater support to companies that invest in the modernization and digitalization of production processes, skills training and knowledge sharing within the company and development of new products and processes. The R&I institutions which have the role of stimulating companies' demand for innovation and strengthening their level of knowledge and awareness, fit perfectly into new strategy.

The Lazio Region developed its Smart Specialization strategy in 2016. The strategy defined three main objectives for the smart specialization of the region – to develop regional production through the knowledge sharing and adaptation of technologies of excellence; to support the internationalization of local market players and to renew the competitive capacity of the regional entrepreneurial fabric. The Lazio region was selected for this study since its Smart Specialisation strategy is supported by a high presence of R&I institutions, which represent a particular strength of the region. Indeed, Lazio region has several R&I institutions that together create an innovative regional fabric. The DIH of Lazio is Cicero, founded in 2018. Cicero works with big companies and SMEs as well as universities and research and excellence centers of Lazio, Italy and EU. Its main strategic sectors of operation are ICT, aerospace, life sciences, renewable energy, green economy, automotive, creative industry and tourism. The competence center deployed in Lazio region is Cyber 4.0; one of the 8 national competence centers with special orientation at cybersecurity. Cyber 4.0 aims to develop competitiveness on the regional and national levels by offering guidance and training services to companies and public administrations and by financing research and innovation projects to raise the level of protection from the risk of cyber-attacks to strategic, corporate and national systems, processes and assets. The Science and Technology Parks (STP) of Lazio operate to increase the competitiveness of the region through the activation and management of research and development, technology transfer and business development projects. STP also favours the cooperation between companies, universities and research centers,

public administrations and credit institutions. Each STP deals with specific thematic sectors, for example: environment, aerospace, biotechnology, telecommunications, hi-tech and multimedia. The Lazio Region has founded three Technological Districts (TD) on its territory that operate in the field of Aerospace, Biosciences and Cultural Heritage conservation. Given the contextual and infrastructural strengths characterizing the Lazio Region (e.g., high concentration of universities and research centers, industrial international groups, great entrepreneurial vitality, high international attractiveness of Rome, etc.), the authors decided to take it as a benchmark to analyse the level of development of the Smart Specialisation strategy in Italy considering the timeframe between the end of the first S3 period introduced by the EU Cohesion Policy 2014-2020 and the beginning of the new Cohesion Policy 2021-2027 (Interreg Europe, 2020).

Relying on the reference scientific and managerial literature as well as current initiatives and ongoing projects on European and Italian level, the authors posed the following research questions for this study:

RQ1: What is the current development of the R&I ecosystem in the Lazio Region according to the objectives set by the EU S3 strategy?

Concerning the concept of ecosystem included in RQ1, given the contextual characteristics of the subject under investigation, we refer to it accordingly to the management research. More in detail, adopting the multi-actor network perspective highlighted in Tsujimoto *et al.* (2018) we define it as the complex dynamic networks, interactions and relationships among actors with different attributes, ranging from private firms, entrepreneurs and investors to innovators outside of company pipelines, users/user communities, universities and research centers, governmental bureaucrats/policy makers, and consortiums.

RQ2: What are the sectors and main activities covered by the R&I institutions in the Lazio region?

Therefore, this research aims at providing a clear and detailed outline of the current degree of development concerning the R&I ecosystem foreseen by European and regional plans for the Lazio region, highlighting implications, gaps and possible improvements. R&I institutions' presence in the Lazio region is an advantage for its development; R&I institutions leverage entrepreneurial ecosystem building and boost the digital transformation of the region. The Lazio region, with its policy dedicated to the S3 implementation

and specific investments in the digital transformation of the local ecosystems, represents a benchmark for many other regional contexts. The R&I institutions' inclusion in regional development represents a good example for the development of other European regions in the framework of the new Cohesion Policy 2021-2027. The results obtained in this study will allow practitioners and policy makers to evaluate the current state of R&I institutions' inclusion in regional development and foresee possible future actions for improvements. The possibility of such an interregional exchange approach, by finding the most effective policy solutions for S3, makes this kind of research an important starting point for policy learning on both regional and European level.

The paper is structured as follows: section two presents a literature review focusing on the topics of Regional Development, Smart Specialization and R&I institutions and platforms. Next, section three provides the research design and methodology used in this study. Section four details the main results, discussion, and implications of the study. In section five conclusion, limitations and future research paths are outlined.

2. Theoretical background

2.1. Regional Development and Smart Specialisation

Regional Innovation and Smart Specialisation Strategy are inevitable elements of smart and sustainable regional growth. First of all, regional innovation development processes depend on the human capital resources and welfare of the region, but also on the regional economy's technological capacity "understood in a broad sense as a level of technological advancement of industry and service sectors, the academic sphere that introduces innovations to the economy" (Kogut-Jaworska *et al.*, 2020). Innovations and knowledge transfer are important components of the regional development and smart specialisation of the European regions (McCann & Ortega-Argilés, 2013). The Smart Specialisation policy has inspired European regional innovation strategies over the last ten years, approximately. It has introduced a successful driver for change in governance settings, inclusive of the policy processes and adoption of strategic priorities combining science and communities as a knowledge base for their identification and joint growth (Interreg Europe, 2020). Smart specialisation initiatives differ significantly from region to region due to the inequality of economic conditions and local governance as well as the relationship between regional and local government (McCann & Ortega-Argilés, 2014). Capello and Lenzi (2015) corroborate

this idea by affirming that the implementation of smart specialisation strategy differences in regionally specific modes of governance. Smart specialisation initiatives implementation also differs between new and traditional industries (Ylinenpää *et al.*, 2016). Innovation and entrepreneurship are considered as the drivers and core processes for regional development in the framework of smart specialisation strategy (Romano *et al.*, 2014). EDP strengthens the links among the regional research and innovation stakeholders hereby contributing to regional development (Ranga, 2018; Szerb *et al.*, 2020). At the same time, the establishment of horizontal and vertical innovation networks is one of the mechanisms that facilitates continuous EDP (Roman *et al.*, 2018). For effective functioning of quadruple helix innovation model in the framework of regional development regions should strengthen collaborative innovation activities and support the cooperation between SMEs and innovation experts (Suzic *et al.*, 2020). Some authors claim that despite the long existence of smart specialisation policy in Europe, critical principles of how to design regional innovation policies are still missing. Focusing on these principles is one of the main steps to define regional innovation policy 4.0 (Benner, 2020).

2.2. R&I stakeholders and Smart Specialization initiatives

The role of universities in regional development and innovation becomes sounder with the emergence of smart specialisation policies (Secundo *et al.*, 2017; Rinaldi *et al.*, 2018). On the one hand, the scientific production of the university crosses the borders of the region due to international nature of the research but on the other hand, universities can become a magnet for the highly-skilled professionals, knowledge and networks from outside the region (Kempton & Delivering, 2015). The last statement is also true for the research infrastructures, such as laboratories (Snickars & Karlsson, 2017). Communities offer a platform for universities to collaborate with other actors of the entrepreneurial discovery process (EDP) and create a strategic vision on their role in regional development (Marinelli & Elena-Perez, 2017). In order to be effective contributors to regional development, universities should develop their strategies in accordance with the development paths in their regions – development of new industries; implementation of an industry from another region or nation; diversification of an industry into related industries or development of existing industries (Gjelsvik, 2018). The cooperation of the universities and SMEs leads to the development of creative entrepreneurship which results in the increase of welfare of a region (Pirnau *et*

al., 2018). The Digital Innovation Hubs are considered by European policy-makers to play several roles in connection to the regional innovation strategy. The efforts of DIHs can also support the development of the regional innovation ecosystem as well as business growth and upgrading of local suppliers (Rissola & Sörvik, 2018). In this context, the study of Hervas-Oliver *et al.* (2020) provides an empirical analysis of the European Commission (EC) digital DIH program, by exploring the activities of ten Spanish DIHs designed for fostering the regional transition into Industry 4.0 and facilitating new path development. These institutions were found to be multi-actor collaborative platforms, including non-local actors, with aims to stimulate transition into Industry 4.0 by promoting place-based collaboration opportunities that respond to local/regional contextual specificities and demands. In this way, these entities are facilitators of public-private partnerships that co-design policy, spatially bound oriented initiatives for digital transformation projects.

2.3. Evidence from Italy

Italian experience and peculiarities in the development and implementation of S3 and the role of R&I institutions is reflected in the scientific literature of the recent years. D'Adda *et al.* (2019) in their study explored the coherence between the technological domains chosen by Italian regions to implement S3 and those in which they show actual innovative capabilities, the research shows that the set of technological domains included by the Italian regions in the S3 is lower than those in which regions show some kind of strength. Balletto *et al.* (2020) studied cohesion policies in the Italian metropolitan cities and highlighted the dualism in Italian context – a country is divided in two areas: North and South that influences the EU cohesion policy implementation. The differences between the more developed center-north and the less developed south were also highlighted by Dileo and Pini (2021) in their study of the Quadruple Helix partnerships for enterprise eco-innovation. Another research (Bellini *et al.*, 2021) shows the differences in the S3 implementation between regions belonging to the same geographic area – Sicily and Apulia (South of Italy); the comparative analysis shows that the two regions approached RIS3 learning in a substantially different way. The case study of Emilia-Romagna region (Labory & Bianchi, 2021) has led to an important outcome that successful S3 requires the deployment of dynamic capabilities, especially in lagging regions, characterized by different barriers that create constraints for the entrepreneurs in their attempt to seize opportunities. The case study of the University of Macerata (Marche region, Italy) (Rinaldi *et al.*, 2018) analysed the

potential contributions of the universities to the development and enhancements of capacities that change the innovation concept through a S3 approach; the findings show that the universities can play a broader role to support regions in designing and implementing of the S3. Del Vecchio *et al.* (2017) discuss the importance of Living Labs as an effective mechanism that can support the creation of innovation ecosystems on the regional level; the study analyses 20 cases of Italian Living Labs and explores their relevance for setting regional strategies for smart growth. The study of Crupi *et al.* (2020) claims that Italian DIHs act not only as knowledge brokers but also as knowledge sources that give rise to a digital imprinting process that is able to shape the digital transformation of the Italian SMEs.

3. Research Methodology

Given the exploratory nature of this paper, the case study research provided the most suitable approach. To answer the research questions, data retrieved from official and reliable sources (e.g., European Commission policies, Lazio Region reports or plans, the official websites of the R&I Institutions under consideration, etc.) was collected for their further analysis and triangulation. Particularly, in an initial phase, secondary data was collected; this include evidence from scientific literature and official documents on European, Italian and regional level policies. For this phase we considered, as a guiding model, the study of Rumyantsev (2018), who used structural and functional analysis of the research and innovation activities in the macroregion of the North-West of Russia, to assess its current status and development trend. Thus, the author found evidence on the creation and development of a polycentric structure of research and supporting polices for regional innovation activities from the standpoint of economic stability. Therefore, from our side, it is important to explore what missions – testing and experimentation, financing, skills, and ecosystem-building (Miörner *et al.*, 2019) – are covered by the R&I institutions operating in the Lazio region and what are their target sectors – public organizations or private sector, including SMEs and large companies. The present analyses of the collected data present clear evidence on the settings and activities of such institutions in the context of regional development, to provide a systemic picture on the overall current degree of achievement of the planned program of the digital agenda and of the S3 strategy for the Lazio region. Particularly, the analysis was carried out by specifically referring to the development in the 5 regional provinces of Lazio. In order to offer a schematic output, that clearly and immediately shows the current state of development of R&I institutions in the

different areas of interests as well as provinces of Lazio Region, a comprehensive table (Table 1) is presented at the end of the first sub-section of the results. As a second phase, based on the evidence obtained in the first one, the authors implemented a SWOT analysis, as the strategic planning tool used to assess the strengths, weaknesses, opportunities and threats of the regional economic system. Following the research objectives, the results will allow researchers, practitioners and policy makers to evaluate the current level of development as well as value offered to the context in which they are embedded and foresee possible improvements.

4. Results and Discussions

Starting from the financial resources for the three-year period 2019-2021, according to the official performance plan of the Lazio Region identified in the financial forecast budget approved by the regional law no. 14, it is possible to identify the areas of investments for the last three years of the previous policy with the aim of increasing the region's economic development and competitiveness. The following table (Table 1) shows the financial resources for the three- year period 2019-2021, divided by missions (main functions of the Region) and programs (homogeneous aggregates of activities aimed at pursuing the objectives defined within the missions).

Table 1. Financial resources for the period 2019-2021 allocated by the Lazio Region

Mission	Program	2019 (€)	2020 (€)	2021 (€)
Economic development and competitiveness	Industry, SMEs and Crafts	28.837.863,57	5.101.000,00	3.500.000,00
	Commerce – distribution networks – consumer protection	13.353.436,61	5.440.000,00	4.500.000,00
	Research and Innovation	69.356.888,42	18.200.000,00	18.400.000,00
	Networks and other public utility services	0,00	0,00	0,00
	Unified regional policy for economic development and competitiveness	209.815.762,04	97.693.539,42	85.827.202,12
	TOTAL MISSION	321.363.950,64	126.434.539,42	112.227.202,12

Lazio smart specialization strategy defines 7 specialization areas of Lazio region – Aerospace, Life Sciences, Cultural Heritage and Culture Technologies, Digital Creative Industries, Agrifood, Green Economy and Security. These are the most significant and successful sectors of the Lazio region in terms of the level of knowledge transfer, research and development infrastructure and the maturity and development of business projects. As implied by the very nature of smart specialization, these areas are the main sectors that should have been developed and supported in order to achieve the objectives of the Lazio region development. In order to answer the research questions posed in this paper, the authors found it interesting to study the level of presence of R&I institutions in each S3 area.

4.1 Aerospace

The Aerospace S3 area is one of the soundest for the Lazio region. According to S3 strategy of Lazio, it is the only Italian region with the entire supply chain present in one region. So further development of the aerospace area affects other sectors, causing positive effects on the quality of business processes, goods and services and providing innovative solutions for the benefit of citizens and society. The S3 strategy of Lazio region stipulates that by the time of the strategy elaboration, the aerospace sector exceeded 5 billion Euros of annual turnover and employed 30,000 people in 250 companies in the various areas of the sector. Lazio Aerospace Technological District (DTA) was created with the aim to promote research, knowledge and technology transfer and the launch of new entrepreneurial initiatives within the ambit of aerospace S3 area. Cicero, the DIH of Lazio supports the entrepreneurial activities of the companies operating in the Lazio region. In particular, Cicero supports companies' digital transformation, so companies from Lazio region can make use of the services offered by Cicero in order to produce excellence in strategic sectors of the region, including aerospace. One of 8 national competence centers located in Lazio, Cyber 4.0, has its main scope in the raising of the level of protection against the risks of cyber-attacks and operates in the sphere of aerospace too. The companies located in the Technological Park, Tecnopolo Tiburtino, operate in ten different sectors; aerospace sector is one of them. Universities located in Lazio are also contributing to the development of this sector. Main Universities located in Rome (Sapienza University of Rome, Tor Vergata University of Rome and Roma Tre University) have aerospace department or faculties. University of Tuscia in Viterbo also participates in EU aerospace projects.

4.2. Life Sciences

The Life Sciences sector is of great importance for Lazio region. It has a strong scientific and research background in the region. In the same way as the aerospace S3 area, the life sciences area has a transversal nature, so it favours the overflow of knowledge and skills in contiguous sectors. According to S3 strategy of Lazio region, the local life sciences sector was ranked second at the national level for turnover (8 billion euros) and number of employees (18,000), but first in terms of export value (4.7 billion euros). Cicero DIH and Cyber 4.0 also contribute to the development of this area creating a field for knowledge transfer and funding opportunities. Technological parks, Technopolo Castel Romano and Technopolo Tiburtino, also contribute to the life sciences S3 area. There is also a sound presence of the universities in this area; for example, the university center, Sabina Universitas in the province of Rieti, has its medical center with bachelor courses in: nursing, medical radiology techniques, imaging and radiotherapy, prevention techniques in the environment and in the workplace and biomedical laboratory techniques. In the province of Latina, the university center Ce.R.S.I.Te.S. at the premises of Sapienza University of Rome has a Pharmacy and medicine faculty.

4.3. Cultural Heritage and Culture Technologies

The cultural heritage of Lazio is undoubtedly one of the most unique in the world. It is a strategic asset on both regional and country levels. The presence of such important historical and cultural heritage poses new challenges for the region – it is important to apply and improve measures and approaches for the restoration and preservation of cultural artifacts. The region has sufficient infrastructure to make these improvements. Of course, the Cultural Heritage and Culture Technologies sector is one of its strongest and the most efficient sectors in which development should be deepened by smart specialization measures' application. As follows from the S3 strategy of Lazio region, the turnover of the cultural heritage sector was over 11.5 billion euros, with 172,000 employees involved. Lazio is the Italian region with the highest intensity of visits and income deriving from museums and archaeological sites, with around 18.5 million visitors in 2014. In order to strengthen the competitive positioning of the sector in the region, the Technological District for Cultural Heritage (DTC) was created. This institution promotes economic and territorial development of the region, activating a collaboration between the stakeholders of the domain, consolidating the more innovation-oriented participants in the sector, in order to promote knowledge and

technology sharing and create infrastructure for research and innovation in the sector. Among the founders of DTC are the universities of Rome (Sapienza University of Rome, Tor Vergata University of Rome and Roma Tre University), University of Cassino and Southern Lazio (province of Frosinone) and Tuscia University (Viterbo).

4.4. Digital Creative Industries

Over the years, Lazio region has concentrated special knowledge and skills, which make a basis for the creation and development of creativity and different types of arts. Development of creative industries attracts creative and cultural human capital that leverages innovation processes in the region and supports the economy's competitiveness. According to Lazio Innova, the creative and digital industries are a very important economic reality, so that more than 90,000 employees are employed in over 18,000 companies (20% of the national total) for a wealth produced of close to 7 billion euros[1]. Collaboration with the representatives of the creative industries area is one of the activities of Cicero DIH. The Technological Park, Tecnopolo Tiburtino, operates in the area of creative industries – especially with a group of companies engaged in design and implementation of audiovisual and multimedia communication systems; as well as companies focused on publishing, graphics and web design. Universities presented in the region have more than 20 bachelor and master programs in the field of creative industries.

4.5 Agrifood

Agrifood is another significant sector for regional economics. Being a traditional sector of the region, its innovation can become an advantage for the development of other S3 areas such as Security and Green Economy. According to the Lazio Innova official site, the agrifood S3 area represents 3% of the wealth of regional economy, with 6.3 billion in annual turnover. There are more than 3,400 companies in the area employing almost 17,000 employees, with exports settling at around 550 million euros per year[2]. In the province of Latina, the scientific and technological park of Southern Lazio (Pa.L.Mer.) carries out chemical analyses for the agrifood sector. Universities of Lazio also actively presented in the research and didactics in this area. For example, Sabina Universitas has the program of Mountain Sciences, the

[1] http://www.lazioinnova.it/reti-cluster-innovazione/industrie-creative-digitali/
[2] http://www.lazioinnova.it/reti-cluster-innovazione/agrifood/

only one existing in Italy. This program has its aim to provide knowledge in the forestry, agricultural, environmental and economic sectors, as well as encouraging entrepreneurial growth in mountain areas.

4.6 Green Economy

Lazio region is adopting green solutions in the region, transforming environmental problems into real economic opportunities. Hence, Lazio is taking green measures to reduce plastic waste, to fight air and water pollution, to increase energy efficiency and the use of renewable energy and to develop a more efficient and green transportation network, etc. To achieve these goals, Lazio region develops several specific support measures and allocates budget funds (Regione Lazio, 2020). At the time of the publishing of S3 strategy of Lazio region, Lazio was in third place after Lombardy and Veneto with just over 28,000 companies (8.6%) that had invested or were aiming to invest in green products and technologies. According to the statistics of GreenItaly report 2020 by of Fondazione Symbola – Unioncamere (Fondazione Symbola, 2020), considering the 5-years period 2015-2019; Lazio is in third place for investments (9.3%) made by companies in green products and technologies. Although Green Economy is one of the burning issues nowadays, not all the universities presented in this study are fully engaged in the study of this topic. Cicero DIH, Technological parks Technopolo Castel Romano and Technopolo Tiburtino perform their activities in the green economy area too.

4.7 Security

Security is a broad area that includes technologies for environmental surveillance and control, effective communications, identification and detection systems of urban infrastructures, energy safety, etc. Since this S3 area ensures the stability and efficiency of other S3 areas, it is of high relevance and priority for the region. According to Lazio Innova, Aerospace and Security S3 areas, in the context of the regional economy, are sectors of vital interest in the regional economy due to the possibility of using scalable and transferable applications that generate virtuous multiplicative circuits of research, development and innovation activities. The soundest example of the R&I institution that operates in the security area is the recently established Cyber 4.0 competence center. Cyber 4.0 carries out its activity in four areas of specialization: Cyber Security Core Services, Aerospace, Automotive and eHealth. Among the

members of Cyber 4.0 competence center are all the main universities of Lazio, showing the interest of the universities in this topic. Cicero DIH and technological park, Tecnopolo Tiburtino, are engaged in the development of ICT technologies that are directly related to cybersecurity.

Table 2 vividly shows the distribution of the discussed R&I institutions organised according to S3 areas and provinces of Lazio.

Table 2. R&I institution according to S3 areas and provinces of Lazio presented in the text

R&I institution / Provinces	**University**	**DIH**	**CC**	**STP**	**TD**
AEROSPACE					
Rome	- Sapienza University of Rome - University of Rome "Tor Vergata" - University of Rome "Roma TRE"	Cicero DIH	Cyber 4.0	Tecnopolo Tiburtino	Lazio Aerospace Technological District (DTA)
Latina					
Frosinone					
Viterbo	Tuscia University				
Rieti					
LIFE SCIENCES					
Rome	- Sapienza University of Rome - University of Rome "Tor Vergata" - University of Rome "Roma TRE"	Cicero DIH	Cyber 4.0	- Polo Tecnologico di Castel Romano - Tecnopolo Tiburtino	
Latina	Ce.R.S.I.Te.S (Sapienza university of Rome)				
Frosinone	University of Cassino and Southern Lazio				
Viterbo					
Rieti	Sabina Universitas				
CULTURAL HERITAGE AND CULTURE TECHNOLOGIES					
Rome	- Sapienza University of Rome - University of Rome "Tor Vergata" - University of Rome "Roma TRE"				Lazio Cultural Technological District (DTC)
Latina					
Frosinone	University of Cassino and Southern Lazio				
Viterbo	Tuscia University				
Rieti					

DIGITAL CREATIVE INDUSTRIES					
Rome	- Sapienza University of Rome - University of Rome "Tor Vergata" - University of Rome "Roma TRE"	Cicero DIH		Tecnopolo Tiburtino	
Latina					
Frosinone					
Viterbo					
Rieti					
AGRIFOOD					
Rome	- Sapienza University of Rome - University of Rome "Tor Vergata" - University of Rome "Roma TRE"				
Latina				Pa.L.Mer – Parco Scientifico e Tecnologico del Lazio Meridionale	
Frosinone	University of Cassino and Southern Lazio				
Viterbo	Tuscia University				
Rieti	Sabina Universitas				
GREEN ECONOMY					
Rome	- Sapienza University of Rome - University of Rome "Tor Vergata" - University of Rome "Roma TRE"	Cicero DIH		Polo Tecnologico di Castel Romano Tecnopolo Tiburtino	
Latina	Ce.R.S.I.Te.S (Sapienza university of Rome)				
Frosinone	University of Cassino and Southern Lazio				
Viterbo	Tuscia University				
Rieti					
SECURITY					
Rome	- Sapienza University of Rome - University of Rome "Tor Vergata" - University of Rome "Roma TRE"	Cicero DIH		Tecnopolo Tiburtino	
Latina	Ce.R.S.I.Te.S (Sapienza university of Rome)				
Frosinone	University of Cassino and Southern Lazio				
Viterbo	Tuscia University				
Rieti					

To systematize this data, a SWOT analysis was performed in table 3. The main strengths of the R&I institutions activity in Lazio region are the significant presence of universities in all the S3 areas and in all provinces. This presence provides better knowledge sharing and creates a fertile ground for the research and innovation activities. The existence of Digital Innovation Hub and Competence Center in the territory of the region, as well as a wide range of R&I institution's types, provides stakeholders with better accessibility to their services and efficient cooperation. The main weaknesses of the R&I institutions' activity in the Lazio region are their uneven distribution and their unequal coverage of the S3 areas. The transversal nature of some S3 areas that supports the overflow of knowledge and skills in contiguous areas can help to achieve the goals set in the opportunities section and reduce the weaknesses. The main threat authors see, resides in the consequences of the COVID-19 pandemic that may affect the priority of the S3 areas' development in the region (for instance Life sciences), that can negatively affect the development of other S3 areas and the activity of R&I institutions.

Table 3. SWOT analysis of the activities of R&I institutions in Lazio region in the framework of the S3 Strategy

Streng	**Weakn**
– The sound presence of universities in all the S3 areas – Existence of Digital innovation Hub and Competence Center on the territory of the region, that provides the stakeholders with better accessibility to their services – Wide range of R&I institution's types in the region	– Uneven distribution of R&I institutions in the Lazio region – Not a11 the S3 areas are equally covered with the activity of R&I institutions
Opportunit	**Thr**
– Increase of number of R&I in the provinces of Latina, Frosinone, Viterbo and Rieti – Increase the activity of R&I institutions in the following S3 areas: Digital creative industries, Agrifood – A transversal nature of some S3 areas that favors the overflow of knowledge and skills in contiguous areas	– The consequences of the COVID-19 pandemic may affect the priority of the S3 areas development (for instance Life sciences), that can negatively affect the development of other S3 areas

A practical example of a systemic application of this strategy at the regional level is Lazio Innova, an in-house company of the Lazio Region. Lazio Innova's mission is to support the development of the region through incentives for the creation of new businesses (e.g., innovative start-ups), the enhancement of existing ones through the internationalization process, the promotion of business networks and regional excellence and the implementation of measures for social inclusion. It provides both effective managerial and technical consulting tools and a direct connection to the business world through local chambers of commerce, and creates a regional network of innovation centers. Lazio Innova is strongly linked to the culture of the provincial area where they are located and embedded inside business incubators. As part of the "Spazio Attivo" project, this new regional network of innovation hubs involves large meeting spaces, open to cooperation between individuals and local authorities, providing access to different services for businesses, start-ups, training and work. In these places, entrepreneurial training, business incubation, coworking ("Talent Working") and FabLab activities to transform an idea into a real object ("Diffused FabLab") co-exist for a cross-fertilisation context, divided into three areas: training, digital and interactive. Another important element is that all the services offered (courses, machines and the majority of materials) are entirely free of charge for citizens-users, as they are financed by the regional administration. Currently there are ten Active Spaces in the Lazio Region in addition to digital platforms. Each of which is characterized by a prevalent specialization: Rome Casilina – fashion and design; Rome Tecnopolo – applications of space technologies; Viterbo – cultural and creative industry; Rieti – electronics and environmental sustainability; Bracciano – agrifood and forestry systems; Ferentino – mechanics and automation systems; Colleferro – energy efficiency and environmental sustainability; Latina – life sciences and economics of the sea; Civitavecchia – tourism; Zagarolo – game, culture and tourism, Roma Casilina – fashion and design.

5. Conclusions

This research aimed to study the current level of R&I ecosystem development in the Lazio Region by analysing the main sectors and activities covered by the R&I institutions in this geographical context region. The study reveals that universities are the most active among all R&I institutions in Lazio region; there is sound presence of universities in all the S3 areas of the region and in all provinces. The high level of engagement of these universities in research and innovation is a fertile ground for better knowledge shar-

ing and promotion of the entrepreneurial activities among citizens. This outcome is in line with previous studies on the role of the universities in regional development (Fonseca & Nieth, 2021; Brekke, 2021). Moreover, the existence of DIH and Competence Centers in the territory of the region, as well as a wide range of R&I institutions, provide SMEs and the public sector with better accessibility to their services and efficient cooperation (Cotrino *et al.*, 2021). DIH and Competence Centers, as well as the network created by Lazio Innova, represent a fertile ground for companies' cooperation. It is known that overlapping professional networks and science-based boundary objects are the building blocks for the companies to endorse the UN Sustainable Development Goals (Williams *et al.*, 2019) that therefore can support local development. At the same time, R&I institutions' activity in Lazio region is currently unevenly distributed and covers unequally the S3 areas. A transversal nature of some S3 areas supports the overflow of knowledge and skills in contiguous areas and can help to overcome this problem by increasing the number of R&I in the provinces of Latina, Frosinone, Viterbo and Rieti, and strengthening the activity of R&I institutions in Digital creative industries and Agrifood S3 areas.

5.1. Implications

The abovementioned findings contribute to both theoretical evidence and managerial practice. Concerning the theoretical implications, given that there is not much evidence on the role of R&D institutions in regional development, this research will significantly contribute to scientific progress in regional science and smart specialisation studies, in particular.

Managerial implications consist in better understanding of the role of R&I institutions in regional development that will help policy makers and other stakeholders involved in such context to adjust their activity for more effective contributions to the regional ecosystem development. Despite the fact that it is not possible to design the all-purpose regional policy by copying the best practices and each region has its own assets (Asheim *et al.*, 2011) the approach applied in this paper can be taken into consideration by policy makers when drawing up a new S3 strategy of Lazio or other regions.

The role of R&I institutions in regional development is becoming sounder over the years. R&I institutions become an advantage and a spin for entrepreneurial ecosystem building and further digital innovation of the regions across Europe. Lazio region represents a best practice in the Italian context, concerning investments and polices dedicated to the S3 implementation for regional development and the digital transformation of the local ecosystems.

For this reason, it can be taken as a benchmark for many other regional contexts. However, as emerged from our results, some areas still need to be developed through ad hoc resources and projects. The ongoing progress undoubtedly represents a solid base for the new Cohesion Policy 2021-2027 under review. The main new element compared to the 2014-2020 Strategy concerns the introduction of two new Areas of Specialization: Automotive and Smart mobility, as well as Economy of the Sea. This review process is carried out through focus groups for each of the 9 areas of specialization, involving all economic operators and knowledge actors active in Lazio region, whose contributions will be used to define strategic choices for the development of the regional economy. At the basis of an effective review of the S3 for Lazio can only be the identification of the most competitive areas and sectors of activity of the region and gaps on which to focus and invest. Thus, our results provide a solid base for researchers, practitioners and policy makers to evaluate the current level of development, the value offered to the context in which they are embedded and foresee possible improvements. In addition, other tools established by the EU can support and facilitate the implementation of smart specialisation and digital transformation strategies. For instance, Interreg Europe projects share good practices and deliver concrete and transformative policy changes on regional policy challenges ranging from the Entrepreneurial Discovery Process (EDP) to S3 Monitoring, offering regional policymakers the possibility to learn from practices implemented in different regional institutional contexts across Europe. Such an interregional exchange approach, by finding the most effective policy solutions for S3, makes it the ideal space for policy learning.

5.2. Limitations and Future Research

This study is exploratory in nature and based on a specific case of the Lazio region, hence the generalization of the results could be constrained. Although the authors have carried out an attentive triangulation of data published by reliable sources, another limitation of this study is its reliance on secondary data. Future research in this field, by drawing on the evidence presented so far, can collect and analyse primary data through in-depth interviews or a quantitative approach concerning the actual development and synergies among the R&I regional ecosystem, by directly involving the representatives of the main institutions. This presents an opportunity to strengthen the present results, obtain further insights and draw more generalizable conclusions. Furthermore, it is also interesting to conduct a comparative analysis of the role of R&I institutions on the regional development in various Italian and European regions.

Another possible direction of future research is the evaluation and comparison of the role of particular R&I institutions (e.g., universities, DIHs, competence centers, technological parks etc.) in regional development. Another impetus to continue the study of this topic will come when a new S3 strategy for the Lazio region will be developed and actually implemented.

References

Asheim B., Boschma R., Cooke P. (2011). Constructing regional advantage: platform policies on related variety and differentiated knowledge bases, *Regional Studies*, 45(7): 893-904. DOI: 10.1080/00343404.2010.543126

Balletto G., Mundula L., Milesi A., Ladu M. (2020). Cohesion Policies in Italian Metropolitan Cities. Evaluation and Challenges. In: Computational Science and Its Applications – ICCSA 2020. ICCSA 2020. Lecture Notes in Computer Science, vol 12255. Springer, Cham. DOI: 10.1007/978-3-030-58820-5_33

Bellini N., Lazzeri G., Rovai S. (2021). Patterns of policy learning in the RIS3 processes of less developed regions. *Regional Studies*, 55(3): 414-426. DOI: 10.1080/00343404.2020.1762855

Benner M. (2020). Six additional questions about smart specialization: implications for regional innovation policy 4.0. *European Planning Studies* 28, 1667–1684. DOI: 10.1080/09654313.2020.1764506

Brekke T. (2021). What Do We Know about the University Contribution to Regional Economic Development? A Conceptual Framework. *International Regional Science Review*. DOI: 10.1177/0160017620909538

Calenda C. (2017). Piano Nazionale Impresa 4.0. Guida agli Investimenti. Ministero dello Sviluppo Economico.

Capello R., Lenzi C. (2016). Relevance and utility of European Union research, technological development and innovation policies for a smart growth. *Environment and Planning C: Government and Policy* 34: 52–72. DOI: 10.1177/0263774X15614655

Cotrino A., Sebastián M.A., González-Gaya C. (2021). Industry 4.0 HUB: A Collaborative Knowledge Transfer Platform for Small and Medium-Sized Enterprises. *Appl. Sci.* 11, 5548. DOI: 10.3390/app11125548

Crupi A., Del Sarto N., Di Minin A., Gregori G.L., Lepore D., Marinelli L., Spigarelli F. (2020). The digital transformation of SMEs. A new knowledge broker called the digital innovation hub. *Journal of Knowledge Management*, 24(6): 1263-1288. DOI: 10.1108/JKM-11-2019-0623

D'Adda D., Guzzini E., Iacobucci D., Palloni R. (2019). Is Smart Specialisation Strategy coherent with regional innovative capabilities? *Regional Studies*, 53:7, 1004-1016. DOI: 10.1080/00343404.2018.1523542

Del Vecchio P., Elia G., Ndou V., Secundo G., Specchia F. (2017). Living Lab as an Approach to Activate Dynamic Innovation Ecosystems and Networks: An Empirical Study. *International Journal of Innovation and Technology Management*, 14(5): 1750024. DOI: 10.1142/S0219877017500249

Dileo I., Pini M. (2021). *The quadruple helix partnerships for enterprise eco-innovation in Italian macro-regions under the lens of smart specialization strategy.* Partnerships for Regional Innovation and Development: Implementing Smart Specialization in Europe, 193-217.

Fondazione Symbola – Unioncamere (2020). *GreenItaly*.

Fonseca L., Nieth L. (2021). The role of universities in regional development strategies: A comparison across actors and policy stages. *European Urban and Regional Studies* 28(3):298-315. DOI: 10.1177/0969776421999743

Gjelsvik M. (2018). Universities, innovation and competitiveness in regional economies. *International Journal of Technology Management* 76, 10–31. DOI: 10.1504/IJTM.2018.088704

Hervas-Oliver J.-L., Gonzalez-Alcaide G., Rojas-Alvarado R., Monto-Mompo S. (2020). Emerging regional innovation policies for industry 4.0: analyzing the digital innovation hub program in European regions. *Competitiveness Review*, 31(1): 106-129. DOI: 10.1108/CR-12-2019-0159

Interreg Europe (2020). *Smart Specialisation Strategy (S3). A Policy Brief from the Policy Learning Platform on Research and innovation*. July.

Kempton L. (2015). Delivering smart specialization in peripheral regions: The role of Universities. *Regional Studies, Regional Science* 2, 489–496. DOI: 10.1080/21681376.2015.1085329

Kogut-Jaworska M., Ociepa-Kicińska E. (2020). *Smart specialisation as a strategy for implementing the regional innovation development policy—Poland case study. Sustainability* (Switzerland) 12, 1–21. DOI: 10.3390/su12197986

Labory S., Bianchi P. (2021). Regional industrial policy in times of big disruption: building dynamic capabilities in regions. *Regional Studies*, 55:10-11, 1829-1838. DOI: 10.1080/00343404.2021.1928043

Marinelli E., Elena-Perez S. (2017). Catalan universities and the entrepreneurial discovery process: Challenges and opportunities emerging from the RIS3CAT Communities. *Industry and Higher Education* 31: 360–372. DOI: 10.1177/0950422217737150

McCann P., Ortega-Argilés R. (2013). Modern regional innovation policy. Cambridge Journal of Regions, *Economy and Society* 6: 187–216. DOI: 10.1093/cjres/rst007

McCann P., Ortega-Argilés R. (2014). Smart specialisation in European regions: Issues of strategy, institutions and implementation. *European Journal of Innovation Management* 17: 409 –427. DOI: 10.1108/EJIM-05-2014-0052

Miörner J., Rissola G., Sörvik J., Wernberg J. (2019). *Putting Digital Innovation Hubs into Regional Context. A European survey*, in Rissola G. and Kalpaka A. (Eds.), EUR 29845 EN, Publications Office of the European Union, Luxembourg. DOI:10.2760/339108

Pirnau C., Ghiculescu D., Ion N. (2018). *SMEs creativity and smart regional development*, in: MATEC Web of Conferences. DOI: 10.1051/matecconf/201817807007

Ranga M. (2018). Smart specialization as a strategy to develop early-stage regional innovation systems. *European Planning Studies* 26: 2125–2146. DOI: 10.1080/09654313.2018.1530149

Regione Lazio (2020). *Lazio Green. Azioni concrete per una regione sostenibile*. October 2020.

Rinaldi C., Cavicchi A., Spigarelli F., Lacchè L., Rubens A. (2018). Universities and smart specialisation strategy: From third mission to sustainable development co-creation. *International Journal of Sustainability in Higher Education* 19: 67–84. DOI: 10.1108/IJSHE-04-2016-0070

Rissola G., Sörvik, J. (2018). *Digital Innovation Hubs in Smart Specialisation Strategies*, EUR 29374 EN, Publications Office of the European Union, Luxembourg. DOI: 10.2760/475335

Roman M., Nyberg T., Fellnhofer K. (2018). *Smart specialisation in finnish regions: How to facilitate continuous entrepreneurial discovery process?* in: Towards Sustainable Technologies and Innovation – Proceedings of the 27th Annual Conference of the International Association for Management of Technology, IAMOT 2018.

Romano A., Passiante G., Vecchio P.D., Secundo G. (2014). The innovation ecosystem as booster for the innovative entrepreneurship in the smart specialisation strategy. *International Journal of Knowledge-Based Development* 5: 271–288. DOI: 10.1504/IJKBD.2014.065315

Rumyantsev A.A. (2018). Research and innovation activity in the region as a driver of its sustainable economic development. *Economic and Social Changes: Facts, Trends, Forecast*, 11(2): 84-99. DOI: 10.15838/esc.2018.2.56.6

Secundo G., Elena Perez S., Martinaitis Ž., Leitner K.H. (2017). An Intellectual Capital framework to measure universities' third mission activities. *Technological Forecasting and Social Change* 123: 229–239. DOI: 10.1016/j.techfore.2016.12.013

Snickars F.V., Karlsson U. (2017). Research infrastructure, networks of science and regional development – the case of oskarshamn. *Region* 4: 119–131. DOI: 10.18335/region.v4i3.143

Suzic B., Ulmer A., Schumacher J. (2020). *Complementarities and synergies of quadruple helix innovation design in smart city development*, in: 2020 Smart Cities Symposium Prague, SCSP 2020. DOI: 10.1109/SCSP49987.2020.9133961

Szerb L., Ortega-Argilés R., Acs Z.J., Komlósi É. (2020). Optimizing entrepreneurial development processes for smart specialization in the European Union. *Papers in Regional Science* 99: 1413–1457. DOI: 10.1111/pirs.12536

Tsujimoto M., Kajikawa Y., Tomita J., Matsumoto Y. (2018). A review of the ecosystem concept. Towards coherent ecosystem design. *Technological forecasting and social change*, 136: 49-58. DOI: 10.1016/j.techfore.2017.06.032

Williams A., Whiteman G., Parker J.N. (2019). Backstage interorganizational collaboration: corporate endorsement of the sustainable development goals. *Academy of Management Discoveries*, 5(4): 367-395. DOI: 10.5465/amd.2018.0154

Ylinenpää H., Teräs J., Örtqvist D. (2016). Innovation networks in different industrial settings: From flexible to smart specialization. *European Journal of Spatial Development* 1: 1–18. DOI: 10.5281/zenodo.5141372

The development of blockchain technology in manufacturing: A bibliometric analysis

Huma Sikandar[*]*, Nohman Khan*[**]*, Muhammad Imran Qureshi*[***]*, Sabeen Bhatti*[****]

Received 03 May 2023 – Accepted 28 June 2023

Abstract

Many manufacturing organizations have adapted their governance systems, strategies, business models, and strategic processes in the "New Normal" and technologies like Blockchains have irreversibly transformed how people live and work. Despite extensive scholarly research, analysing emerging trends in Blockchain research remains critical. Unfortunately, the use of bibliometric analysis to study Blockchain has been limited, with little understanding of how its various research areas are progressing. Bibliometric analysis, a useful method for examining the development of research, has not been widely used in the context of blockchain. The progression of its numerous research areas is also yet unknown. This study seeks to fill these gaps by employing bibliometric analysis to assess scientific progress and research focus on Blockchains in manufacturing. We used Vos Viewer to conduct this bibliometric analysis to evaluate 265 papers published from 2017 to 2022 using co-authorship and co-occurrence of keywords analysis. We have identified the most productive authors, institutions, countries, and top research fields, highlighting the essential advancements in the Blockchain field. The findings demonstrate how keywords related to Blockchain have changed over time and describe the research hotspots. The originality of this research lies in its application of bibliometric analysis to examine the development and emerging trends in Blockchain research within the manufacturing domain while offering novel insights into the productivity of authors, institutions,

[*] Ph.D. Student. Universiti Teknologi Malaysia. huma.sikandar@gmail.com

[**] Ph.D in Management from UniKL Business School Universiti Kuala Lumpur, Malaysia. nohman.khan@s.unikl.edu.my

[***] Ph.D. in Operations Management from Universiti Teknologi Malaysia. M.Qureshi@tees.ac.uk

[****] Associate Fellow. Teesside University. s.bhatti@tees.ac.uk

Corporate Governance and Research & Development Studies, n. 2-2023
(ISSN 2704-8462-ISSNe 2723-9098, Doi: 10.3280/cgrds2-2023oa15802)

and countries, as well as identifying research hotspots and future research directions. This study contributes to the inadequate body of literature on bibliometric analysis in Blockchain research and provides useful guidance for researchers and practitioners in the field.

Keywords: Blockchains, blockchain technology, bibliometric analysis, VOS viewer.

Sommario

Molte organizzazioni manifatturiere hanno adattato i loro sistemi di governance, strategie, modelli di business e processi strategici nel "New Normal", laddove tecnologie come la Blockchain hanno trasformato irreversibilmente il modo in cui le persone vivono e lavorano. Nonostante l'ampia ricerca accademica, l'analisi delle tendenze emergenti nella ricerca sulle Blockchain rimane fondamentale. Sfortunatamente, l'uso dell'analisi bibliometrica per studiare le Blockchain è stato limitato, con poca comprensione di come stanno progredendo le varie aree di ricerca. L'analisi bibliometrica, un metodo utile per esaminare lo sviluppo della ricerca, non è stata ampiamente utilizzata nel contesto della blockchain. Anche la progressione delle sue numerose aree di ricerca è ancora sconosciuta.

Questo studio cerca di colmare tali lacune impiegando l'analisi bibliometrica per valutare il progresso scientifico e l'attenzione della ricerca sulle Blockchain nella produzione. Abbiamo utilizzato Vos Viewer per condurre questa analisi bibliometrica, valutando 265 articoli pubblicati dal 2017 al 2022 eed utilizzando la co-paternità e la co-occorrenza dell'analisi delle parole chiave. Abbiamo identificato gli autori, le istituzioni, i paesi e i principali campi di ricerca più produttivi, evidenziando i progressi essenziali nel campo della Blockchain. I risultati dimostrano come le parole chiave relative alle Blockchain siano cambiate nel tempo e descrivano i punti caldi della ricerca.

L'originalità di questa ricerca risiede nell'applicazione dell'analisi bibliometrica per esaminare lo sviluppo e le tendenze emergenti nella ricerca Blockchain all'interno del settore manifatturiero, offrendo al contempo nuovi approfondimenti sulla produttività di autori, istituzioni e paesi, oltre a identificare la ricerca hotspot e direzioni di ricerca future. Questo studio contribuisce all'inadeguatezza della letteratura sull'analisi bibliometrica nella ricerca Blockchain e fornisce una guida utile per ricercatori e professionisti del settore.

Parole chiave: Blockchains, blockchain technology, bibliometric analysis, VOS viewer.

1. Introduction

Technology-driven practices are embedded within the organizations in the new normal (Carroll and Conboy, 2020; Singh *et al*., 2022) as the pandemic created a transformative environment in which individuals and

companies rapidly adopted digitalization (Bag *et al*., 2021). Blockchain technology is the most recent 'disruptive innovation' that has piqued the interest of academicians and scholars. Bitcoin is the first and the most well-known blockchain application. According to Adam Hayes, 2022 Blockchain is "a decentralised ledger" that secures, verifies, and transparently maintains all transactions done on top of a peer-to-peer network (Hayes, 2022). The primary advantage of Blockchain over traditional technology is that it enables two parties to perform secure Internet transactions without the need for a third party. The technique is simple yet powerful, consisting of a chain of information blocks, each of which is validated by a distributed network of nodes. The blockchains are classified into three categories in order to conceptualise the rapid development of blockchain technologies that is blockchain 1.0, blockchain 2.0, and blockchain 3.0 (Raja Santhi & Muthuswamy, 2022; Swan, 2015; Zhang & Jacobsen, 2018). Blockchain 1.0 is the currency in the same way as digital payment and cryptocurrencies are. Smart contracts are at the heart of Blockchain 2.0. Blockchain 3.0 has potential in areas other than financial, such as government, health, science, arts, and culture. However, according to the previously stated principle, contemporary blockchain applications are still in the 1.0 and 2.0 stages. Research conducted recently has looked into the potential of blockchain to help citizens reclaim control over their personal information (Mainelli, 2017), make the insurance business more transparent (Disparte, 2017), manage supply chains (Tönnissen & Teuteberg, 2020; Queiroz, Fosso Wamba, 2019), manage employee benefits (Ying *et al*., 2018) transform electronic health records (Mayer *et al*., 2020) (Epiphaniou *et al*., 2019; Madir, 2020; Yeung, 2021) and manufacturing processes (Ghimire *et al*., 2022; Kurpjuweit *et al*., 2021; Agarwal, 2018).

Blockchains are used in sectors that value openness, automation, and a verifiable ledger. Healthcare, finance, energy, government, and manufacturing are just a few of the areas that potentially benefit from Blockchains (Ghimire *et al*., 2022). Due to the distinctive breakthroughs in decentralisation and security, the recent development of blockchain technology offers a potentially practical solution. Blockchains are classified into three types: public, private, and federated or consortium (Raja Santhi & Muthuswamy, 2022). The public Blockchain allows you to view, write, and check the blockchain. It is completely decentralised. In contrast, only one individual or organisation is authorised to write to a private Blockchain. It lacks essential decentralisation properties. Finally, the federated Blockchain allows for the management of several organisations. It has a group of organisations or people who make decisions mutually for the network's best interests.

A blockchain is "a database architecture which enables the keeping and sharing of records in a distributed and decentralized way, while ensuring its

integrity through the use of consensus-based validation protocols and cryptographic signatures" (Benos *et al*., 2017, p.1). The resulting blockchain is saved on each node, constituting a distributed database network, rather than on a single server. Blockchain offers inherent security, record immutability, transaction transparency, digital information authenticity, data ownership, and the ability to replace trust in intermediary organisations with trust in cryptographic consensus (Beck *et al*., 2016; Christidis, Devetsikiotis, 2016). In the context of supply chains, blockchain is projected to act as a seamless peer-to-peer network infrastructure in which each supply chain participant would have access to a reliable source of data in the form of distributed copies of blockchain transactions (Kurpjuweit *et al*., 2021). To summarise, the key features of blockchain are depicted in Fig. 1.

Figure 1. Features/benefits of Blockchains

While Bitcoin and other financial blockchain applications get the most attention, organisations in the industrial manufacturing industry are also developing novel commercial solutions based on the technology. Manufacturers are discreetly experimenting with blockchain applications that are changing the way businesses communicate. Simply said, blockchain technology could transform the way manufacturers create, design, build, and scale their goods. It is paving the way for a future with increased trust, streamlined processes, transformed pricing, and more security. Blockchains in manufacturing are more subtle than blockchains in finance.

As manufacturers around the world become more interconnected, the

importance of blockchains is growing in the manufacturing sector as well. Now, more than ever before, manufacturers face the challenge of securely sharing data within and outside factory walls. Manufacturing is the transformation of raw materials or parts into finished products through a variety of tools, machinery, chemical processing and labour. The primary four departments of the manufacturing industry include engineering, IT and finance, operations, and marketing (Raja Santhi & Muthuswamy, 2022). Manufacturing, production planning, maintenance, quality control, supply chain, logistics, packing, and dispatch are all examples of operations. Several applications for blockchains have been identified in manufacturing and supply chain management (Kurpjuweit *et al*., 2021; Wamba & Queiroz, 2020; Zhao, 2020). Blockchain can enhance transparency and trust at every stage of the industrial value chain. It is, basically, a decentralised ledger that allows two parties to trade value without the need for a third party.

Ever since the industrial revolution, we have seen remarkable progress in technologies that make up the tangible manufacturing process. Machines communicate with one another, and they are controlled by software that trades data at incomprehensible rates on the cloud and can be sometimes vulnerable to outside sources. In such a scenario the manufacturing sector needs to protect sensitive personal data. Manufacturers are increasingly focusing on integrating blockchain technology into their manufacturing processes as a result of concerns like data protection. Data is the most valuable resource on the planet right now (Kessler, 2019). The core of blockchain in the manufacturing industry is classifying and safeguarding data ownership and legality. The real challenge of ensuring product visibility at every stage remains unaddressed, even though many large enterprises have long moved away from conventional methods of tracking their products, such as Excel sheets, emails and physical ledgers in favour of IT-based technology infrastructure (Klapita, 2021; Jiménez & Muñoz, 2006). Furthermore, because conventional manufacturing processes are centralised database management technologies, they are vulnerable to manipulation and security threats.

Manufacturers have become much more aware of blockchain technology's potential usage in their processes, but in practicality, it is still a few years away. A private blockchain is an appealing alternative for industrial applications due to data privacy and the flexibility to select network participants. Blockchain can manufacture better, more intelligent, and increasingly secure supply chains, tracking an item's voyage consistently.

In the past few years, the rapid development of Blockchain technology has created numerous research gaps and directions for the scientific community(Abbas *et al*., n.d.). As a result, a significant amount of research has been conducted in the field of Blockchain (Sharma *et al*., 2018; Xia *et al*., 2017;

Cruz *et al*., 2018). Over a thousand scientific publications have recently been published and indexed in the Web of Science, not to mention other similar databases (Dabbagh *et al*., 2019). Given the increasing quantity of research papers in the field of Blockchain, there is a need for research studies that examine the present state of knowledge in this area. To meet this demand, a bibliometric analysis of the current literature on blockchains and their applications in the manufacturing sector is carried out in order to examine past research trends and emerging topics in the literature for future research, as well as identify top authors, countries, journals, and institutions. Few review articles have been published to explain the recent developments and challenges in blockchains (Karafiloski & Mishev, 2017; Meng *et al*., 2018; Khan & Salah, 2018; Tama *et al*., 2017; Frizzo-Barker *et al*., 2020; Andoni *et al*., 2019) and few bibliometric analysis have been conducted (Niknejad *et al*., 2021; Guo *et al*., 2021; Duan & Guo, 2021; Luo *et al*., 2021; Musigmann *et al*., 2020; Hakim & Bahari, 2021). However, to the best of the author's knowledge, no bibliometric analysis of the state-of-the-art in blockchain in the manufacturing area has yet been published in which Scopus or any similar database has been used as a literature database. As a result, to keep making continuous development in this area, a thorough bibliometric analysis of recent scientific papers in the Blockchain in manufacturing sector is required, with the goal of providing useful information to the Blockchain research community.

The primary goal of this study is to gather, describe, and analyse the blockchain research publications in the manufacturing industry that have been indexed by Scopus. To accomplish this, we conducted a bibliometric analysis of the Blockchain literature to offer some useful insights to current researchers and practitioners in the field. This study aims to answer the following research questions to provide significant insights to existing scholars and practitioners in the field of blockchain research in the manufacturing industry:

1. What are the annual publication trends and prior research patterns in the manufacturing industry's blockchain research?
2. Who are the most productive authors, which publications are the most prominent, and which nations have made substantial contributions to blockchain research in manufacturing?
3. Which research articles on blockchain in manufacturing have acquired a high number of citations, suggesting their impact and significance?
4. What are the most popular publication venues for disseminating research on blockchains in the manufacturing sector?
5. What are the well-established and emerging keywords in blockchain research?

To answer the research questions mentioned above, this study gathered,

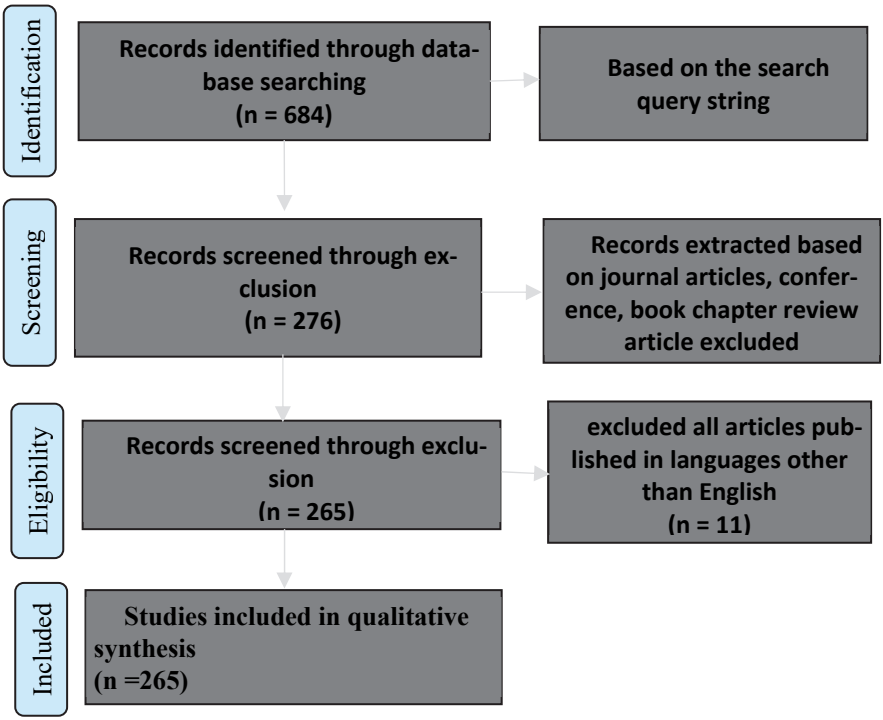
described, and examined blockchain research publications that are listed in the Scopus index. The analysis's findings offer important new perspectives on yearly publication patterns, significant contributors, significant articles, and changing keywords and publication venues in blockchain research for the manufacturing sector. These results act as a conduit for knowledge that can guide current work in the field of blockchain in manufacturing as well as future study and practice.

The rest of this paper is structured as follows. Section II explains the research methods used in this study. Section III gives the detailed findings from the bibliometric analysis. Section IV wraps up this research and describes future work.

2. Methodology

We conducted a bibliometric study on scholarly research on blockchain technology in the domain of manufacturing. Bibliometrics is a quantitative method for visualising and synthesising a body of knowledge on a certain topic (Sikandar *et al*., 2022). The bibliometric analysis in this study was performed with VOS viewer software. Our search period included the years 2017 to 2022. The search was performed on 18th May 2022. The overall procedure of selecting and rejecting the pertinent articles is described using the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement template. The PRISMA statement aids researchers in enhancing the reporting of review articles (Sikandar & Abdul Kohar, 2021). The articles were then assessed for relevance to our study using the inclusion criteria. The terms blockchain and manufacturing were used as primary terms in the title and abstract of the article to be considered in the analysis. In this study, we only included academic peer-reviewed journal publications, excluding conference papers, book chapters, and review articles, as well as those articles that were not available in English. The records originally identified through the search query were 684. The total number of articles on which the bibliometric analysis was performed was 265. The inclusion and exclusion criteria of the articles are mentioned in Fig. 2.

Figure 2. Search Flow Chart based on PRISMA

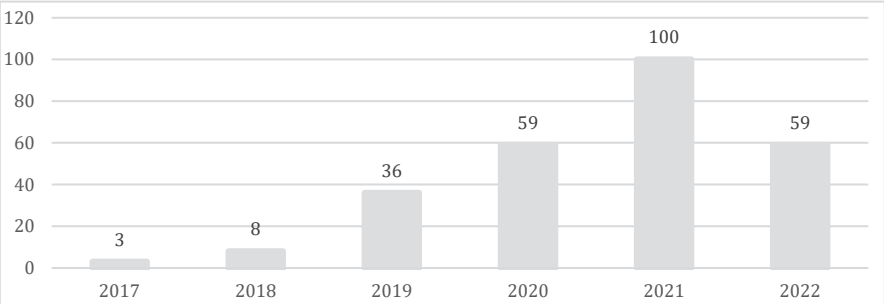


3. Results

3.1. Publication Trend

Fig. 3 depicts the publication growth of articles published in the blockchains in the manufacturing sector. The growth of articles has essentially increased from 2017 to 22. Although the year 2022 is still going on, the number of articles published has already reached the entire number of articles published in 2020. The year 2021 has the most published articles. However, given the current trend in the year 2022, the total number of published papers in the field is expected to exceed the total number of published articles in the year 2021. Because of the increased interest of academics and practitioners in blockchains, this pattern is likely to persist in the future.

Figure 3. Publication Trends in Blockchains research in the manufacturing sector



3.2. Top journals and authors

The top journal that published research articles on blockchains in the manufacturing sector has been identified. IEEE Access, with 16 published articles and 336 citations, appears to be the leading journal with the most publications. It was followed by the International Journal of Production Research and Sustainability Switzerland, which each published 10 articles with 177 and 206 citations.

Table 1. Top journal in blockchains research

Source	Documents	Citations	Publisher
IEEE Access	16	336	IEEE
International Journal of Production Research	10	177	Taylor & Francis
Sustainability Switzerland	10	206	Multidisciplinary Digital Publishing Institute (MDPI)
IEEE Internet of Things Journal	8	143	IEEE
IEEE Transactions on Industrial Informatics	8	190	IEEE
Sensors	7	20	Multidisciplinary Digital Publishing Institute (MDPI)
International Journal of Production Economics	6	24	Elsevier
Journal of Manufacturing Systems	6	59	Elsevier
Technological Forecasting and Social Change	5	19	Elsevier
Annals of Operations Research	4	23	Springer Nature

Table 2 lists the top 10 authors who have contributed to the blockchains literature in the manufacturing sector. The top author in the said field is Raja Jayaraman from UAE followed by Zhi Li from China and Mohammed Omar from UAE. The complete details of the top 10 authors including their h index, total publications, current affiliations and total citations are listed in Table 2.

Table 2. Top 10 most productive authors

Rank	Author	TP	Scopus Author ID	h-index	Current affiliation	Country	Year of 1st Publication	Total citations
1	Jayaraman, R.	5	14520494400	21	Khalifa University of Science and Technology, Abu Dhabi	United Arab Emirates	2020	99
2	Li, Z.	5	57189370824	24	Guangdong University of Technology, Guangzhou	China	2018	383
3	Omar, M.	5	23101060500	27	Khalifa University of Science and Technology, Abu Dhabi	United Arab Emirates	2020	99
4	Salah, K.	5	35617663600	37	Khalifa University of Science and Technology, Abu Dhabi	United Arab Emirates	2020	99
5	Byun, Y.C.	4	8897891700	16	Jeju National University, Jeju	South Korea	2021	64
6	Huang, G.Q.	4	7403425048	58	The University of Hong Kong, Pokfulam	Hong Kong	2018	363
7	Leng, J.	4	57188970257	24	Guangdong University of Technology, Guangzhou	China	2019	218
8	Shahbazi, Z.	4	57212241946	7	Jeju National University, Jeju	South Korea	2021	64
9	Singh, S.K.	4	57211843264	11	Seoul National University of Science and Technology (SNUST), Seoul	South Korea	2020	89
10	Tao, F.	4	12141248300	64	Beihang University, Beijing	China	2019	88

3.3. Top cited articles

We found the top ten most cited articles in blockchain research through our study. Table 3 lists the top ten most cited articles.

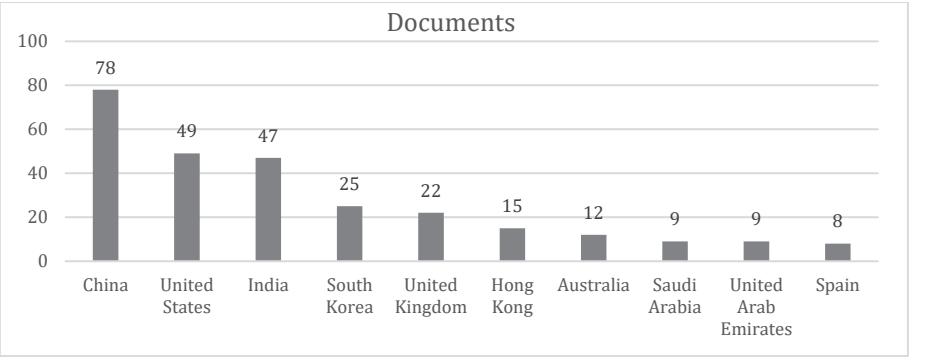
Table 3. Top cited articles in blockchains area in the manufacturing domain

Rank	Authors	Title	Year	Source Title	Citations
1	Lin C., He D., Huang X., Choo K.-K.R., Vasilakos A.V.	BSeIn: A blockchain-based secure mutual authentication with a fine-grained access control system for industry 4.0	2018	Journal of Network and Computer Applications	199
2	Zhao G., Liu S., Lopez C., Lu H., Elgueta S., Chen H., Boshkoska B.M.	Blockchain technology in agri-food value chain management: A synthesis of applications, challenges and future research directions	2019	Computers in Industry	167
3	Li Z., Barenji A.V., Huang G.Q.	Toward a blockchain cloud manufacturing system as a peer-to-peer distributed network platform	2018	Robotics and Computer-Integrated Manufacturing	156
4	Li Z., Wang W.M., Liu G., Liu L., He J., Huang G.Q.	Toward open manufacturing, a cross-enterprises knowledge and services exchange framework based on blockchain and edge computing	2018	Industrial Management and Data Systems	154
5	Tang C.S., Veelenturf L.P.	The strategic role of logistics in the industry 4.0 era	2019	Transportation Research Part E: Logistics and Transportation Review	139
6	Dutta P., Choi T.-M., Somani S., Butala R.	Blockchain technology in supply chain operations: Applications, challenges and research opportunities	2020	Transportation Research Part E: Logistics and Transportation Review	129
7	Mandolla C., Petruzzelli A.M., Percoco G., Urbinati A.	Building a digital twin for additive manufacturing through the exploitation of blockchain: A case analysis of the aircraft industry	2019	Computers in Industry	114
8	Fraga-Lamas P., Fernández-Caramés T.M.	A Review on Blockchain Technologies for an Advanced and Cyber-Resilient Automotive Industry	2019	IEEE Access	112
9	Olsen T.L., Tomlin B.	Industry 4.0: Opportunities and Challenges for operations management	2020	Manufacturing and Service Operations Management	111
10	Lee J., Azamfar M., Singh J.	A blockchain enabled Cyber-Physical System architecture for Industry 4.0 manufacturing systems	2019	Manufacturing Letters	107

3.4. Leading countries

It has been discovered that China is the leading country in terms of blockchain research publications in the manufacturing sector, with 78 publications. It is followed by the United States, which has 49 publications on the topic, and India, which has 47 publications in the field. Fig. 4 shows the top 10 countries that published the most articles in the stated field.

Figure 4. Most productive countries in blockchain research in manufacturing



4. Bibliometric Analysis

A bibliometric map depicts items and their links. For instance, the number of publications two scholars co-authored together (in the case of co-authorship links) or the number of publications where two terms occur together may be indicators of the strength of a link (in the case of co-occurrence links). A network, precisely, is a collection of items and the links connecting those items. The links attribute displays the number of co-authorships links a certain researcher has with other researchers in the case of co-authorship of authors and certain countries with each other in the case of co-authorship of countries. The total link strength (TLS) attribute represents the total strength of a researcher's co-authorship links with other researchers (Jan van Eck & Waltman, 2021).

4.1. Co-Authorship Analysis of Countries

Co-authorship analysis was conducted to determine the collaboration among authors from different geographical regions. The minimum number

of countries for the co-authorship of countries analysis was set at 5, implying that only documents with a minimum of three published documents per country should be chosen. Consequently, thirty countries out of eighty-three matched the criteria.

We discovered that China had the most publications (n=80) and citations (n=1615), as well as the highest connections with countries, with 19 linkages and a total link strength of 54, based on co-authorship analyses. The United States came in second, with 18 links, a total link strength of 40, and 50 published papers with 1357 citations. India ranked third in the collaborative research in blockchains, with 17 links, a total link strength of 34, 48 total published publications and 556 citations. Table 4 lists all 33 nations, together with their link strength, the number of documents, and total citations, and Fig. 6 displays a screenshot from the VOS viewer illustrating the relationships between the countries. The close proximity of the two countries in the figure denotes their close relationship.

Figure 5. Bibliometric map of co-authorship analysis of countries, available online at URL: https://bit.ly/38cOU88

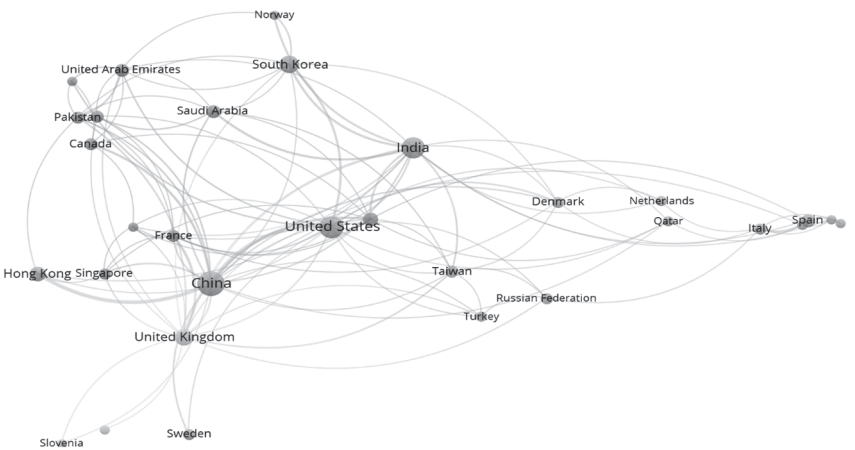


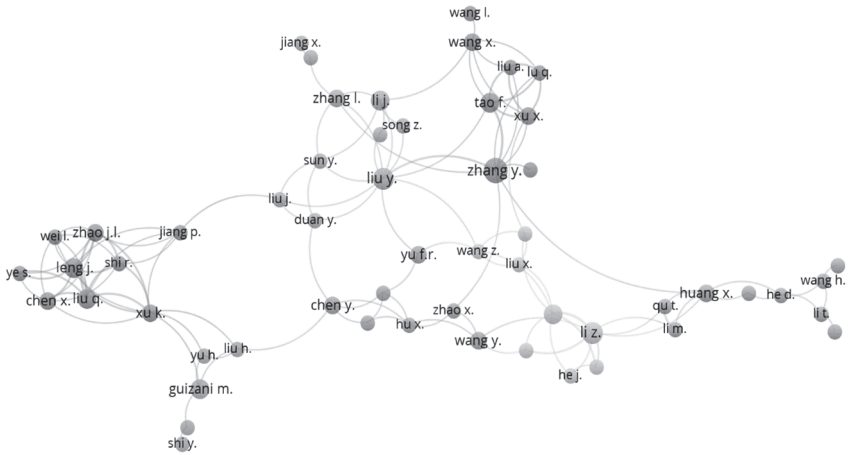
Table 4. Results of country-based co-authorship analysis as per their total link strength (TLS)

Countries	Links	TLS	Documents	Citations
China	19	54	80	1615
United States	18	40	50	1357
India	17	34	48	556
United Kingdom	16	28	22	435
Australia	12	19	12	210
France	10	17	7	21
South Korea	9	16	25	354
Hong Kong	5	14	15	707
Pakistan	10	14	7	81
Saudi Arabia	8	13	9	82
United Arab Emirates	10	13	9	123
Taiwan	9	11	7	58
Denmark	8	10	6	63
Malaysia	6	9	7	44
Canada	5	8	7	164
Italy	7	8	6	146
Morocco	7	8	3	8
Singapore	6	7	6	64
Spain	6	7	8	165
Ireland	6	6	4	35
Kuwait	4	6	3	42
Norway	3	6	3	12
Portugal	5	5	3	10
Qatar	5	5	4	75
Russian Federation	5	5	5	26
Turkey	5	5	4	44
Greece	4	4	3	16
Netherlands	4	4	4	197
Sweden	2	3	6	235
Slovenia	2	2	3	174
Hungary	1	1	3	157

4.2. Co-Authorship (Authors)

A co-authorship analysis of authors is carried out to determine the authors who contributed to the field's advancement through collaboration. The main research method for studying research collaboration (RC) is co-authorship analysis (Chen *et al*., 2019). The connections in the co-authorship analysis represent the overall number of co-authorship linkages with other researchers. The total link strength (TLS) gauges the quality of a researcher's collaborations with other researchers (Van Eck & Waltman, 2018).

Figure 6. Bibliometric map showing Co-authorship analysis of authors in network visualisation mode, available online at URL: https://bit.ly/3yNcYJz



In the Vos viewer, to perform the co-authorship analysis the minimum number of authors for co-authorship analysis was set to 2 and the minimum number of citations for an author was set to 0. Out of 857 authors, only 105 met the criteria. 56 of the 105 authors were closely linked, forming seven clusters (as displayed in Fig. 6). This demonstrates how these 56 authors are well connected and how they have enriched the literature through collaborative research work.

As a result of the co-authorship analysis, we found out that Leng J. has the highest overall link strength (TLS=17) with 4 published documents and 203 citations, followed by Liu Q. (TLS=17, documents=4 and citations=203), and Xu K. (TLS=14, documents=3 and citations=226). Table 5 shows the linkages, TLS, documents, and citations for the top 10 writers according to their TLS. It's worth mentioning that Li Z. has the most citations (n=371), whereas Zhang Y. has the most published documents (n=7).

Table 5. Results of Co-authorship analysis of Authors based on Total Link Strength (TLS)

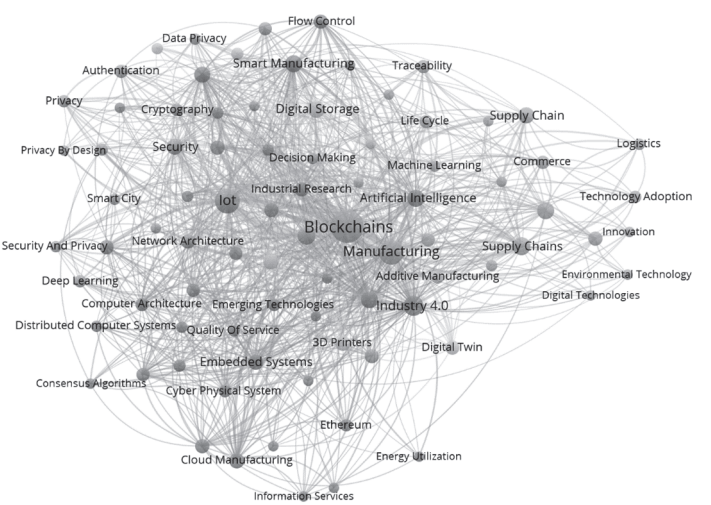
Label	Links	TLS	Documents	Citations
Leng J.	8	17	4	203
Liu Q.	8	17	4	203
Xu K.	10	14	3	226
Zhao J.L.	8	14	3	203
Li Z.	8	12	5	371
Liu Y.	11	12	5	45
Zhang Y.	9	12	7	136
Shi R.	7	11	2	163
Tao F.	6	11	4	81
Huang G.Q.	7	10	4	353

4.3. Co-occurrence keywords

Co-occurrence is the term used to describe how frequently a keyword appears in a document. The total link strength (TLS) reflects the frequency with which a term appears in a document. The size of nodes can represent keyword frequency: the larger the node, the more frequently the keyword appears. The thickness of the line between two keywords is related to their proximity and depicts their strong association (Eck & Waltman, 2020)(Sikandar *et al*., 2021). The minimum number of keyword occurrences was set to 5 when importing Scopus data into the VOS viewer for keyword analysis, yielding 106 keywords out of 2140. Simply put, only 106 terms had at least 5 occurrences, resulting in 7 different keyword clusters. We found 84 keywords out of 2120 (creating 5 clusters) that met the requirement of being present in five articles per document after merging the related keywords and deleting the irrelevant ones.

We identified the well-established and emerging topics in blockchains through the co-occurrence of keywords analysis. Some of the most frequently used keywords are blockchains, internet of things (IoT), manufacturing, industry 4.0, smart contracts, smart manufacturing, supply chains, artificial intelligence, manufacturing industry, digital storage, security, industrial IoT, embedded systems, information management, cloud manufacturing, network architecture and supply chain management. Table 6 presents the keywords with top occurrences along with their links, TLS, number of occurrences and their average publication year.

Figure 7. Bibliometric map of co-occurrence of keywords analysis in network visualisation mode; available at URL: https://bit.ly/3wAEqsn



In contrast, some of the keywords with the least number of occurrences in the given dataset are Digital Technologies, Energy Utilization, Environmental Technology, Innovation, Complex Networks, Quality Control, Machine Learning, Performance, Logistics, Manufacturing Resource, Privacy By Design, Cyber Security, Efficiency, Technology Adoption, Enabling Technologies, Service Oriented Architecture (SOA), Consensus Algorithms, Edge Computing, Information Services, Product Design and Economic And Social Effects of blockchains. We may conclude from this study that more research is needed in the aforementioned domains to obtain a better knowledge of the concept and to expand the literature. Fig. 8 illustrates developing blockchain themes in yellow to emphasise how recently they have been researched in the literature. These are the research hotspots and areas where future research is required. Table 7 presents the research hotspots of blockchains research in manufacturing.

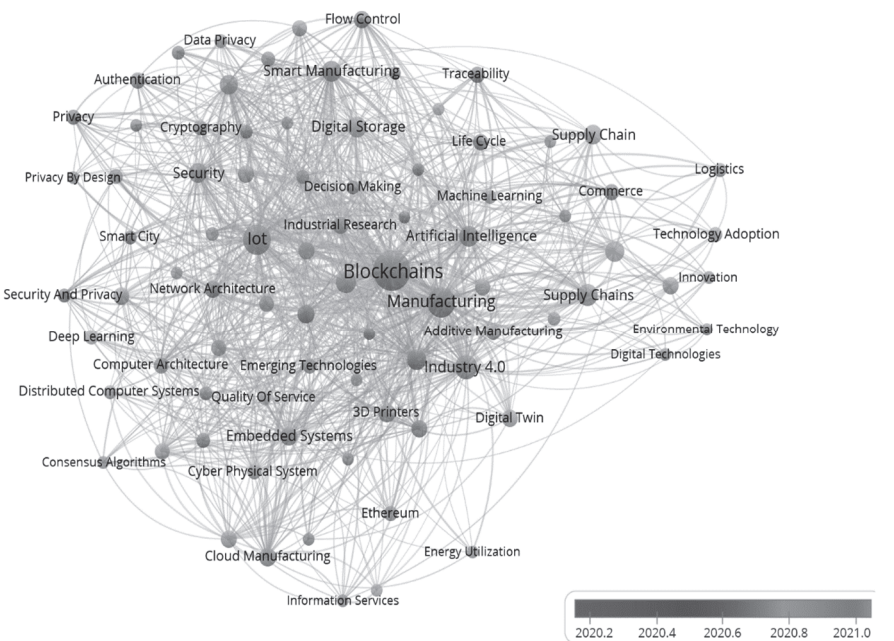
Table 6. Top studies keywords based on their Total link strength (TLS)

Keywords	links	TLS	Occurrences	Avg. pub. year
Blockchains	83	1039	230	2020.639
IoT	78	484	90	2020.889
Manufacturing	80	475	86	2020.605
Industry 4.0	73	272	47	2020.66
Smart Contracts	59	179	32	2020.688
Smart Manufacturing	54	169	26	2020.962
Supply Chains	48	156	33	2020.697
Artificial Intelligence	55	153	26	2020.962
Manufacturing Industry	64	153	26	2020.423
Digital Storage	52	149	27	2020.815
Security	55	143	23	2021.13
Industrial IoT	51	141	22	2021
Embedded Systems	57	138	19	2020.316
Information Management	53	132	19	2020.526
Cloud Manufacturing	42	127	17	2020.353
Network Architecture	55	122	16	2020.375
Supply Chain Management	43	122	26	2020.808
Industrial Research	51	113	16	2020.875
Flow Control	40	109	15	2020.6
Supply Chain	40	106	23	2020.826
3D Printers	50	105	17	2020.294
Computer Aided Manufacturing	38	102	15	2020.2
Computer Architecture	46	102	12	2021
Manufacturing Process	47	102	15	2020.533
Peer To Peer Networks	42	100	13	2020.077
Security Of Data	43	93	16	2020.25
Distributed Ledger	44	92	15	2021.4
Cloud Computing	40	89	11	2020.909
Network Security	44	88	16	2019.938
Big Data	44	84	12	2020.917

Table 7. Emerging keywords/Research Hotspots

Keywords	links	TLS	Occurrences	Avg. pub. year
Digital Technologies	16	22	6	2020.667
Energy Utilization	17	25	5	2021
Environmental Technology	15	26	6	2020.667
Innovation	15	26	5	2021
Complex Networks	23	29	5	2020.8
Quality Control	19	29	6	2020.5
Machine Learning	23	30	7	2020.714
Performance	25	30	6	2021.333
Logistics	14	31	7	2020.286
Manufacturing Resource	22	32	5	2020.6
Privacy By Design	23	33	6	2021
Cyber Security	25	35	5	2020.4
Efficiency	27	35	5	2021.4
Technology Adoption	16	35	10	2019.7
Enabling Technologies	24	37	5	2020.6
Service Oriented Architecture (SOA)	23	37	5	2020.8
Consensus Algorithms	22	38	6	2021
Edge Computing	23	39	7	2020.571
Information Services	21	39	6	2021
Product Design	24	39	6	2020.5
Economic And Social Effects	28	40	6	2021
Industrial Revolutions	26	42	6	2020.5

Figure 8. Bibliometric map of co-occurrence of keywords analysis in overlay visualisation mode



5. Discussion and Conclusion

Manufacturing has long been regarded as a conservative business. However, when technology such as artificial intelligence, machine learning and blockchains gain acceptance, the factory of the future will appear drastically different. As blockchain technology evolves, manufacturers will be able to overcome some of the barriers that have prevented the mainstream adoption of other next-generation technologies and creative business models. Consequently, more efficient industrial processes will be developed and embraced as the industry's new standard, necessitating data exchange and collaboration across complex networks of businesses and machinery. By eliminating the need for human validation at each step, a blockchain technique would increase standards, trust, and project delivery speed. This would have a knock-on effect on product availability and production schedules.

This study has analysed the previous literature and attempted to analyse the top trends in blockchains in the manufacturing sector. We have analysed the publication growth along with top journals, leading countries, and the top-cited articles in the said field. While conducting bibliometric analysis, through co-authorship analysis we have determined the countries and authors involved in collaborative research with the authors of other countries. Our findings suggest that China is the top country involved in collaborative research followed by the US and India. Through the co-occurrence of keywords, we determined the well-established and emerging topics in blockchain research. This research identifies areas that have received less attention, highlighting potential gaps in the literature. Future scholars can help fill these gaps and advance the knowledge base in the field of blockchains in manufacturing by focusing on these underexplored areas.

6. Implications for Theory and Practice

This research adds to our understanding of how blockchain technology could affect the conservative manufacturing industry by enabling the adoption of next-generation technologies and creative business models. Blockchain can revolutionise the manufacturing sector by breaking down barriers and promoting more efficient industrial processes. This study enhances the theoretical understanding of these processes and sheds light on the consequences of blockchain adoption in manufacturing.

This study provides valuable managerial insights for manufacturing practitioners. The findings highlight the potential benefits of implementing Blockchain technology in manufacturing operations, such as improved

efficiency, trust, and production schedules. This data can help organisations considering Blockchain adoption guide their decision-making processes and strategic planning efforts.

Additionally, an examination of co-authorship patterns and collaborative research in Blockchain in the manufacturing sector identifies key countries and authors involved in international research collaborations. This managerial insight enables practitioners and researchers to identify potential collaboration and knowledge exchange opportunities in the field. Furthermore, the study identifies research gaps and emerging topics through keyword co-occurrence analysis in Blockchain research in manufacturing. This information is a valuable resource for future scholars, directing their attention to areas that have received less attention and assisting in the filling of gaps in the existing literature.

7. Limitations

Although we tried to provide a thorough analysis of the previous research in the field of blockchains in the manufacturing domain, our research is constrained by several factors. To begin, our study focused solely on the use of blockchains in the manufacturing sector, neglecting the rest of the industries where blockchains may be beneficial. Secondly, we looked at research that was written in English. As a result, important literature research published in different languages may have been overlooked. Future research might broaden the scope of the search to include more relevant studies, therefore adding to the body of knowledge. thirdly, due to the paucity of research on the topic, we have chosen journal and conference publications that may or may not have undergone comprehensive peer review. Third, we solely used Scopus to collect and analyse data; while Scopus is a vast database which published a diverse range of articles every year, there's a chance we overlooked some potential publications. Different databases might be used to compare the results in future studies.

References

Abbas A.F., Qureshi N.A., Khan N., Chandio R., Ali J. (2022). The Blockchain Technologies in Healthcare: Prospects, Obstacles, and Future Recommendations; Lessons Learned from Digitalization. *International Journal of Online & Biomedical Engineering*, 18(9). DOI: 10.3991/ijoe.v18i09.32253

Agarwal S. (2018). Blockchain Technology in Supply Chain and Logistics. *MIT Sloan Management Review*, 23 (Doctoral dissertation, Massachusetts Institute of Technology).

Andoni M., Robu V., Flynn D., Abram S., Geach D., Jenkins D., McCallum P., Peacock A. (2019). Blockchain technology in the energy sector: A systematic review of challenges and opportunities. In *Renewable and Sustainable Energy Reviews*, 100: 143-174. DOI: 10.1016/j.rser.2018.10.014

Beck R., Stenum Czepluch J., Lollike N., Malone S. (2016). Blockchain - The gateway to trust-free cryptographic transactions. *24th European Conference on Information Systems, ECIS 2016*.

Benos E., Garratt R., Gurrola-Perez P. (2017). The Economics of Distributed Ledger Technology for Securities Settlement. *SSRN Electronic Journal*. DOI: 10.2139/ssrn.3023779

Chen K., Zhang Y., Fu X. (2019). International research collaboration: An emerging domain of innovation studies? *Research Policy*, 48(1): 149–168. DOI: 10.1016/j.respol.2018.08.005

Christidis K., Devetsikiotis M. (2016). Blockchains and Smart Contracts for the Internet of Things. In *IEEE Access*. DOI: 10.1109/ACCESS.2016.2566339

Cruz J.P., Kaji Y., Yanai N. (2018). RBAC-SC: Role-based access control using smart contract. *IEEE Access*. DOI: 10.1109/ACCESS.2018.2812844

Dabbagh M., Sookhak M., Safa N.S. (2019). The evolution of blockchain: A bibliometric study. *IEEE Access*. DOI: 10.1109/ACCESS.2019.2895646

Disparte D. (2017). Blockchain could make the insurance industry much more transparent. *Harvard Business Review*, 2.

Duan R., Guo L. (2021). Application of blockchain for internet of things: a bibliometric analysis. *Mathematical Problems in Engineering*, 1-16. DOI: 10.1155/2021/5547530

Epiphaniou G., Daly H., Al-Khateeb H. (2019). Blockchain and Healthcare. In: Jahankhani H., Kendzierskyj S., Jamal A., Epiphaniou G., Al-Khateeb H. (eds.) *Blockchain and Clinical Trial. Advanced Sciences and Technologies for Security Applications*. Springer, Cham.

Frizzo-Barker J., Chow-White P.A., Adams P.R., Mentanko J., Ha D., Green S. (2020). Blockchain as a disruptive technology for business: A systematic review. *International Journal of Information Management*. 51: 102029. DOI: 10.1016/j.ijinfomgt.2019.10.014

Ghimire T., Joshi A., Sen S., Kapruan C., Chadha U., Selvaraj S.K. (2022). Blockchain in additive manufacturing processes: Recent trends & its future possibilities. *Materials Today: Proceedings*, 50: 2170-2180. DOI: 10.1016/j.matpr.2021.09.444

Guo Y.M., Huang Z.L., Guo J., Guo X.R., Li H., Liu M.Y., Ezzeddine S., Nkeli M.J. (2021). A bibliometric analysis and visualization of blockchain. *Future Generation Computer Systems*, 116: 316-332. DOI: 10.1016/j.future.2020.10.023

Hakim T., Bahari M. (2021). Blockchain Technology Research in Business, Management and Accounting Field: A Bibliometric Analysis. *International Conference on Research and Innovation in Information Systems, ICRIIS*. DOI: 10.1109/ICRIIS53035.2021.9616980

Hayes A. (2022). *Blockchain Definition: What You Need to Know*. Blockchain Definition: What You Need to Know.

Jiménez L., Muñoz R. (2006). Integration of supply chain management and logistics: development of an electronic data interchange for SAP servers. *Computer Aided Chemical Engineering*. DOI: 10.1016/S1570-7946(06)80375-5

Kamble S.S., Gunasekaran A., Sharma R. (2020). Modeling the blockchain enabled traceability in agriculture supply chain. *International Journal of Information Management*, 52: 101967. DOI: 10.1016/j.ijinfomgt.2019.05.023

Karafiloski E., Mishev A. (2017). Blockchain solutions for big data challenges: A literature review. *17th IEEE International Conference on Smart Technologies, EUROCON 2017 - Conference Proceedings*. DOI: 10.1109/EUROCON.2017.8011213

Kessler J. (2019). Data protection in the wake of the gdpr: California's solution for protecting "the world's most valuable resource". In *Southern California Law Review*, 93(1): 99–128.

Khan M.A., Salah K. (2018). IoT security: Review, blockchain solutions, and open challenges. *Future Generation Computer Systems*, 82: 395-411. DOI: 10.1016/j.future. 2017.11.022

Klapita V. (2021). Implementation of electronic data interchange as a method of communication between customers and transport company. *Transportation Research Procedia*, 53: 174-179. DOI: 10.1016/j.trpro.2021.02.023

Kurpjuweit S., Schmidt C.G., Klöckner M., Wagner S.M. (2021). Blockchain in Additive Manufacturing and its Impact on Supply Chains. *Journal of Business Logistics*, 42(1): 46-70. DOI: 10.1111/jbl.12231

Luo J., Hu Y., Bai Y. (2021). Bibliometric Analysis of the Blockchain Scientific Evolution: 2014-2020. *IEEE Access*, 9: 120227-120246. DOI: 10.1109/ ACCESS.2021.3092192

Madir J. (2020). Blockchain opportunities in healthcare. In *HealthTech*, 193-217. DOI: 10.4337/9781839104909.00019

Mainelli M. (2017). Blockchain Could Help Us Reclaim Control of Our Personal Data. *Harvard Business Review*, 2-5.

Mayer A.H., da Costa C.A., Righi R. (2020). Electronic health records in a Blockchain: A systematic review. *Health Informatics Journal*, 26(2): 1273-1288. DOI: 10.1177/1460458219866350

Meng W., Tischhauser E.W., Wang Q., Wang Y., Han J. (2018). When intrusion detection meets blockchain technology: A review. *IEEE Access*, 6: 10179-10188. DOI: 10.1109/ACCESS.2018.2799854

Musigmann B., Von Der Gracht H., Hartmann E. (2020). Blockchain Technology in Logistics and Supply Chain Management - A Bibliometric Literature Review from 2016 to January 2020. *IEEE Transactions on Engineering Management*, 67(4): 988-1007. DOI: 10.1109/TEM.2020.2980733

Niknejad N., Ismail W., Bahari M., Hendradi R., Salleh A.Z. (2021). Mapping the research trends on blockchain technology in food and agriculture industry: A bibliometric analysis. In *Environmental Technology and Innovation*, 21: 101272. DOI: 10.1016/j.eti.2020.101272

Queiroz M.M., Fosso Wamba S. (2019). Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA. *International Journal of Information Management*, 46: 70-82. DOI: 10.1016/j.ijinfomgt.2018.11.021

Raja Santhi A., Muthuswamy P. (2022). Influence of Blockchain Technology in Manufacturing Supply Chain and Logistics. *Logistics*, 6(1): 15. DOI: 10.3390/logistics6010015

Sharma P.K., Chen M.Y., Park J. H. (2018). A Software Defined Fog Node Based Distributed Blockchain Cloud Architecture for IoT. *IEEE Access*. DOI: 10.1109/ACCESS.2017.2757955

Sikandar H., Abbas A.F., Khan N., Qureshi M.I. (2022). Digital Technologies in Healthcare: A Systematic Review and Bibliometric Analysis. *International Journal of Online and Biomedical Engineering*, 18(8): 34–48. DOI: 10.3991/ijoe.v18i08.31961

Sikandar H., Abdul Kohar U.H. (2021). A systematic literature review of open innovation in small and medium enterprises in the past decade. In *Foresight,* 24(6): 742-756. DOI: 10.1108/FS-01-2021-0030

Sikandar H., Vaicondam Y., Khan N., Qureshi M.I., Ullah A. (2021). Scientific Mapping of Industry 4.0 Research: A Bibliometric Analysis. *International Journal of Interactive Mobile Technologies*, 15(18): 129-147. DOI: 10.3991/ijim.v15i18.25535

Swan M. (2015). *Blockchain: Buleprint for a new Economy*. O'Reily Media.

Tama B.A., Kweka B.J., Park Y., Rhee K.H. (2017). A critical review of blockchain and its current applications. *ICECOS 2017 - Proceeding of 2017 International Conference on Electrical Engineering and Computer Science: Sustaining the Cultural Heritage Toward the Smart Environment for Better Future*. DOI: 10.1109/ICECOS.2017.8167115

Tönnissen S., Teuteberg F. (2020). Analysing the impact of blockchain-technology for operations and supply chain management: An explanatory model drawn from multiple case studies. *International Journal of Information Management*, 52. DOI: 10.1016/j.ijinfomgt.2019.05.009

Van Eck N.J., Waltman L. (2018). VOSviewer Manual: Manual for VOSviewer version 1.6.7. *Univeristeit Leiden*, *February*, 51.

Wamba S.F., Queiroz M.M. (2020). Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities. In *International Journal of Information Management*, 52. DOI: 10.1016/j.ijinfomgt.2019.102064

Xia Q., Sifah E.B., Asamoah K.O., Gao J., Du X., Guizani M. (2017). MeDShare: Trust-Less Medical Data Sharing among Cloud Service Providers via Blockchain. *IEEE Access*, 5: 14757-14767. DOI: 10.1109/ACCESS.2017.2730843

Yeung K. (2021). The Health Care Sector's Experience of Blockchain: A Cross-disciplinary Investigation of Its Real Transformative Potential. *Journal of Medical Internet Research*, 23(12). DOI: 10.2196/24109

Ying W., Jia S., Du W. (2018). Digital enablement of blockchain: Evidence from HNA group. *International Journal of Information Management*, 39: 1–4. DOI: 10.1016/j.ijinfomgt.2017.10.004

Zhang K., Jacobsen H.A. (2018). Towards dependable, scalable, and pervasive distributed ledgers with blockchains. *Proceedings - International Conference on Distributed Computing Systems*. DOI: 10.1109/ICDCS.2018.00134

Zhao M. (2020). Blockchain Technology Improves Supply Chain: A Literature Review. *Academic Journal of Computing & Information Science*, 3(4): 73–85.

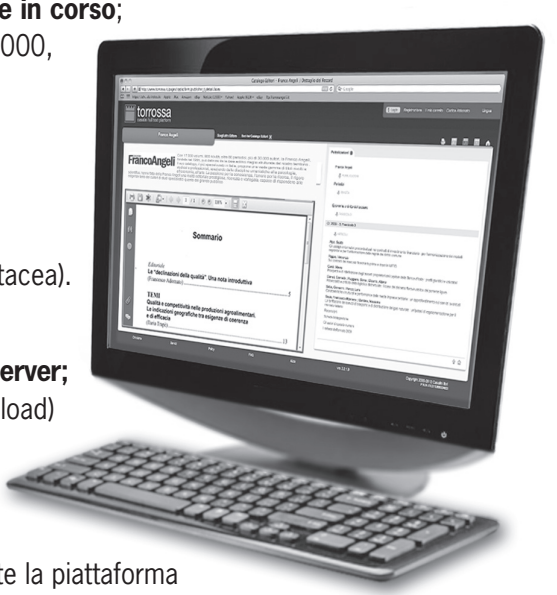
FrancoAngeli

Riviste
SERVIZI ONLINE PER ATENEI

Dal 2013 oltre 80 riviste FrancoAngeli sottoscrivibili per gli Atenei in versione online ***con diritto d'accesso perpetuo al corrente e a tutti gli arretrati disponibili.***

Tramite un'unica licenza è possibile accedere:

- alle versioni in formato digitale delle **annate in corso**;
- a tutte le annate arretrate (a partire dal 2000, se disponibili) in formato digitale;
- con **diritto d'accesso perpetuo**.



Le modalità di accesso consentono:

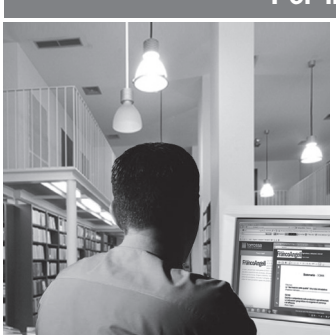
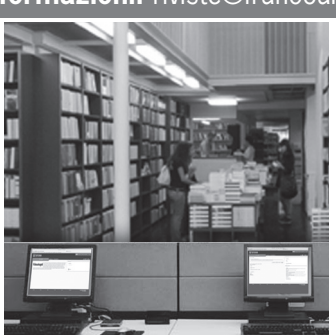
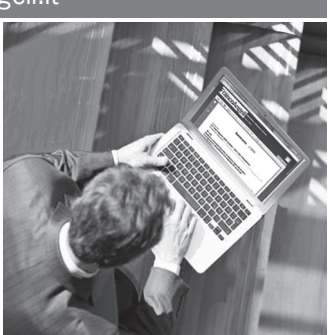
- la ricerca (per autore, per titolo, full-text);
- la visualizzazione del documento (corrispondente a quello dell'edizione cartacea).

Come **facoltà opzionali** sono previsti:

- diritti di accesso da remoto tramite **proxy server;**
- diritti di effettuare **copia e incolla** (download) ad uso personale.

La fruizione di tutti i contenuti avviene tramite la piattaforma
Torrossa - Casalini Full Text Platform

Per informazioni: riviste@francoangeli.it

European climate policy for decarbonization: State of the art

Cristina Simone[*], *Sara Diana*[**], *Silvia Scardini*[***], *Marcelo Enrique Conti*[****]

Received 2 may 2023 – Accepted 30 may 2023

Abstract

This paper aims to analyse European climate policy's state of the art concerning the urgent need to decarbonize society and the economy and meet pressing climate demands. Decarbonization refers to the progressive reduction of the carbon-to-hydrogen ratio within energy sources. The primary objective consists of a gradual transition to sustainable economic less polluting development models. The Paris Agreement (2015) highlighted the need to take concrete and timely action to prevent the planet's already precarious balance from definitively collapsing. This paper analyses the main strategies that the European Union has conducted to take an active part in the decarbonization project by critically highlighting the challenges and opportunities that await us in the future.

Keywords: decarbonisation, European Union, Green Deal, European climate policies, climate change, emissions, Taxonomy.

[*] Full Professor of Business Management. Department of Management. Sapienza, University of Rome. cristina.simone@uniroma1.it

[**] Master's Degree in Business Management. Department of Management. Sapienza, University of Rome saradiana97@gmail.com

[***] Business Management student. Department of Management. Sapienza, University of Rome. silvia.scardini@gmail.com

[****] Full Professor of Environmental Management and Sustainability. Department of Management. Sapienza, University of Rome. marcelo.conti@uniroma1.it

Corporate Governance and Research & Development Studies, n. 2-2023
(ISSN 2704-8462-ISSNe 2723-9098, Doi: 10.3280/cgrds2-2023oa15942)

Sommario

Il presente lavoro è volto a definire lo stato dell'arte della politica climatica europea rispetto all'urgente necessità di decarbonizzare la società e l'economia, nell'ottica di far fronte alle impellenti istanze climatiche. Con il termine decarbonizzazione si intende la progressiva riduzione del rapporto carbonio-idrogeno all'interno delle fonti energetiche. L'obiettivo primario consiste in una graduale transizione verso modelli economici di sviluppo sostenibili meno inquinanti e impattanti sull'ambiente. L'Accordo di Parigi (2015) ha evidenziato la necessità di intraprendere azioni concrete e puntuali per evitare che i già precari equilibri del pianeta collassino definitivamente. Nel presente lavoro sono analizzate le principali strategie che l'Unione Europea ha assunto per prendere parte attivamente al progetto decarbonizzativo evidenziando criticamente in particolare le sfide e le opportunità che ci attendono in futuro.

Parole chiave: decarbonizzazione, Unione Europea, Green Deal, politiche climatiche europee, cambiamento climatico, emissioni, tassonomia.

1. Introduction

Decarbonisation refers to the progressive reduction of the carbon-hydrogen ratio within energy sources to reduce the concentration of carbon dioxide (CO2) in the atmosphere.

The Intergovernmental Panel on Climate Change (IPCC) concluded its Sixth Assessment Report on Climate Change (AR6) on March 20, 2023, releasing the last part of the sixth report, which calls on the community to act immediately to avoid an imminent climate collapse.

Presently, there is an increase of 1.1 degrees Celsius in the average global temperature compared to the pre-industrial average, affecting more than 3 billion people. The main risks identified by the IPCC for the European continent are (Lionello, 2022):

- Risks from heat waves to populations (deaths), terrestrial and marine ecosystems (loss of habitat and biodiversity);
- Risks to agricultural production attributed to a mix of heat and drought. In Europe, for example, this context will affect an increasing population segment. A 3°C increase over pre-industrial levels would affect about 170 million people in severe drought conditions. Limiting warming to 1.5°C would reduce the number of people exposed to such conditions to 120 million;
- Risks associated with water scarcity;
- Risks produced by higher frequency and intensity of coastal, river and rainfall flooding.

As set out in the Paris Agreement, the goal is to limit the increase in global average temperature to 1.5 degrees Celsius above pre-industrial levels, achieving net emissions by 2050 while respecting the principle of common but differentiated responsibility (Conti, 2018). The opportunity to act now lies with those who can make a difference: Policy and Industry. Action must be taken in time and implement the solutions proposed by science. Transnational coordination is imperative; it is not enough for a single country to achieve its ladder of results, but joint action is needed. All countries should prepare to achieve the goals according to their capabilities.

Reducing emissions by 43% by 2030 (compared to 2019 values) and 84% by 2050 will make it possible to keep average global warming this century below 1.5 degrees. A more gradual reduction in emissions of 27% by 2030 and 67% by 2050 could limit average global warming to 1.5 and 2°C.

2. The European regulatory scenario for the decarbonisation challenge

The European Union is responsible for only 8% of global CO2 emissions. Europe cannot make a difference individually and acts as a pioneer by encouraging change. The decisions taken are mainly aimed at influencing the vision and approach of other countries in combating climate change (Tagliapietra, 2021).

The basis for the concretization of the transition is the Green Deal, or European Green Pact, announced in December 2019. This can be defined as a set of strategies and policy initiatives functional to implementing the 2030 Agenda. Through the Green Deal, the EU aims to position itself as a global leader in a climate-neutral economy model.

The initiative is driven by the president of the European Commission (Ursula Von Der Leyen), who has placed the ecological transition[1] at the top of the agenda (European Parliament, 2023).

The management of the Green Deal is entrusted to the European Commission, the European Parliament, and the Council (Tab. 1).

In the context of European climate policy, decarbonization is pursued by considering Fit for 55 as a reference scenario. The package presents new proposals and revised regulations, considering the climate sphere of transport, energy, taxation, and trade.

The Fit for 55 package aims to reduce greenhouse gas emissions by 55 percent by 2030.

Table 1. The main strategies of the Green Deal roadmap

European Climate Act	Regulation 2021/1119/EU sets a binding goal of climate neutrality in the European Union by 2050, also establishing an obligation for 2030 to cut 55 per cent of GHG emissions from 1990 levels.
European Industrial Strategy	It aims to strengthen the competitiveness and resilience of industries by accelerating the green and digital transition.
Action plan for the circular economy	Promotes the sustainable use of resources from a circular perspective, fostering production process efficiency, consumer awareness and empowerment.
European Biodiversity Strategy	To be achieved by 2030 by protecting the planet's natural resources.
European strategy "From producer to consumer"	Aims for the sustainability of the food system through an adequate and diverse supply of safe, nutritious and sustainable food at all times.
The European strategy for the integration of energy systems and hydrogen	It focuses on the development of renewable hydrogen produced through wind and solar energy. This will be done gradually, i.e., divided into several phases: - between 2020 and 2024, it is planned to install at least 6 gigawatts of electrolysers for renewable hydrogen and produce up to one million tons of it; - between 2025 and 2030, hydrogen should enter fully into the integrated energy system, with at least 40 gigawatts of electrolyzers and production of up to ten million tons of renewable hydrogen; - between 2030 and 2050, hydrogen-based renewable technologies are expected to reach maturity and find large-scale application in all hard-to-decarbonize (so-called hard-to-abate) sectors.
"Wave of restructuring" strategy	Aims to double energy renovation rates over the next decade to reduce energy and resource consumption in buildings.
Offshore renewable energy strategy	It is proposed to increase Europe's wind capacity from the current 12 GW to 60 GW by 2030, and to 300 GW by 2050 through the use of ocean energy and other emerging technologies, such as floating wind and photovoltaics.
European Battery Alliance	Launched in 2017, it provides for the revision of European battery legislation, presenting the first in a series of initiatives announced in the Circular Economy Action Plan.

Among the main changes the Fit includes (Dirigenti Industria 2022):

- the revisions to the Energy Efficiency Directive, which brought a 39% reduction in primary energy consumption compared to 1990;
- the amendment of the Renewables Directive using 32% renewable energy sources in the European energy mix;
- the revision of the Emission Trading System (EU-ETS) to achieve the goal of reducing emissions initially by 43%, brought to 62% by 2030 (revised April 2023);
- Revised legislation to reduce CO2 emissions from cars and vans by 55% by 2030;
- new initiatives in the aviation and maritime sectors to refuel aircraft and ships with sustainable fuels;
- the creation of the Carbon Border Adjustment Mechanism (CBAM), a carbon tax levied on the import of certain products to discourage companies from relocating to countries where emissions are not taxed.

The carbon tax will take effect in 2026 and must be observed by the cement, steel, aluminium, fertilizer, and energy sectors.

The package also includes changes related to the Energy Products "Minimum" Taxation Directive (ETD), Land Use and Forestry Regulations (LULUCF), and the Effort Sharing Regulation (ESR) to reduce emissions from sectors outside the EU-ETS (ISPI, 2021).

These objectives are then supported by a variety of means aimed at mobilizing EU resources and stimulating public and private investment. These include the Mechanism and Fund for a Just Transition, the European Taxonomy, and funding programs destined for research and innovation, such as Horizon Europe and Life.

In the "Investment Plan for a Sustainable Europe", the Commission published the Just Transition Mechanism (JTM). This mechanism will mobilize about 100 billion euros between 2021 and 2027 to mitigate the socioeconomic impacts of the transition and support the most vulnerable workers and communities.

The JTM consists of three pillars: the Just Transition Fund (JTF), the InvestEU and the Public Sector Loan Facility.

The JTF or Just Transition Fund aims to achieve the national climate neutrality target by 2050. If member states fail to meet these commitments, access to the fund may be limited to 50 per cent of the national allocation. So, to adjudicate funding, states are required to submit land conversion plans as part of the National Energy and Climate Plan by 2030. The plans may be amended to include new areas affected by transition impacts.

Second, it has been proposed to establish a just transition program under

InvestEU, with the aim of generating a wave of investment of €372 billion between 2021 and 2027.

The third and final pillar features the identification of the financial instrument that the European Investment Bank (EIB) will provide to the public sector. The fund includes €1.5 billion in grants from the EU budget and €10 billion in loans from the EIB's own sources.

In addition, the outbreak of the Covid-19 pandemic has highlighted the need for a €750 billion European emergency measure, to be added to the period 2021-2027 multi-year financial framework (MFF) of €1100 billion.

The Next Generation EU (NGEU), also known as the Recovery Fund, is an interim financing instrument that allows for timely and significant spending increases without increasing public debt (Masi, 2021).

But what is the link between the goals of the European Green Deal and the Recovery Fund? The answer lies in the opportunity to use the emergency funds allocated by the Recovery Fund, to accelerate the green transition, committing up to 37 per cent of the available resources.

This indicates that more than one-third of the resources will be used to finance green conversion projects. The Recovery Fund's other priorities will receive fewer resources, apart from funding for digital transformation, to which 20 per cent of the total funding will be allocated (Mazzantini, 2020).

Among other instruments, we recall Regulation 2020/852 or European Taxonomy.

The work, carried out by the committee about sustainable finance issues, revolves precisely around the Taxonomy, a tool used to define a list of activities considered sustainable. It is a guide that suggests investing in economic activities that do not negatively impact the environment (Etica sgr, 2020).

The technical criteria specify the conditions that must be met for an activity to be recognized and labelled as environmentally sustainable. Environmental and climate objectives include climate change mitigation and adaptation; sustainable use and protection of water and marine resources; transition to a circular economy; pollution prevention and control; and biodiversity and ecosystem health protection.

The legislation aims to combat *greenwashing*, a practice consisting of selling financial products falsely claimed to be environmentally friendly, to gain an unfair advantage over competitors.

An activity is eco-friendly if: it makes a positive and significant contribution to achieving one or more of the previously identified environmental objectives; it does not cause significant harm to other objectives, and it is performed with minimal social guarantees. Hence, actions that undermine

the good ecological status of water bodies and marine waters (e.g., pollution by chemicals), including surface and groundwater, cause significant harm to their sustainable use and protection.

Regarding the circular economy, significant harm occurs when there are considerable inefficiencies in the use of recovered and recycled materials, in the direct or indirect use of natural resources and the increase in waste, its incineration or disposal that causes significant long-term environmental damage (BeSafe Group, 2022).

In June 2021, the EU Taxonomy Compass was launched. This tool identifies which activities are included in the EU taxonomy, what objectives they contribute to, and what criteria they must satisfy (European Commission, 2022). Among the most controversial topics is the dispute about the use of natural gas (Greenreport, 2022).

Taxonomy has determined that for a gas-fired power plant to be considered sustainable, emissions must not exceed a threshold of 100 g of CO2 equivalent per kilowatt, a measure that to date cannot yet be guaranteed. Without a green label, gas-fired power plants could lose billions in private finance.

In this regard, the IEA (*International Energy Agency*) considers gas a necessary alternative to coal to ensure flexibility and storage capacity to the energy supply system, in order to meet peak demand that cannot be guaranteed by renewable energy sources alone.

The nuclear power industry is highly controversial, not so much because of pollutant emissions (modest in themselves), but because of the management of nuclear waste, which can be highly detrimental to the achievement of other goals.

Among the many critical issues are plastics (Simone & Conti, 2022), which are considered sustainable in the taxonomy if produced by mechanical or chemical waste recycling processes.

In February 2022, the Commission classified some activities in the nuclear and gas sector as environmentally sustainable, despite technical opinions. However, the Commission would like to specify the need to consider these activities as transitional, i.e., activities that cannot yet be replaced by affordable low-carbon alternatives but that contribute to climate change mitigation for achieving climate neutrality.

Nuclear and gas activities considered as sustainable activities, must meet clear and strict conditions (Tibaldi, 2022). Queste condizioni prevedono che le attività contribuiscano alla neutralità dei cambiamenti climatici e che soddisfino requisiti stringenti di sicurezza e impatto ambientale e un maggior utilizzo delle risorse rinnovabili.

Eurosif (2021), the European Sustainable Investment Promotion Associa-

tion, expresses an opinion against the inclusion of natural gas and nuclear energy in the European taxonomy. Eurosif believes that such decisions negatively impact the usefulness of the framework for sustainable investment, thus hindering the goals of the Green Deal. Indeed, including gas and nuclear in the Taxonomy seems driven more by an interest related to the various industry lobbies rather than a genuine interest in environmental protection.

In addition, the Taxonomy will need to be expanded to integrate environmental goals with social goals and sub-goals. The three main objectives of the social taxonomy cover: decent working conditions, living standards and well-being appropriate to end users, and inclusive and sustainable communities and societies (ESG News, 2022).

3. Conclusions

Despite the European Union's limited responsibility for global CO2 emissions, the decarbonization challenge has been at the centre of the political agenda, in line with the United Nations' Paris Agreement.

Through the Green Deal, the entire European productive economic system is stimulated toward a paradigm shift characterized by a reduced carbon footprint in order to achieve the net emissions target by 2050.

The current regulatory complex is constantly being updated, and the dibattles over the environmental sustainability of some energy resources, such as gas and nuclear, do not seem to be over.

Beyond the now-ended pandemic crisis, the war in Ukraine is an additional element of uncertainty. In both cases, these are unlikely events - N.A. Taleb (2007) would call them "black swans"- that have had significant impacts and consequences on the European decarbonization project. The sanctions imposed by the EU in response to the invasion led Russia to use energy as a weapon. In any case, to avoid climate collapse, transnational coordination is necessary to effectively implement the proposed solutions. Each country, based on the principle of common but differentiated responsibility, should strive to achieve the set goals.

References

BeSafe Group (2022). *Principio DNSH nei PNRR: cos'è e come viene applicato. Ambiente e rifiuti.* Luglio 2022. Available at: https://www.besafegroup.it/blog-sicurezza-sul-lavoro/ambiente-e-rifiuti/principio-dnsh-nei-pnrr-cos-e-e-come-viene-applicato [20/05/2023]

Conti M.E. (2018*). Il management ambientale: teorie, metodi e strumenti in una prospettiva sostenibile.* Roma: Nuova cultura.

Dirigenti industria (2022). *Il percorso di decarbonizzazione in Europa: il programma "FIT for 55".* Agosto 2022. Available at: https://dirigentindustria.it/notizie/energia-ed-ecologia/il-percorso-di-decarbonizzazione-in-europa-il-programma-fit-for-55-2022-07-20.html [20/05/2023]

ESG News (2022). *Pubblicato il report sulla Tassonomia sociale Ue.* Platform on Sustainable Finance. Testo disponibile al sito: https://esgnews.it/social/pubblicato-il-report-sulla-tassonomia-sociale-ue-della-piattaforma-sulle-finanza-sostenibile/ [20/05/2023]

Etica Sgr (2020). *Finanza sostenibile. Che cos'è la tassonomia e come funziona*? Approfondimenti. Giugno 2020. Testo disponibile al sito: https://www.eticasgr.com/storie/approfondimenti/tassonomia-ue [20/05/2023]

European Commission (2023). *EU Taxonomy Compass*. Available at: https://ec.europa.eu/sustainable-finance-taxonomy/taxonomy-compass [21/05/2023]

Eurosif (2021). *Eurosif statement on risks arising from inclusion of natural gas & nuclear energy in the EU Taxonomy.* Novembre 2021. Available at: https://www.eurosif.org/news/eurosif-statement-on-risks-arising-from-inclusion-of-natural-gas-nuclear-energy-in-the-eu-taxonomy/ [21/05/2023]

Greenreport.it (2022). *Tassonomia Ue: l'Europarlamento dice sì all'inclusione di gas e nucleare.* Luglio 2022. Testo disponibile al sito: https://greenreport.it/news/energia/tassonomia-ue-leuroparlamento-dice-si-allinclusione-di-gas-e-nucleare/ [21/05/2023]

ISPI (2021). *"Fit for 55", il nuovo pacchetto climatico dell'UE e le sfide per l'Italia*. Luglio 2021. Testo disponibile al sito: https://www.ispionline.it/it/pubblicazione/fit-55-il-nuovo-pacchetto-climatico-dellue-e-le-sfide-litalia-31197 [19/05/2023]

Jayanti S. (2022). *Europe's Energy Crisis Is Going to Get Worse. The World Will Bear the Cost.* Time. Agosto 2022. Testo disponibile al sito: https://time.com/6209272/europes-energy-crisis-getting-worse/ [21/05/2023]

Lionello P. (a cura di) (2022). *Il rapporto IPCC spiegato dagli esperti italiani con i contenuti principali su Europa, Mediterraneo e Italia*. IPCC Italia. Febbraio 2022. Testo disponibile al link: https://ipccitalia.cmcc.it/il-rapporto-ipcc-spiegato-dagli-esperti-italiani-con-i-contenuti-principali-su-europa-mediterraneo-e-italia/ [19/05/2023]

Masi C. (2021). *Verso la transizione ecologica. Agenda 2030, Mobilità sostenibile, Next Generation EU, PNRR, Transizione ecologica.* Rotary per la sostenibilità. Available at: https://www.rotaryperlasostenibilita.it/verso-la-transizione-ecologica/ [20/05/2023]

Mazzantini U. (2020). *Next Generation EU: 750 miliardi per un recovery plan europeo sostenibile, omogeneo, inclusivo ed equo.* Greenreport.it. Testo disponibile al sito: https://greenreport.it/news/economia-ecologica/next-generation-eu-750-miliardi-per-il-recovery-plan-europeo-sostenibile-omogeneo-inclusivo-ed-equo/ [19/05/2023]

Parlamento Europeo (2023). *Green Deal europeo: la chiave per un'UE sostenibile e climaticamente neutrale*. Attualità. Giugno 2020. Testo disponibile al sito: https://www.europarl.europa.eu/ [19/05/2023]

Pictet AM Italia (2021). *Dizionario della decarbonizzazione: cosa significa e cosa prevede. Investire per l'ambiente*. Luglio 2021. Testo disponibile al sito: https://am.pictet/it/blog/articoli/guida-alla-finanza/dizionario-della-decarbonizzazione-cosa-significa-e-cosa-prevede [20/05/2023]

Severini G., Barelli U. (2021). *Gli atti fondamentali dell'Unione Europea su "transizione ecologia" e "ripresa e resilienza": prime osservazioni.* RGA online. Numero 20. Aprile 2021. Testo disponibile al sito: https://rgaonline.it/article/gli-atti-fondamentali-dellunione-europea-su-transizione-ecologica-e-ripresa-e-resilienza-prime-osservazioni/ [20/05/2023]

Simone C., Conti M.E. (2022). Reflecting on hypertrophic plastic waste: concerns and levers. *Revista Tecnologia e Sociedade*, 18(53): 1-18. DOI: 10.3895/rts.v18n53.15858

Tagliapietra S. (2021). *Una politica industriale verde per l'Europa.* Pandora rivista. Maggio 2021. Testo disponibile al sito: https://www.pandorarivista.it/pandora-piu/una-politica-industriale-verde-per-l-europa/ [20/05/2023]

Taleb N.A. (2007). *The black swan*. New York: Random House.

Tibaldi V. (2022). *Tassonomia verde? Gas e nucleare tra gli investimenti green. Non solo ambiente.* Settembre 2022. Available at: https://www.nonsoloambiente.it/tassonomia-verde-gas-e-nucleare-tra-gli-investimenti-green [21/05/2023]

Tsangas M., Papamichael I., Zorpas AA. (2023). Sustainable Energy Planning in a New Situation. *Energies*, 16(4): 1626. DOI: 10.3390/en16041626

A valuation of football companies between tangible and intangible values: A preliminary study*

*Francesco Laviola**, Fernando Camastra***, Annabella Conturso****, Roberto de Renzi*****

Received 12 December 2023 – Accepted 15 January 2024

Abstract

This study delves into the dynamic world Football Club Valuations, an area rich in economic and cultural significance. It addresses the complex issue of which factors most profoundly influence the enterprise value of a football club.

Central to the hypothesis is the notion that a club's infrastructural investments, player salaries, and on-field successes are determining factors in its financial value. To test this, and the other hypotheses of the study, the research employs a rigorous quantitative approach, utilizing multiple linear regression analysis, to investigate the factors influencing the enterprise value of European football clubs. Examining data from 28 prominent clubs between 2018 and 2023, our research focuses on infrastructural investments, player salaries, team value, and on-field performance.

The results of this study are revealing, demonstrating a clear correlation between the hypothesized factors and club valuations, with infrastructural investments and player salaries emerging as key determinants of club valuation. The integration of a

* Although the work is the result of collective reflection, paragraphs 4 and 5 should be attributed to Francesco Laviola; paragraphs 3 and 6 should be attributed to Fernando Camastra; paragraphs 2, 7, and 8 should be attributed to Annabella Conturso; and paragraph 7 should be attributed to Roberto de Renzi.

** Ph.D. Candidate in Management, Banking, and Commodity Sciences at Sapienza University of Rome: francesco.laviola@uniroma1.it

*** Ph.D. Student in Management, Banking and Commodity Sciences at Sapienza University of Rome: fernando.camastra@uniroma1.it

**** Ph.D. Student in Corporate Financial Management and Crisis Prevention at the Universitas Mercatorum: annabella.conturso@studenti.unimercatorum.it

***** Ph.D. in Economics and Finance in Corporate Governance from the University of Rome La Sapienza. roberto.derenzi@uniroma1.it

Corporate Governance and Research & Development Studies, n. 2-2023
(ISSN 2704-8462-ISSNe 2723-9098, Doi: 10.3280/cgrds2-2023oa16978)

polynomial transformation for team value captures its complex, non-linear relationship with enterprise value. The model provides nuanced insights for football club stakeholders and managements.

What distinguishes this work is its pioneering integration of financial acumen with a deep understanding of the unique cultural and economic landscape of football and reveals, how the dynamics of investment in infrastructure and player salaries, along with success in international competitions, significantly and complexly influence the corporate value in the football sector, offering a new framework for analyzing enterprise value in football.

Keywords: enterprise value, football club valuations, financial variables, infrastructural investments, player salaries.

Sommario

Questo studio si addentra nel dinamico mondo delle valutazioni dei club di calcio, un'area ricca di significato economico e culturale. Affronta la complessa questione di quali fattori influenzano più profondamente il valore d'impresa di un club di calcio. Fondamentale è l'ipotesi che gli investimenti infrastrutturali di un club, gli stipendi dei giocatori e i successi sul campo siano fattori determinanti per il suo valore finanziario. Per verificare questa e le altre ipotesi dello studio, la ricerca impiega un approccio quantitativo rigoroso, utilizzando l'analisi di regressione lineare multipla, per indagare i fattori che influenzano l'enterprise value dei club calcistici europei. Esaminando i dati di 28 club importanti tra il 2018 e il 2023, la nostra ricerca si concentra sugli investimenti infrastrutturali, sugli stipendi dei giocatori, sul valore della squadra e sulle prestazioni sul campo.

I risultati di questo studio sono rivelatori e dimostrano una chiara correlazione tra i fattori ipotizzati e le valutazioni dei club, con gli investimenti infrastrutturali e gli stipendi dei giocatori che emergono come determinanti chiave della valutazione dei club. L'integrazione di una trasformazione polinomiale per il valore della squadra coglie la sua relazione complessa e non lineare con il valore d'impresa. Il modello fornisce approfondimenti sfumati per gli stakeholder e i dirigenti delle società calcistiche. Ciò che distingue questo lavoro è la sua pionieristica integrazione di acume finanziario con una profonda comprensione del paesaggio culturale ed economico unico del calcio.

Parole chiave: valore dell'impresa, valutazione dei club calcistici, variabili finanziarie, investimenti infrastrutturali, salari e stipendi.

1. Introduction

The football industry, with its vast global reach and intricate economic dynamics, represents a fascinating field of investigation for academic research in sports management (Bridgewater, 2010; McLeod *et al.*, 2021).

This extends to aspects of corporate governance (Michie & Oughton, 2005; Hamil *et al.*, 2004), leadership (Crust *et al.*, 2006), supply chain (Memari *et al.*, 2021), and financial economic nature (Nicoliello & Zampatti, 2016). This interest also encompasses the study of the socio-cultural impact of sports (Giulianotti, 1999), sports marketing strategies, and fan loyalty (Bauer *et al.*, 2008), as well as the influence of new technologies on sports operations (Ratten & Ratten, 2011). Furthermore, there is a growing focus on sustainability and ethics in football, as highlighted by research on corporate social responsibility in the industry (Paramio-Salcines *et al.*, 2013) and financial fair play (Szymanski, 2014). To fully understand these dynamics, it is necessary to adopt a multidisciplinary approach that combines sports management with sociology, economics, and law, providing a holistic view useful for navigating and influencing current and future trends in global football. Considering the economic and financial aspects, particularly in light of the Financial Fair Play (FFP) regulations established by UEFA, it is important to analyze the impact of these rules on European and Italian football, aiming to promote responsible and sustainable financial management of clubs. These regulations aim to limit excessive spending, and their influence is evident when examining cases of some Italian clubs. In 2019, for example, Inter was sanctioned under FFP due to significant losses. In response, the club had to sell prominent players, such as Romelu Lukaku, who moved to Chelsea, in an attempt to rebalance its finances in line with UEFA's established norms. Juventus faced the need to adjust its expenses during the COVID-19 pandemic, adopting a more cautious strategy to comply with FFP criteria. These situations demonstrate how the Financial Fair Play (FFP) can influence the financial and strategic decisions of clubs, albeit not without criticism. Some observers raise doubts about the actual fairness of the FFP rules, suggesting that they may favor established clubs with greater resources, potentially to the detriment of less capitalized ones (Calcio e Finanza, 2023; Pecunya, 2022). An emblematic case of positive adaptation to FFP is represented by AC Milan, which has recently improved its economic situation through player sales and the restructuring of its debt, thereby aligning itself with FFP parameters and strengthening its financial stability. In this context, the vital role of the media and governance bodies in monitoring the financial situation of clubs and promoting public awareness is clearly evident. However, there are lingering concerns about these entities' ability to

ensure competitive balance. The crisis unleashed by the COVID-19 pandemic has highlighted the fragility of football's financial structures, emphasizing the need for ongoing dialogue and policy review to ensure sustainability and fairness in the European football landscape, particularly in the Italian context (Ferrari, 2021).

In this context, scholars have questioned whether *"it is possible for an industry to sustain losses consistently on an annual basis and not eventually face a catastrophic industry transformation crisis"* (Hamil & Walters, 2010, p. 355). This reflection has been prompted by the observation that many European clubs have experienced challenging financial conditions for years, drawing the attention of oversight bodies such as UEFA and the media, thus highlighting a growing interest in the financial dynamics of football. A less than favorable economic situation certainly impacts the ability to attract talent and plan new investments. The wealthier and more successful clubs tend to stay at the top through a virtuous cycle of sporting and financial success. A club's ability to attract private investments and generate a high brand value can translate into success on the field, which, in turn, can further increase revenues. This is particularly crucial in unfavorable economic periods because it demonstrates that clubs with a solid financial foundation are better equipped to attract talent and sustain investments, even when the overall economy is in decline (Rohde & Breuer, 2016). Permissive management and soft budget constraints can lead to a spiral of unsustainable salaries and debts. Less financially stable clubs face numerous challenges to remain competitive, as an excessive emphasis on the short-term results in long-term financial difficulties. This is especially relevant for clubs that do not have the same ability to attract significant investments as their wealthier counterparts (Andreff, 2018).

In this context, it is essential to emphasize that, although there is a wide range of research on the value of sports enterprises (Sloane, 2015; Sanchez *et al.*, 2022; Ace Advisory, 2022;), some gaps are identified that need to be addressed. Specifically, there is a lack of empirical studies that directly investigate the relationship between investments in infrastructure, such as stadiums and training centers, and the business value in football. This is a fundamental dimension, considering the significant role that such infrastructures play in shaping the profile and capabilities of a club. Similarly, while salaries and wages are recognized as one of the major costs for football clubs, there is insufficient research bridging the gap between these costs and the actual business value. Studies are lacking that thoroughly analyze how salary strategies influence long-term business valuation and how this correlates with sporting performance and commercial success.

These gaps in the literature suggest that further research is needed to better understand how infrastructural investments and salary policies can be optimized to enhance the value of football enterprises. A detailed analysis in these areas could provide valuable insights for sports executives, helping formulate more effective strategies for the financial and sporting success of clubs.

As the business value of football clubs is a multifaceted indicator that encapsulates not only the financial strength of these entities but also their sporting competitiveness and commercial appeal (Szymanski, 2017), this research poses the following research question: "*What are the tangible and intangible factors that influence the business value of a football club?".*

In this sense, business value is not only a reflection of the economic balance sheet but also an aggregate of perceived values that can influence corporate strategies and stakeholder decisions. Our study aims to provide an understanding of the forces shaping today's football landscape, contributing to more informed management strategies and entrepreneurial practices that take into account both tangible and intangible aspects in the assessment and enhancement of business value. The analysis focused on a group of 28 elite clubs from the most prestigious European leagues, employing a regression model to unveil the key determinants shaping the future value of these prominent football enterprises. The independent variables analyzed include investments in infrastructure, player salaries, player value, victories in international competitions, and stadium ownership. The model demonstrated a strong predictive ability. The results revealed a significant and complex relationship between the analyzed factors and business value, highlighting the importance of investments in infrastructure and salaries, success in international competitions, and team value as drivers of business value. In this study, we investigate the direct and yet under-explored link between infrastructure investments and player salaries, and the corporate value in football. This unique perspective offers a new understanding of how clubs can optimize such investments to enhance both sporting success and commercial value, highlighting the critical importance of balanced financial management in the unique context of professional football.

2. The paradox of the football industry: creation or destruction of value

This study makes a significant theoretical contribution to the analysis of determinants impacting business value in the football sector. On an applied

level, the work provides an analytical framework that can assist sports managers in investment decisions and strategic management. The analysis of top-tier clubs shows a substantial correlation between infrastructural investments, sporting success, on-field results, team value, and business value, indicating that careful management of these aspects can decisively influence long-term corporate value. Such understanding is crucial for clubs aiming to balance profitability with the development of a successful sporting profile.

The interaction between financial fair play (FFP) regulations and the financial management strategies of European and Italian football clubs reveals a complex context characterized by unique challenges and opportunities in professional football. While the experiences of teams like Inter, Juventus, and Milan underscore the need to adhere to FFP rules to preserve financial balance, it is also noteworthy how the assessment of corporate value and external capital injection are becoming central elements in this scenario. This reality is evident in the inclination of some clubs to make substantial investments, often in contrast to prudent financial management, indicating an approach to the world of football that goes beyond mere compliance with FFP. Emblematic examples of such dynamics include the acquisition of Chelsea FC by a consortium led by Todd Boehly (valued at 4.25 billion euros, Bellinazzo, 2022), marking one of the largest transactions in football, or the signing of players like Jack Grealish by Manchester City, for a record sum in English football (valued at 118 million euros, Fiorenza, 2021). These cases illustrate the trend of clubs engaging in significant spending despite deficit budgets, in open contradiction to cautious financial management and the principles of economic and social sustainability.

Only a limited number of clubs, such as Bayern Munich and Borussia Dortmund, have demonstrated an adaptation to Environmental, Social, and Governance (ESG) principles, integrating environmental, social, and governance criteria into their business model, thus supporting the long-term value of the enterprise. For instance, Bayern Munich had already installed solar panels on the roof of the Allianz Arena and used energy-efficient lighting systems. Borussia Dortmund had taken similar measures, also promoting public transportation for its fans on match days to reduce CO2 emissions. Clubs have a long history of community involvement, with projects promoting social integration and support for various social groups. Bayern Munich has its “FC Bayern Hilfe eV”, which supports people in financial difficulty, while Borussia Dortmund is known for its work with youth through its academies and initiatives aimed at combating racism and discrimination. The Bundesliga, the German league in which both clubs compete, is renowned for its financial sustainability and ethical governance. Bayern Munich and

Borussia Dortmund have followed this model with prudent financial management, including adherence to financial fair play rules and the implementation of transparent governance structures.

Simultaneously, significant investments in football from entities outside the sports world, such as the acquisition of Newcastle United by the Public Investment Fund (PIF) of Saudi Arabia, highlight an investment approach that goes beyond mere financial analysis, aligning with broader goals of market positioning and geopolitical influence. The rapid growth of this fund and its prominent position in the global economy have raised questions among academics not only about its role as an economic growth engine but also about the potential use of the PIF as a political tool in the hands of the ruling elite. In particular, there is concern about how this fund could be employed to influence political decisions, strengthen internal control, project power internationally, or even serve as a means to consolidate the position and authority of the ruling elite within the country and on the world stage (Seznec & Mosis, 2018). The literature has consistently argued that to create economic value, a business must be able to strike a balance between costs and revenues, i.e., between economic and financial situations.

However, this interpretation is not easily applicable in the football industry, where investors seem less attracted to the purely economic value of enterprises that often record substantial losses, while they are more drawn to other factors. The primary objectives of this research aim to investigate what these factors independent of the economic and financial balance strictly tied to costs and revenues might be that make a football club attractive to investors.

3. Literature Review

The enterprise value in the sports sector, particularly in the realm of football, takes shape as a complex interplay of various tangible and intangible variables (Yiapanas *et al.*, 2023). Investments in infrastructure represent a vital strategic lever for the value of an enterprise due to their direct impact on productivity, efficiency, and the organization's attractiveness. In the broader economic context, robust infrastructure can translate into increased operational efficiency, cost reduction, and enhance the ability to meet customer needs. According to the theory of enterprise value, this can increase revenues and reduce operational risks, leading to an overall better assessment of the enterprise (Brealey *et al.*, 2006).

However, infrastructure extends well beyond physical constructions, em-

bracing technological innovation and user experience. The adoption of advanced technologies, such as ERP systems or big data analytics, can provide businesses with tools to analyze and optimize processes, improving decision-making and market adaptability (Fiorucci, 2023). Furthermore, infrastructure enhances the user experience with intuitive digital platforms or engaging retail environments that can significantly increase customer loyalty and per-consumer spending. It has been empirically demonstrated that an online flow state, which is a momentary phenomenon, helps e-commerce websites build customer satisfaction and loyalty indirectly through the customer experience (Ertemel *et al.*, 2021).

Transposing this understanding into the specific context of football clubs, infrastructure takes on an even more complex dimension. Modern stadiums, world-class training facilities, and advanced technological systems for performance analysis and fan engagement are crucial for the success of a football club. According to an analysis conducted by Siegfried and Zimbalist (2000), new stadiums have a significant impact on urban renewal and economic activity. Their studies have shown how modern stadiums can serve as catalysts for urban development, stimulating not only sporting interest but also promoting tourism, employment, and the regeneration of declining urban areas. Through these multifunctional roles, stadiums contribute to creating new economic and social opportunities in the cities that host them.

In football, the importance of infrastructure is further amplified by the emotional nature and loyalty of fans. A club with advanced facilities can create an environment that enhances the fan experience, increasing their emotional connection and propensity to spend, both in terms of tickets and merchandise. Baade and Matheson (2011) discussed how improvements to the stadium influence consumer perception and behavior, primarily in the context of highly significant sporting events, such as the NFL (National Football League) Super Bowl. They particularly examined the economic impact of NFL mega-sporting events, like the Super Bowl, on the host city and consumer perception. In addition, a football club's infrastructure is often seen as a physical manifestation of its brand and cultural heritage. Investments in iconic structures or technologies that enhance fan engagement can, therefore, not only increase direct revenues but also significantly improve the club's market value (Romero-Jara *et al.*, 2023).

This research postulates that:

• **HP1***: Investments in infrastructure have a positive correlation with the value of football enterprises.*

In contemporary economic literature, the impact of wages on enterprise value is a topic of crucial importance, explored in depth to reflect its complexity (Ouimet & Simintzi, 2018). Wages are not merely an operating expense but also represent an investment in human capital, an intangible asset that can generate significant economic returns. Human capital theory suggests that investing in skilled and well-compensated workers can increase corporate productivity and lead to a sustainable competitive advantage (Van Der Lugt *et al.*, 2023).

In the financial domain, the efficiency wage theory posits that paying employees above the market wage can reduce turnover and increase motivation, with a positive impact on corporate productivity (Ansari, 2023). These principles are also reflected in the human resources literature, discussing how fair and competitive compensation is crucial for attracting and retaining top talents and how wage disparities can influence morale and employee engagement (Morris Morant & Jacobs, 2018).

Effective management in football clubs, necessitates a balanced approach towards wage structures and relational dynamics, where harmonious internal relationships contribute to enhancing overall performance and value creation within the organization (Pellicano et al, 2016). In the football sector, the issue of wages takes on unique facets given its distinctive market dynamics. Salaries in football are closely tied to both sporting performance and the economic valuation of clubs. Szymanski (2009) has linked athletes' salaries to sporting performance, noting that teams investing more in high-level talents tend to perform better in championships, with direct implications for revenues derived from victories and participation in lucrative competitions.

Frank *et al.*'s research (2011) has highlighted that a fair distribution of wages could positively influence team cohesion and performance. In team sports, unlike many corporate environments, cohesion is particularly critical: a united group focused on the same goal can surpass teams with superior individual talents but less cohesion.

Managing player salaries in football must therefore consider the impact of these compensations not only on the club's budget but also on team dynamics and player morale. A balanced salary structure can promote a positive team environment, while significant disparity could cause tensions and envy, negatively influencing performance (Késenne, 2000). It is argued that salaries in football are not just a reflection of players' costs but also an investment in the club's sporting and commercial potential.

Therefore, hypothesis HP2 can be formulated as follows:

- **HP2:** *Player salaries have a positive correlation with the club's value.*

The link between a company's performance and its enterprise value is a fundamental principle in business and economics studies. In general, sustained successes in any sector, whether in sales, innovation, market expansion, or other indicators of success, tend to be associated with an increase in enterprise value. This association is based on the perception that success is an indicator of effective management, a winning corporate strategy, and potential future growth. Continued business successes over time contribute to improving a company's reputation. This enhancement in external perception, reflecting both past financial performance and initiatives beyond mere economic gain, strengthens the corporate brand and makes the company more attractive to investors. This elevated reputation, in turn, creates a virtuous circle, fueling and sustaining further positive outcomes. A solid and growing reputation, built on foundations of repeated successes, becomes a valuable asset that drives continuous growth and long-term business success (Roberts & Dowling, 2002).

In the sporting context, the results achieved on the field have a direct and tangible resonance on enterprise value, as demonstrated by the analysis of publicly traded sports entities, where a positive correlation between sporting performance and stock prices is observed (Pinnuck & Potter, 2006). Sporting triumphs can significantly enhance the value of a club through mechanisms such as increased brand value, higher revenues from victory-related prizes, and a boost in earnings from related activities such as ticket sales, merchandising, and television broadcasting rights (Mullin & Hardy, 2014).

Taking a closer look at the world of football, this relationship becomes even more evident. Sporting outcomes are a crucial determinant of a club's market value. Victories in major leagues and performances in international competitions like the UEFA Champions League have a direct impact on revenues, not only through immediate cash prizes but also by increasing global visibility, attracting more lucrative sponsorships, and expanding the international fan base (Késenne, 2006).

Furthermore, sporting successes influence the club's value in the transfer market. A winning club can attract top-tier talents eager to join successful teams and can also command higher fees for its best players, thereby increasing the valuation of the player roster, which represents a significant asset on the club's balance sheets (Carmichael *et al.*, 2001).

The relationship between on-field successes and a club's market value has also been examined in terms of the "halo effect," where success in a specific area can have a positive impact on stakeholders' perception in other areas. Applied to the context of sports clubs, this principle suggests that on-field successes, such as victories in important matches or the conquest of titles, can positively influence the overall perception of the club by fans,

sponsors, media, and other key stakeholders. When a club achieves significant results in sports, this success tends to create a positive aura that extends beyond mere athletic performances. Over the years, the crucial importance of relationships and value co-creation in emerging companies has been increasingly recognized, suggesting that these dynamics are essential for sustainable development and long-term success, positively influencing the firm's market value (Casali *et al.*, 2018).

The third hypothesis (HP3) of this research proposes that:

• **HP3:** *Sporting results have a positive correlation with the economic value of clubs.*

In the context of sports organizations and businesses in general, personnel value is strongly linked to enterprise value. Corporate values, when focused on personnel and effectively implemented, can significantly improve financial performance and overall organizational stability. An analysis of the Fortune Global 500 has shown that all corporate values indirectly influence income and operational performance through human values. The research has reconciled and explained inconsistent results in decades-old literature, redefining corporate values and establishing their impact on financial performance when human values are implemented (Taher, 2023). Studies on Employee Stock Ownership Plans (ESOPs) have demonstrated that companies with ESOPs outperform those without. This includes an increase in the market value of stocks, higher returns on assets, higher net profit margins, and sales growth rates (Blasi *et al.*, 2013; Stretcher, 2006; Han Kim, 2010).

In football, managing the value of the team is crucial for economic and sporting success. Successful clubs like Liverpool and Real Madrid have generated hundreds of millions of euros in value through team value management, surpassing the value derived from investing money in new players. Team value management offers the best opportunity to maximize the overall value of a club in the highly competitive world of professional football (Beiderbeck *et al.* 2020). The valuation of a club includes both physical and sports-related assets. The entire team roster is a key factor in the evaluation. For example, the difference in valuation between clubs like Chelsea and Milan can be partially explained by the different value of each team's players, measured through the players' market values (Cavallini, 2023).

In this research, the fourth formulated hypothesis (HP4) suggests that:

• **HP4:** *The value of the team has a positive correlation with economic value.*

Table 1. Bibliographic Analysis of Hypotheses

AUTHOR	JOURNAL	ABSTRACT	HP
Brealey *et al.*	Journal Of Apllied Corporate Finance	According to the theory of business value, investments in infrastructure can increase revenues and reduce operational risks, leading to an improved overall assessment of the company.	HP1
Pellicano *et al.*	Business Systems Laboratory International Symposium Book of Abstracts	It discusses how relationality is a key to understanding current and future entrepreneurial phenomena, and how systems thinking can contribute to this approach	
Yiapanas *et al.*	Auditing & Accountability Journal	The enterprise value in the sports industry is a complex interweaving of various tangible and intangible variables.	
Ertemel *et al.*	Plos One	Infrastructure enhances the user experience with intuitive digital platforms or engaging retail environments that can significantly increase customer loyalty and spending.	
Siegfried & Zimbalist	Journal of Economic Perspectives	Stadiums can serve as catalysts for urban renewal and economic activity.	
Baade & Matheson	Regional studies	Analysis of the direct link between infrastructure and fan engagement.	
Romero-Jara *et al.*	Palgrave Communications	Positive correlation between infrastructure investments and business value.	
Ouimet & Simintzi	American Economic Review	The impact of salaries on the business value.	HP2
Van Der Lugt *et al.*	S&P Global	Salaries are not only an operational expense but also an investment in human capital, an intangible asset that can generate significant economic returns. The theory of human capital suggests that an investment in qualified and well-compensated workers can increase corporate productivity and lead to a sustainable competitive advantage.	
Szymanski	(monograph)	It discusses how salaries in football are closely linked to the sporting performance and economic valuation of clubs.	
Frank *et al.*	Journal of Labour Economics	A fair distribution of salaries positively influences the performance of a club.	
Késenne	Scottish Journal of Political Economy	Salary disparity negatively influences performance.	

Casali *et al.*	Sustainability	Examines how the adaptability of the business idea influences sustainability and the creation of shared value in emerging companies.	
Roberts & Dowling	Strategic Management Journal	Positive correlation between achieved results and enterprise value.	HP3
Pinnuck & Potter	Accounting and Finance	Analysis of publicly traded sports companies, where a positive correlation is observed between sports performance and stock prices.	
Mullin & Hardy	(monograph)	It discusses how sporting triumphs can significantly enhance the value of a club.	
Carmichael *et al.*	Applied Economics	It examines how sporting successes influence the value of the club in the transfer market.	
Morris Morant & Jacobs	Journal of Management History	They discuss how fair and competitive compensation is crucial for attracting and retaining top talent and how salary disparities can affect morale and employee engagement.	
Taher	Future Business Journal	It redefines corporate values and establishes their impact on financial performance when human values are implemented.	HP4
Blasi *et al.*; Stretcher; Han Kim & Ouimet.	Emerald Insight; Journal of Employee Ownership Law and Finance; Corporations of America; Journal of Employee Ownership Law and Finance; AFA 2010 Atlanta meeting paper	They have shown that companies with ESOPs perform better than those without. This includes an increase in the market value of stocks, higher returns on assets, higher net profit margins, and growth rates in sales.	
Beiderbeck *et al.*	Mckinsey & Company	Managing the value of the team provides the best opportunity to maximize the overall value of a club in the highly competitive world of professional football.	

4. Methodology

The main objective of this paper is to analyze the factors that influence the future value of European football enterprises. The research question that guides this study is: *What are the tangible and intangible factors that influence the business value of a football club?*

To answer this question, we adopt a quantitative research design based on multiple linear regression analysis. This approach allows us to examine the relative influences of multiple independent variables on the dependent variable, while controlling for the effects of other variables. We chose this methodology because it is widely used in similar studies (Buse *et al.*, 2010; Quarato *et al.*, 2023) and it provides a rigorous and robust way to test our hypotheses (Jobson, 1991).

Next we formulate a step-by-step summary of our research design and analysis process.

The sample for this study consists of 28 among the most relevant European football teams, for which we collected data from various sources for the period between 2018 and 2023. The data sources include Refinitiv database, AIDA database, official football teams' websites, *football benchmark* report, and other specialized web sources.

The dependent variable for this study is firm value (V.IMP.), which is extracted from *football benchmark* report. The independent variables include investments in infrastructures (INF), players' salaries (SALAR), team value (VALUE), and team performance in national and international competitions (RIS.N. and RIS.I.). The control variables include stadium ownership (STADIO) and total assets (T.A.).

To test the hypotheses, we used a multiple linear regression model presenting the first following specification:

$$V.IMP. = \beta_0 + \beta_1 \cdot INF + \beta_2 \cdot SALAR + \beta_3 \cdot VALUE + \beta_4 \cdot RIS.N. + \beta_5 \cdot RIS.I. + \beta_6 \cdot STADIO + \beta_7 \cdot T.A. + \epsilon$$

We performed the regression analysis using R software, version 4.1.2. We also applied some methodological choices to enhance the validity and robustness of the model, such as scaling the continuous variables, transforming the VALUE variable into a polynomial, and using the Akaike Information Criterion (AIC) for model selection. The regression model resulting from these multi-step refinement techniques is as follows.

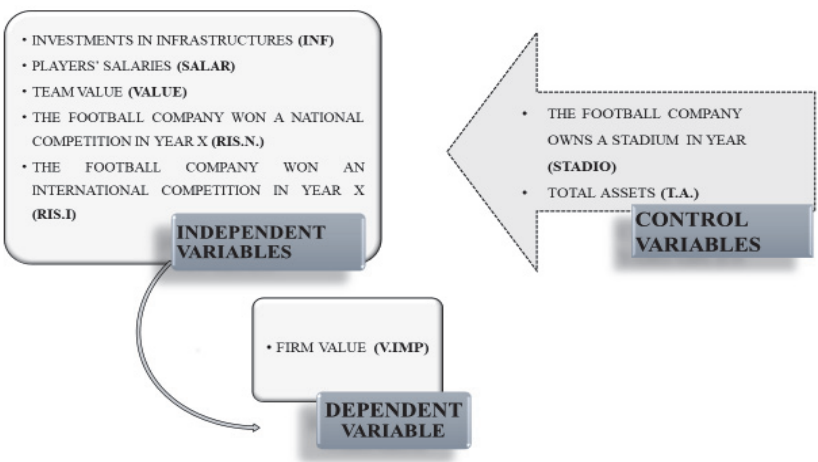
$$V.IMP. = \beta_0 + \beta_1 \cdot scale(INF) + \beta_2 \cdot scale(SALAR) + \beta_3 \cdot scale(VALUE) + \beta_4 \cdot scale(VALUE)^2 + \beta_5 \cdot RIS.I. + \beta_6 \cdot STADIO + \epsilon$$

4.1. Sample description

The present research is mainly based on desk data from various sources. The starting point is in fact the Refinitiv database, which is among the most complete and well reputed worldwide provider of financial market data and infrastructure. The dataset included information on more than 85000 among active and inactive companies across 125 markets, with time series available from the 1900s onwards. Guided by the objective of this paper, only the data of the most important European football companies were selected; furthermore, in order to ensure the availability of data to perform the analysis, the timeframe between 2018 and 2023 was considered. Similarly, 12 football companies have been excluded due to lack of data. The final dataset used for the analysis included a total of 140 observations between 2018 and 2023, expressing data about 28 among the most relevant European football teams. All information related to firms' governance structures were extracted from Refinitiv and AIDA (Bureau van Dijk's database on Italian firms) databases, and official football teams' websites. Information on sport performance of football teams were retrieved from football benchmark report (ACE advisory) and other specialized web sources (transfermarkt.it).

Data about investments in infrastructures (INF), players' salaries (SALAR), team value (VALUE), national (RIS.N.) and international (RIS.I.) team performance, stadium ownership (STADIO) and total assets (T.A.) were provided for the years ranging from 2018 to 2022, while firm value (V.IMP.) is also provided for 2023.

Figure 1. Research design: independent, dependent and control variables



4.2. Variables and analysis

The dependent variable employed in the present research is firm value (V.IMP.), extracted from football benchmark report. To capture the effect of the factors on the future value of football companies, this variable relates to year x + 1, while all independent and control variables relate to year x.

Independent variables included in the regression model cover information about firms' governance structures and sport performance. In order to capture the effect of football teams' performance in national and international competitions, two dummy variables (RIS.N., RIS.I.) has been constructed, being equal to one if the team won a competition in the corresponding year, zero otherwise. Continuous independent variables cover information on investments in infrastructures (INF) and players' salaries (SALAR), extracted from Refinitiv database and official team's websites, and team value (VALUE), extracted from transfermarkt website.

The set of control variables includes STADIO, a dummy variable taking value of one if the team owned a stadium in the corresponding year, zero otherwise, and firms' total assets (T.A.), a continuous variable extracted from Refinitiv database and official teams' websites.

As in Quarato *et al.* (2023), table 2 reports all variables measures.

Table 2. Variables measures

	Variable	*Measurement*
Dependent Variable	V.IMP.	Continuous Firm Value in year x + 1
Independent Variables	INF	Continuous Investments in infrastructures
	SALAR	Continuous Players' salaries in year x
	VALUE	Continuous Team value in year x
	RIS.N.	Dummy 1 = the football company won a national competition in year x; 0 = Otherwise
	RIS.I	Dummy 1 = the football company won an international competition in year x; 0 = Otherwise
Control Variables	STADIO	Dummy 1 = the football company owns a stadium in year x; 0 = Otherwise
	T.A.	Continuous Total Assets in year x

To test the hypotheses introduced in the previous section, a multiple linear regression model was used. The choice of a multiple linear regression model is supported by its widespread use in similar studies and its ability to examine the relative influences of multiple independent variables on the dependent variable (Jobson, 1991). For instance, the study by Buse *et al.* (2010) have successfully employed multiple linear regression models to analyze the impact of various factors on firm value, and Kologlu *et al.* (2018) used it to estimate market value of football players. Multiple linear regression models are particularly useful in this context as they allow for the examination of the individual effects of each independent variable on the dependent variable, while controlling for the effects of other variables. This is especially important in studies like the present one, where there are several independent variables that could potentially influence the dependent variable. Finally, it is of paramount importance to elucidate the specific methodological choices made downstream of the first specification of the multiple linear regression model. Firstly, the continuous variables within the model have been scaled.

This standardization procedure ensures that the regression coefficients are interpretable on a comparable scale, thereby facilitating a more intuitive understanding of the relationships between the variables. Secondly, a polynomial transformation to the VALUE variable has been applied.

This decision was informed by the recognition that the relationship between VALUE and the dependent variable may not be strictly linear. The polynomial transformation allows to capture potential non-linearities in this relationship, thereby enhancing the accuracy of the model. Lastly, the Akaike Information Criterion (AIC) for model selection has been employed. This step led to the exclusion of the independent variable RIS.N. and the control variable T.A. from the final model. The AIC is a well-established method for model selection that balances the goodness-of-fit of the model with the principle of parsimony (Kieseppä, 1997). Excluding RIS.N. and T.A., ensured that our final model is as simple as possible while still providing a good fit to the data. These methodological choices, while technical in nature, are crucial for the robustness and validity of the findings.

5. Results

The regression analysis conducted on the dataset provides a comprehensive understanding of the factors influencing the future value (year x + 1) of a football enterprise (V.IMP.). As presented below, the final model includes several independent variables, each of which captures a different aspect of the football enterprise's operations and performance in year x.

Table 3. Multiple linear regression summary

> summary(regrscelta_scaled)					
Call:					
lm(formula = dataset$V.IMP. ~	*scale(dataset$INF) +*				
	scale(dataset$SALAR) +				
	poly(scale(dataset$VALUE), 2, raw = TRUE) +				
	dataset$RIS.I. + dataset$STADIO)				
Residuals:	*Min*	*1Q*	*Median*	*3Q*	*Max*
	-848.44	*-143.63*	*-26.59*	*92.39*	*1523.7*
Coefficients:					
	Estimate	*Std. Error*	*t value*	*Pr(>|t|)*	
(Intercept)	*610.8*	*64.31*	*9.498*	*< 2e-16*	***
scale(dataset$INF)	*186.72*	*41.63*	*4.485*	*1.56E-05*	***
scale(dataset$SALAR)	*544.06*	*59.36*	*9.165*	*7.99E-16*	***
poly(scale(dataset$VALUE), 2, raw = TRUE)1	*176.72*	*63.26*	*2.793*	*0.00599*	**
poly(scale(dataset$VALUE), 2, raw = TRUE)2	*115.99*	*28.46*	*4.075*	*7.86E-05*	***
dataset$RIS.I.	*363.62*	*146.53*	*2.482*	*0.01433*	*
dataset$STADIO	*222.07*	*74.18*	*2.994*	*0.00329*	**
---					
*Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*					
Residual standard error: 363.1 on 133 degrees of freedom					
Multiple R-squared: 0.8778, Adjusted R-squared: 0.8723					
F-statistic: 159.2 on 6 and 133 DF, p-value: < 2.2e-16					

The first variable, INF, represents the investment in infrastructure. The coefficient for this variable is 186.72, and it is statistically significant at the 0.001 level. This means that for every standard deviation increase in INF, we

expect an increase of approximately 186.72 million euros in V.IMP., holding all other variables constant. This result underscores the importance of infrastructure investment in enhancing the value of a football enterprise. Infrastructure can include facilities such as training grounds and stadiums, which are crucial for a team's performance and can generate significant revenue streams.

The second variable, SALAR, represents the salary paid to players. The coefficient for this variable is 544.06, and it is statistically significant at the 0.001 level. This implies that for every standard deviation increase in SALAR, there is an associated increase of approximately 544.06 million euros in V.IMP., holding all other variables constant. This result highlights the role of player salaries in determining a football enterprise's value. Higher salaries can attract top talent, which can enhance team performance and increase the enterprise's value.

The third variable, VALUE, represents the value of the team's players. This variable has been transformed into a polynomial to capture any non-linear effects on V.IMP. The coefficients for the linear and quadratic terms are 176.72 and 115.99 respectively, both statistically significant at the 0.01 level or better. These results suggest that VALUE has a complex, non-linear relationship with V.IMP. At lower levels of VALUE, increases in VALUE are associated with substantial increases in V.IMP. However, at higher levels of VALUE, further increases in VALUE still increase V.IMP., but at a decreasing rate.

In more detail, the first term of the polynomial, poly(scale(dataset$VALUE), 2, raw = TRUE)1, has an estimated coefficient of 176.72 and is significant at the 0.01 level. This represents the linear effect of VALUE on V.IMP.: for a one standard deviation increase in VALUE, we expect an increase of about 176.72 million in V.IMP., holding all other variables constant.

The second term of the polynomial, poly(scale(dataset$VALUE), 2, raw = TRUE)2, has an estimated coefficient of 115.99 and is significant at the 0.001 level. This represents the quadratic effect of VALUE on V.IMP.: it indicates the effect of VALUE on V.IMP. changes depending on the level of VALUE itself. Specifically, for every one standard deviation increase in the square of VALUE, we expect an increase of about 115.99 million in V.IMP., holding all other variables constant.

In sum, both the linear and quadratic effects of VALUE are significant, suggesting that VALUE has a complex, nonlinear effect on V.IMP. This might reflect the fact that the value of players on a team may have different effects on firm value depending on the context: for example, having very valuable players might increase firm value, but it might also entail higher

costs and financial risks that could have negative effects on firm value at very high levels of VALUE.

The fourth variable, RIS.I., is a binary variable indicating whether the team won an international competition in year x. The coefficient for this variable is 363.62 and it is statistically significant at the 0.05 level. This suggests that winning an international competition can significantly enhance a football enterprise's value, likely due to increased prestige and fan base.

The fifth variable, STADIO, is another binary variable indicating whether the team owns its stadium in year x. The coefficient for this variable is 222.07 and it is statistically significant at the 0.01 level. This result indicates that owning a stadium can significantly increase a football enterprise's value, possibly due to additional revenue from ticket sales and concessions.

Overall, these results provide compelling evidence that investments in infrastructure and player salaries, player value, international competition success, and stadium ownership are all key drivers of a football enterprise's value in the subsequent year. The model has indeed an adjusted R-squared value of 0.8723, indicating approximately 87% of the variation in V.IMP. can be explained by these variables.

6. Discussion

Understanding the complexity and dynamics behind the valuation of football clubs is crucial in the current context of professional football. This paper addresses this topic by providing a detailed empirical analysis of various factors influencing the value of businesses in the sector. The research specifically explores correlations between investments in infrastructure, player salaries, sporting results, player value, and corporate value. The adopted approach is a regression analysis based on a sample of 28 elite clubs from European leagues, providing an in-depth insight into the financial dynamics of professional football.

The study focuses on three main hypotheses: the first (HP1) concerns the effect of infrastructure investments on the value of football businesses, suggesting that an increase in these investments leads to an increase in the value of the enterprise. The second hypothesis (HP2) explores the correlation between player salaries and corporate value, indicating that higher salaries, attracting better talent, are associated with an increase in corporate value. The third hypothesis (HP3) examines the relationship between sporting results and corporate value. The fourth hypothesis (HP4) considers the relationship between the overall value of players and corporate value.

The document highlights that for each standard deviation increase in infrastructure investments (INF), an increase of approximately 186.72 million euros in the future enterprise value (V.IMP.) is expected, holding all other variables constant. This result emphasizes the importance of infrastructure investments, which may include facilities such as training grounds and stadiums, crucial for team performance and generating significant revenue streams.

The coefficient for player salaries (SALAR) is 544.06, indicating that for each standard deviation increase in salaries, an associated increase of about 544.06 million euros in enterprise value is predicted. This highlights the role of player salaries in determining the value of a football enterprise. Higher salaries can attract top talent, improve team performance, and increase enterprise value.

The analysis revealed that the value of players (VALUE) has a complex and nonlinear relationship with enterprise value. The results suggest that at lower levels of VALUE, increases are associated with substantial increases in V.IMP., while at higher levels, additional increases in VALUE enhance V.IMP. but at a decreasing rate.

The variable RIS.I., indicating whether the team won an international competition in year x, has a coefficient of 363.62, suggesting that winning an international competition can significantly increase the value of a football enterprise.

From a practical standpoint, these results have important implications for football club management. Clubs can use this information to formulate more informed investment strategies, focusing on aspects such as advanced infrastructure, talent management, and success in international competitions. The research also underscores that investing in competitive salaries is crucial to attract and retain top talent, a key factor for sporting success and enterprise value. In addition, teams can leverage these insights to optimize their marketing and branding decisions, capitalizing on sporting success and utilizing infrastructure to enhance fan experience and create new income sources. The results can influence governance and regulatory policies in football, promoting a better balance between financial investments, player welfare, and fan interests.

The implications of this research are broad and multidimensional, offering valuable insights for both academics and professionals in the field of football. They provide a solid foundation for further research and management strategies in the industry, highlighting the importance of a balanced and data-driven approach in evaluating football enterprises.

7. Conclusion

This research aimed to address the question of whether a company, particularly in the European football sector, can sustain annual losses consistently without incurring a confirmed financial and economic crisis. This rationale is based on a growing trend in the literature to consider a balanced approach reflecting the importance of managing both athletic and performance aspects and organizational and business aspects to ensure success both on and off the field of an elite sports organization.

Starting from the reflection by Hamil and Walters (2010) on persistent financial difficulties in many clubs, the goal was to delve into the financial dynamics using an empirical investigation conducted on 28 elite football clubs from the major European football leagues.

The work was primarily based on the analysis of data from various sources (information on corporate governance structures extracted from the AIDA database - Bureau van Dijk's database on Italian companies, from the official websites of football teams, as well as from the financial statements of companies). In particular, the Refinitiv database - one of the most comprehensive and well-regarded globally - was used for data and financial market infrastructure, including information on over 85,000 active and inactive companies in 125 markets, with time series available from the 1990s onwards. Only data from the most important European football companies were extracted from the dataset, covering the period from 2018 to 2023.

The results of the regression analysis revealed a significant and complex relationship between the various independent variables analyzed (INF, SALAR, VALUE, RIS.N., RIS.I) and the value of football enterprises. In particular, investments in infrastructure and player salaries emerged as particularly influential independent variables regarding corporate value, thus emerging as fundamental strategic factors for efficient business management.

Indeed, the analysis of the salary variable (SALAR) highlights the role of player salaries in determining the value of a football enterprise: higher salaries can attract the best talents, which can improve team performance and increase the value of the enterprise.

Regarding the infrastructure variable (INF), the analysis emphasizes the importance of infrastructure investments in increasing the value of a football enterprise: infrastructure can include facilities such as training grounds and stadiums, which are crucial for a team's performance and can generate significant revenue streams.

Furthermore, success in international competitions (RIS.N., RIS.I) and the overall value of the team (VALUE) were identified as additional drivers of enterprise value.

From a theoretical perspective, the study offers an innovative perspective that challenges traditional theories of corporate value, highlighting the importance of specific elements in the sports sector. The correlation between high player salaries and enterprise value supports the theory of efficiency wages in the sports context, suggesting that investing in higher wages can be an effective tool to improve club performance and attractiveness, while being careful not to exceed the threshold beyond which the positive correlation reverses.

The practical implications of this research provide important guidance for the management of football clubs. Formulating informed investment strategies on infrastructure, talent management, and success in international competitions can be crucial to ensure a balance between profitability and the development of a winning sports profile. Optimizing marketing and branding decisions, leveraging sporting success, and improving the fan experience through infrastructure emerge as keys to generating new sources of income.

Moreover, this research provides several points for reflection for both academics and professionals in the football sector. The work represents a solid foundation for future research and management strategies in the industry, highlighting the importance of a balanced and data-driven approach in evaluating football enterprises. Ultimately, understanding the complexity of financial dynamics in professional football is crucial for the long-term sustainability of businesses in the sector and, more broadly, for the community.

In conclusion, the importance of ongoing research in this field should be emphasized to identify and incorporate additional predictors that can enhance our understanding of the evaluation of football clubs. Indeed, this work aims to provide valuable insights into the determining variables of football club value and serves as a useful starting point for further investigations. Future studies could address these limitations by exploring specific non-linearities or incorporating additional control variables.

In summary, this study highlights the significance of certain strategic factors (SALAR, INF) in making the corporate management of a football club more efficient.

8. Limitations

The regression model under consideration in the present study provides a robust framework for understanding the factors that influence the future value (year x + 1) of a football enterprise. It incorporates both linear and quadratic terms for the value of the team's players (VALUE), as well as linear terms for the investment in infrastructure (INF), the salary paid to players

(SALAR), whether the team won an international competition (RIS.I.), and whether the team owns a stadium (STADIO) in year x.

The model demonstrates a robust explanatory power with an Adjusted R-squared of 0.8723, suggesting that it accounts for approximately 87.23% of the variation in the dependent variable, V.IMP. The F-statistic of 159.2 and its associated p-value, which is less than 2.2e-16, provide strong evidence against the null hypothesis that all regression coefficients are zero, indicating that the predictors included in the model have a statistically significant association with V.IMP.

However, like all models, it is an abstraction of reality and thus has certain limitations. These limitations, while important to acknowledge, do not detract from the model's utility but rather highlight areas for further investigation and refinement.

One such limitation pertains to the assumption of linearity between the dependent variable and the independent variables. While this assumption simplifies interpretation of the coefficients, it may not fully capture the complexity of the underlying relationships. For instance, the relationship between infrastructure investment (INF) and enterprise value may not be strictly linear; there may be diminishing returns to scale or threshold effects not captured in this model.

This presents an opportunity for future research to explore alternative model specifications that can better capture these complexities. Non-linear models or models incorporating interaction effects could provide a more nuanced understanding of these relationships.

The model also assumes that all relevant predictors have been included and correctly specified. While it controls for several key variables, there may be other factors influencing enterprise value that are not included in the model.

References

Ace Advisory (2023). *Football Benchmark. The European elite 2023*.

Andreff W. (2018). *Different types of manipulation in sport*. The Palgrave handbook on the economics of manipulation in sport, 13-35.

Baade R.A., Matheson V. A. (2011). *An evaluation of the economic impact of national football league mega-events*. In The Economics of the National Football League: The State of the Art (pp. 243-258). New York, NY: Springer New York.

Bauer H. H., Stokburger-Sauer N. E., Exler, S. (2008). Brand image and fan loyalty in professional team sport: A refined model and empirical assessment. *Journal of sport Management*, 22(2): 205-226. DOI: 10.1123/jsm.22.2.205

Blasi J., Kruse D., Weltmann D. (2013). *Firm survival and performance in privately*

held ESOP companies. In Sharing ownership, profits, and decision-making in the 21st century (pp. 109-124). Emerald Group Publishing Limited.
Brealey R.A., Cooper I.A., Habib M.A. (1996). Using project finance to fund infrastructure investments. *Journal of applied corporate finance*, 9(3): 25-39. DOI: 10.1111/j.1745-6622.1996.tb00296.x
Brealey R.A., Myers S.C., Allen F., Krishnan V.S. (2006). *Corporate finance* (Vol. 8). Boston McGraw-Hill/Irwin.
Bridgewater S. (2010). *Football management.* Basingstoke: Palgrave Macmillan.
Buse P.L., Ganea A.M., Cîrciumaru L.D. (2010). *Using linear regression in the analysis of financial-economic performances*. Annals of University of Craiova - Economic Sciences Series, 2(38).
Casali G.L., Perano M., Moretta Tartaglione A., Zolin R. (2018). How business idea fit affects sustainability and creates opportunities for value co-creation in nascent firms. *Sustainability*, 10(1): 189. DOI: 10.3390/su10010189
Carmichael F., Thomas D., Ward R. (2001). Production and efficiency in association football. *Journal of sports Economics*, 2(3): 228-243. DOI: 10.1177/152700250100200303
Crust L., Lawrence I. (2006). A review of leadership in sport: Implications for football management. *Athletic Insight: The Online Journal of Sport Psychology*, 8(4): 28-48.
Ertemel A.V., Civelek M.E., Eroğlu Pektaş G.Ö., Çemberci M. (2021). The role of customer experience in the effect of online flow state on customer loyalty. *PloS one*, 16(7), e0254685. DOI: 10.1371/journal.pone.0254685
Esposito De Falco S. (2023), *Corporate Governance. Teorie, attori e sistemi di controllo nelle imprese,* 3 Ed., Milano: McGraw-Hill.
Esposito De Falco S., Genco P. (2009), Il governo dell'impresa negli studi economico aziendali, in "Il governo dei sistemi complessi tra creazione e distruzione di valore. L'impresa e oltre l'impresa", *Sinergie* n. 79: 119-144. https://hdl.handle.net/11573/131720
Esposito De Falco S, Renzi A. (2015), The role of sunk cost and slack resources in innovation. A conceptual reading in an entrepreneurial perspective, in S. Esposito De Falco, A. Renzi (guest editor), *Special Issue of Entrepreneurship Research Journal*, July 2015, 5(3). DOI: 10.1515/erj-2015-0019
Giulianotti R. (1999). *Football: A sociology of the global game*, 160(5). Cambridge: Polity Press.
Jobson J.D. (1991) "Multiple Linear Regression", in J.D. Jobson (Ed.), *Applied Multivariate Data Analysis: Regression and Experimental Design*, Springer Ed., 219–398.
Késenne S. (2000). The impact of salary caps in professional team sports. *Scottish journal of political economy*, 47(4): 422-430. DOI: 10.1111/1467-9485.00171
Kieseppä I.A. (1997). Akaike information criterion, curve-fitting, and the philosophical problem of simplicity. *The British journal for the philosophy of science*, 48(1): 21-48. DOI: 10.1093/bjps/48.1.21
Kim E.H., Ouimet P. (2010). *Employee capitalism or corporate socialism? Broad-based employee stock ownership*. Broad-Based Employee Stock Ownership (March 6, 2008). AFA.

Kologlu Y., Birinci H., Kanalmaz S.I., Ozyilmaz B. (2018). *A multiple linear regression approach for estimating the market value of football players in forward position*. arXiv preprint arXiv:1807.01104. DOI: 10.48550/arXiv.1807.01104

Hamil S., Holt M., Michie J., Oughton C., Shailer L. (2004). The corporate governance of professional football clubs. *Corporate Governance: The international journal of business in society*, 4(2): 44-51. DOI: 10.1108/14720700410534967

McLeod J., Shilbury D., Ferkins L. (2021). Board roles in Scottish football: An integrative stewardship-resource dependency theory. *European Sport Management Quarterly*, 21(1): 39-57. DOI: 10.1080/16184742.2019.1699141

Memari Z., Rezaei Pandari A., Ehsani M., Mahmudi S. (2021). Business management in the football industry from a supply chain management perspective. *International Journal of Sports Marketing and Sponsorship*, 22(4): 737-763. DOI: 10.1108/IJSMS-02-2020-0025

Michie J., Oughton C. (2005). The corporate governance of professional football clubs in England. *Corporate governance: An international review*, 13(4), 517-531. DOI: 10.1111/j.1467-8683.2005.00446.x

Montambault Trudelle A. (2023). Towards a sociology of state investment funds? sovereign wealth funds and state-business relations in Saudi Arabia. *New Political Economy*, 28(3): 380-397. DOI: 10.1080/13563467.2022.2126448

Morris Morant R.A., Jacobs D.C. (2018). Frontiers of efficiency wages: unconventional wisdom? *Journal of Management History*, 24(3): 300-315. DOI: 10.1108/JMH-09-2017-0045

Mullin B.J., Hardy S., Sutton W. (2014). *Sport marketing 4th edition*. Human Kinetics.

Nicoliello M., Zampatti D. (2016). Football clubs' profitability after the Financial Fair Play regulation: evidence from Italy. *Sport, Business and Management: An International Journal*, 6(4): 460-475. DOI: 10.1108/SBM-07-2014-0037

Ouimet P., Simintzi E. (2018). *Wages and firm performance: Evidence from the 2008 financial crisis*. Available at SSRN.

Paramio-Salcines J.L., Babiak K., Walters G. (Eds.). (2013). *Routledge handbook of sport and corporate social responsibility*. London: Routledge.

Pawłowski J. (2020). Financial condition of football clubs in the Polish Ekstraklasa. *Journal of Physical Education and Sport*, 20(5): 2839-2844. DOI: 10.7752/jpes.2020.s5385

Pellicano M., Perano M., Casali L. (2016). The enterprise relational view (ERV): exploring future in strategic management. In *Governing Business Systems: Theories and Challenges for Systems Thinking in Practice-4th Business Systems Laboratory International Symposium Book of Abstracts* (pp. 228-233). Business Systems Laboratory.

Pinnuck M., Potter B. (2006). Impact of on-field football success on the off-field financial performance of AFL football clubs. *Accounting & Finance,* 46(3): 499-517. DOI: 10.1111/j.1467-629X.2006.00179.x

Quarato F., Rocco Cambrea D., Laviola F. (2023). CEO Succession and Shared Leadership: Which factors shape firm performance? *Corporate Governance and Research & Development Studies*, 1: 103–130. DOI: 10.3280/cgrds1-2023oa15766

Ratten V., Ratten H. (2011). International sport marketing: practical and future research implications. *Journal of Business & Industrial Marketing*, 26(8): 614-620. DOI: 10.1108/08858621111179886

Roberts P.W., Dowling G.R. (2002). Corporate reputation and sustained superior financial performance. *Strategic management journal*, 23(12): 1077-1093. DOI: 10.1002/smj.274

Rohde M., Breuer C. (2016). The financial impact of (foreign) private investors on team investments and profits in professional football: Empirical evidence from the premier league. *Applied Economics and Finance*, 3(2): 243-255. DOI: 10.11114/aef.v3i2.1366

Romero-Jara E., Solanellas F., Muñoz J., López-Carril S. (2023). Connecting with fans in the digital age: an exploratory and comparative analysis of social media management in top football clubs. *Humanities and Social Sciences Communications*, 10(1): 1-12. DOI: 10.1057/s41599-023-02357-8

Seznec J.F., Mosis S. (2018). *The Financial Markets of the Arab Gulf: Power, Politics and Money*. Routledge.

Siegfried J., Zimbalist A. (2000). The economics of sports facilities and their communities. *Journal of Economic Perspectives*, 14(3): 95-114. DOI: 10.1257/jep.14.3.95

Stretcher R., Henry S., Kavanaugh J.K. (2006). The ESOP performance puzzle in public companies. *The Journal of Employee Ownership Law and Finance*, 18(4). Available at SSRN: https://ssrn.com/abstract=1800366

Szymanski S. (2009). *Playbooks and checkbooks: An introduction to the economics of modern sports*. Princeton University Press.

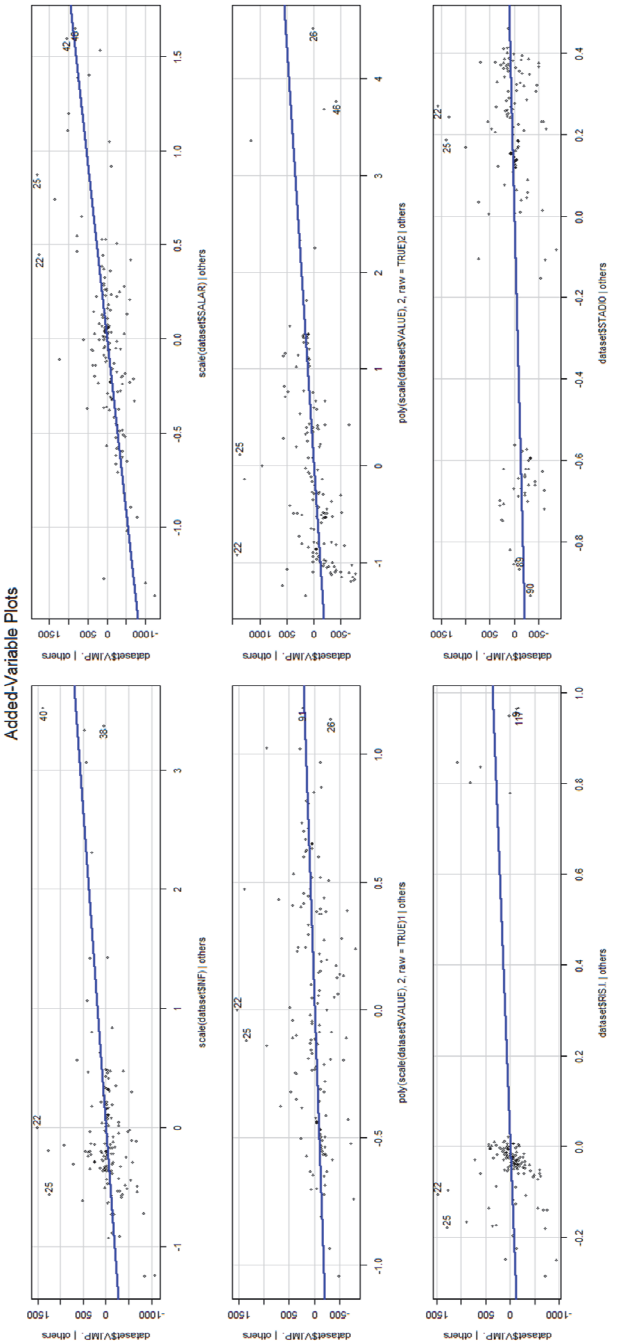
Szymanski S. (2014). Fair Is Foul: A Critical Analysis of UEFA Financial Fair Play. *International Journal of Sport Finance*, 9(3).

Taher A. (2023). Do corporate values have value? The impact of corporate values on financial performance. *Future Business Journal*, 9(1): 76. DOI: 10.1186/s43093-023-00254-9

Van Der Lugt, Zimmerman, Podshadley, Mac Farland, (2023). *How good human capital management creates competitive advantage*. S&P Global Sustainable.

Yiapanas G., Thrassou A., Vrontis D. (2023). The contemporary football industry: a value-based analysis of social, business structural and organizational stakeholders. *Accounting, Auditing & Accountability Journal.* ahead-of-print DOI: 10.1108/AAAJ-06-2022-5855

Appendices



Towards a global regulation of the football industry

Filomeno Rocco Fimmanò[*]

Received 23 May 2023 – Accepted 1 December 2023

Abstract

The author talks about the evolution of the football system from the perspectives of the markets, sport, and its centrality in a state's economy and internationally. The paper analyzes its exponential growth, which makes a financial change and improvement to respond to important competition costs and, in general, economic operations increase with the realization of a global regulatory harmonization. In fact, there is the implementation of a rules system that want to strengthen the transparency in these operations. Also, the author finds to examine the new regulation effective from 2023 and related sanctions. Another thematic here are multi-club ownerships (MCO), which are always more central and frequent; as the "sui generis" role of the sports agent and the development of the illegal practice of third-party ownership.

Keywords: Football, UEFA, clubs, MCO, agent.

Sommario

L'autore affronta in primo luogo l'evoluzione del sistema calcio dal punto di vista dei mercati, dello sport e della sua centralità nell'economia di uno Stato e a livello internazionale. Analizza la sua crescita esponenziale, la quale comporta un cambiamento ed un miglioramento finanziario per rispondere ad un incremento altrettanto forte dei costi di competizione e, più in generale, di operazioni economiche importanti, mediante la realizzazione di un'armonizzazione regolamentare globale. A tal proposito, vi è la realizzazione di un sistema di regole finalizzate a rafforzare la trasparenza di tali operazioni. Inoltre, si analizza la nuova normativa in vigore dal 2023 e le relative sanzioni. Un altro tema è quello delle pluriproprietà delle società di calcio professionistiche (MCO), un fenomeno sempre più centrale e frequente; così come quello, in conclusione, della figura "anomala" dell'agente sportivo e lo sviluppo dell'istituto illegale del third-party ownership.

Parole chiave: Calcio, UEFA, società, pluriproprietà, agente.

[*] Dottorando di ricerca presso l'Università del Salento. E-mail: filofimma@gmail.com

Corporate Governance and Research & Development Studies, n. 2-2023
(ISSN 2704-8462-ISSNe 2723-9098, Doi: 10.3280/cgrds2-2023oa16413)

1. Football between Sport, States and Markets

In the last 30 years, football has had a real "genetic mutation" starting from an activity of an ideal and playful nature, born as completely amateur and becoming a very important industrial sector, in the entertainment and show business segment. This profound "genetic mutation" has undermined not only the rules of international legal systems, which are unsuitable for the profound transformation, but also the models of governance, highlighting the inadequacy of the management of insiders that it has often produced in crisis situations, despite the adoption of models and codes of self-discipline that have proved to be completely useless. National and supranational institutions have not remained indifferent to a reality that is now objectively linked to public interests, especially in the sphere of external controls.

In the category of professional team sports, it is undoubtedly the one that attracts the greatest interests and determines the most relevant social and even geopolitical implications. Just think of China's stadium diplomacy or the Arab football of the superchampions, which has been chosen as the main tool in the process of affirming the new Saudi and pan-Arab identity. Uefa and Fifa, which are private associations of companies based in Switzerland and which pursue their own interests (*pecunia non olet*) and are supporting these processes of globalization, sponsoring the rise of Saudi Arabia and that of the United States, where the next World Cup will be held. And this is also because the Court of Justice will soon rule on the Super League affair and in particular on the compatibility of their monopoly on international competitions.

In any case, except for the areas of information technology, no sector of the economy has experienced growth rates comparable to those of football in recent years. Yet the situation of the clubs has worsened in terms of assets and finances as the appearance in the sector of large multinational groups has increased the costs of competing, but without investments capable of increasing revenues. In England, investments in sports and commercial facilities, atypical activities, merchandising, licensing, digital activities, have at least allowed the growth of turnover, which is no longer even comparable to those of other countries.

For a long time, the United Kingdom had favoured access to the listing of sports clubs, both on the London Exchange and on the Alternative Investment Market with the creation of a real sector of football club shares and the development of significant experience of analysts and investors in the valuation of clubs. For years, British companies have been planning to diversify their sources of revenue (ownership of stadiums, consequent advertising, collateral activities, shopping malls, merchandising) which reduced the risks

associated with revenues from "sports results". However, the Premier League also earns a lot but spends more and the debt of English teams is £ 4.1 billion, with two-thirds of clubs making structural losses.

In order to operate a "turnaround", a global regulatory harmonization of football is necessary, as on some issues a comparative normative elaboration of phenomenology is absolutely necessary. The picture outlined highlights the urgent need to separate first the amateur sport from the professional one and from that of football in particular, which suffers from critical issues due to contradictions and ambiguities already highlighted by the jurisprudence.

Companies have been forced to take on excessive debt in order to compete and in order to have an economic return in the short to medium term that will raise their financial capacity and achieve a surplus. Such a situation has produced a situation that is often worrying, especially when combined with the effects of the notorious Bosman judgment of the Court of Justice of the European Community, of 15 December 1995, which held that art. 48 of the EEC Treaty, which establishes the free movement of workers within the European Union, also with regard to sporting activities such as those of professional footballers.

The Court also affirmed that this rule precludes the application of rules issued by sports associations (national, supranational and international), according to which a professional footballer, a national of a Member State of the European Union, at the end of a contract binding him to a club, may be engaged by a club of another Member State upon payment, to the company of origin, an allowance by way of transfer, training and promotion.

2. Football economic and financial sustainability: An overview

To curb these problems, since 2004, a system of rules has been introduced for clubs participating in European competitions to obtain the so-called UEFA licenses. The UEFA Club Licensing System: overview of Implementation and Application across Europe was the first document on the functioning of the licensing system with the collection of the history since the first application of the legislation. UEFA introduced the system with the aim of defining a set of regulatory and administrative standards and creating a homogeneous regulatory framework. In order to participate in the Champions League, the Europa League and the Conference League, it is necessary to obtain a license, i.e. a certification that confirms compliance with all the minimum criteria, under penalty of exclusion from competitions. The affiliated Federation or League acts as the licensor and evaluates each request according to the five criteria of sport, infrastructure, personnel and administration, and profiles.

Each club must comply with the accounting principles of its own legislation and listed companies are required to prepare their financial statements with reference to IAS/IFRS international accounting standards. The main aim was to strengthen the transparency of the clubs' economic and financial operations in order to make the system more stable and the related market more attractive to investors.

In addition, UEFA's Executive Committee, as early as September 2009, issued the Financial Fair Play Concept, a set of rules in force since 2012 that had to be observed by teams participating in European competitions. The objectives were to incentivise clubs to operate on a self-managed basis on the basis of their revenues, introduce greater rationality into the accounts and protect the teams' creditors in the prospect of potential crises. After a suspension of the regime in the Covid era, on 7 April 2022 the UEFA Executive Committee in Nyon launched the new "UEFA Club Licensing and Financial Sustainability Regulations" which was approved on 28 June 2023 in the latest version (2023 Edition) and which replaces the UEFA Club Licensing Regulations and the Fair Play Concept.

Uefa's goal is solvency, stability and above all greater control of clubs' costs and the new parameters are an evolution "of the existing break-even requirements and will bring greater stability to the club's finances. To facilitate implementation, the calculation of football earnings becomes similar to the calculation of the draw result...». On the other hand, with regard to the part relating to the maximum allowed for each club's expenses, the biggest innovation is the introduction of a rule on 'team costs', in order to achieve 'better control in relation to players' salaries and transfer costs. The regulations limit spending on agents' salaries, transfers, and commissions to seventy percent of the club's revenue. Assessments will be carried out in a timely manner and violations will result in fines and predefined sporting measures".

Uefa's goal is solvency, stability and above all greater control of clubs' costs and the new parameters are an evolution "of the existing break-even requirements and will bring greater stability to the club's finances. To facilitate implementation, the calculation of football earnings becomes similar to the calculation of the draw result...". On the other hand, with regard to the part relating to the maximum allowed for each club's expenses, the biggest innovation is the introduction of a rule on 'team costs', in order to achieve 'better control in relation to players' salaries and transfer costs. The regulations limit spending on agents' salaries, transfers, and commissions to seventy percent of the club's revenue. Assessments will be carried out in a timely manner and violations will result in fines and predefined sporting measures".

The changes will be implemented gradually over three years, to allow all clubs to adapt and are structured in four macro-areas.

The 'solvency' (no overdue payables rule) i.e. the obligation to pay all debts to other clubs, employees, tax authorities, social authorities and UEFA within 90 days, subject to four checks per year. The rule is intended to ensure greater solvency and protect the integrity of competitions. Checks are carried out every quarter, with less tolerance for defaulters.

The 'stability' (football earnings rule), i.e. the setting of a maximum deficit (acceptable deviation) of €60 million over three years and for clubs with accounts in the order of €90 million (€10 million for each reference period in the monitoring period), while considering expenditure, including those for young people and facilities previously excluded.

The "squad cost rule" aimed at establishing that no more than ninety percent of turnover can be spent on salaries, market and commissions for agents for the next season, eighty percent for the next and seventy percent when fully operational from the 2025-2026 season. The rule is contained in art. 92 entitled "Calculation of squad cost ratio" which deals with the calculation and in art. 93 entitled "Squad cost rule" which deals with setting the limit.

The system of "fixed sanctions" at the end of the checks, i.e. the provision of predetermined sanctions in relation to violations that leave no margin of discretion, including progressive fines in relation to both violations and recidivism, sporting sanctions (prohibition of fielding players, exclusions from tournaments, relegation from one cup to another) and economic sanctions.

The system of financial sustainability is applied through a process called 'club monitoring' and applies to teams participating in UEFA competitions. More than 230 clubs (UCL, UEL, UECL) are observed throughout the season by the UEFA Club Financial Control Body (CFCB), which is a financial control body that can impose disciplinary measures in the event of non-compliance with the Regulations.

The final decisions of the CFCB can only be appealed to the Court of Arbitration for Sport (CAS) in Lausanne. It is a supervisory body with judicial functions that has the power to determine whether licensors (national federations or the affiliated league) and applicants/licensees (clubs) have met the criteria for licensing or financial sustainability requirements and to decide on a club's suitability for competitions. The Control Body is composed of a First Chamber (of first instance) and an Appellate Section, with two different and independent presidents. The First Chamber, in the event that defendants violate the obligations set out in the Club Licensing and Financial Sustainability Regulations, may enter into settlement agreements or impose disciplinary measures exhaustively defined within the procedural rules governing the CFCB.

The Appeals Chamber of the Club Financial Control Body hears appeals against decisions of the First Chamber of the CFCB.

Disciplinary measures include, but are not limited to: warning; formal appeal; fines, deductions of points, freezing of revenue from UEFA competitions; a ban on signing up new players; limiting the number of players that a club can register for European competitions, including a financial cap on the total total cost of players registered in List A per club; disqualification from current competitions and/or exclusion from future competitions; the revocation of a title or award.

The penalties for non-compliance with the "No overdue payables rule" have been strengthened, while in the event of a breach of the 'Football earnings rule' there will be the possibility of concluding settlement agreements. These are the so-called "Settlement Agreements" which, together with the "Voluntary Agreements", are part of the peculiar sanctioning procedure already provided for by the previous system.

From July 2023, some significant changes have also been provided in addition to the UEFA regulations on depreciation and capital gains, after the well-known events, especially in Italy, on fictitious capital gains with "so-called mirror cross-transactions". It concerns operations between clubs based on agreements aimed at the exchange of players (often young talents from the youth academy), overestimating them in order to achieve fictitious capital gains without (or with minimal) financial transactions. These operations, beyond disciplinary and fiscal implications, contaminate the financial statements that should provide a truthful representation of the asset, financial, and income situation, resulting in 'short-term' improvements in the accounting situation but subsequently requiring the need to face higher burdens, in terms of depreciation.

The amortization of the player's contract will be limited to five years in order to ensure equal treatment of all clubs and improve financial sustainability. In the event of an extension of the contract, on the other hand, it can be spread over the duration of the relationship, but up to a maximum of five years from the date of the extension.

However, clubs authorized by their national governing bodies to enter contracts for a period of more than five years may continue to do so. The rules do not apply retroactively to transfers that have already taken place. In the case of a player exchange, the new rule specifies that it is up to the clubs to assess whether a transfer transaction qualifies as an 'exchange', in which case it will have to be accounted for in line with international accounting standards. Therefore, in transactions involving the acquisition and sale of players' multi-year rights with the same counterparty, for which there is no corroborating quantitative evidence, supported by valuation techniques,

demonstrating that the fair value can be reliably determined, the multi-year rights of the acquired players must be valued at the book value of the rights to the sports performances of the transferred players.

3. Multinational and multi-ownership groups: A pillar challenge in football

Another global issue is the phenomenon of multi-ownership groups of several professional football clubs, even when it comes to shareholdings held in different countries and in different competitions at international level, as it can also lead to the creation of "dominant positions", such as to disturb the free market, in violation of national and EU law.

We will define below the case more properly "multi-timeshare", as the term used in practice, derived from the experience of other countries, is "multi-club ownerships", or more simply MCOs that as an "occasional" phenomenon arise very far in time. Around the mid-1960s, a group of companies operating in Sardinia – the most important of which was the S.A.RA.S. oil refinery owned by Angelo Moratti, owner and president of Inter F.C. – decided to invest in Cagliari Calcio, which won the Scudetto in 1970. In more recent times, the Pozzo family, historic owners of Udinese Calcio, acquired the entire shareholding of Granada Club de Fútbol in Spain and then Watford F.C. in England. After selling the Spanish club in 2016 to the Chinese holding company Desports Group (which also owned Chongqing Lifan, and which would acquire Parma a year later), he fell back on Watford. Thanks to earnings from the English league, the Hornets have surpassed Udinese's turnover.

In fact, the first episode of MCO proper was that of the English National Investments Company, better known as ENIC, the company of the British Joe Lewis that between 1995 and 1997 bought AEK Athens, Slavia Prague S.K. and L.R. Vicenza, constituting an authentic multinational football company. Faced with the rules of the national federations that forbade owning different teams in the same country, the solution was to buy new clubs abroad. ENIC then sold all three clubs, and today owns only one, a new one, Tottenham Hotspur F.C.

Another famous case, in the mid-2000s, involved the Russian energy giant Gazprom, which controlled Zenit St. Petersburg and also became the main sponsor of the Germans Schalke 04. Then he expanded his sphere of influence over the entire Uefa system until the Russian-Ukrainian conflict.

The real revolution was made in the 2000s by Red Bull, which after buying two Formula 1 teams, replicated the model in football, buying the New

York Metrostars (now known as New York Red Bull) in 2006 and adding it to the Football club Salzburg, taken the previous year. Within three years, the Austrian company also took control of a club in Brazil, now called Red Bull Brasil, and one in Germany, RB Leipzig. The example of Red Bull represented a real change of perspective of the phenomenon, given that Austria and especially Germany had very stringent rules that strongly limited the presence of sole owners in football clubs, to favour fan and supporters' associations: having shown that it could circumvent them, Dietrich Mateschitz's company paved the way for new investors of this type. The Red Bull model is, from a business perspective, the most innovative and functional, not only aimed at advertising the brand but at creating a pyramid in growth. Those who excel in various steps move on to Leipzig, the flagship team of the group, and from there are transferred to other clubs with significant capital gains. Throughout these transitions, Red Bull has invested little, controlling the player from a young age. High player contract prices and exorbitant agent fees have been eliminated.

In this vein, the most striking case has become that of the CFG (City football group) of the Abu Dhabi United Group, an investment company headed by Sheikh Mansour bin Zayed Al Nahyan, a holding company that has controlling stakes in at least ten clubs around the world in as many countries on four continents. In addition to holding Manchester City F.C. in England and Melbourne Heart F.C. in Australia, he is also a shareholder of the Japanese company Yokohama Marinos and co-owner of New York F.C. and a few days ago of Palermo F.C., newly promoted to Serie B.

A similar position is being acquired by the US fund RedBird, which recently acquired the majority shareholding of A.C. Milan from its counterpart and compatriot fund Elliott Management Corporation, which remained a minority shareholder as collateral for the loan that the latter made to RedBird for the same purchase. The Elliott fund owns a minority stake in Liverpool and a majority stake in Toulouse F.C., which achieved promotion to Ligue 1. The same fund has a significant shareholding position in Lille Olympique Sporting Club, French champions in 2021, thanks to which it de facto controls the club and which allowed it, a year ago, to force the sale of the majority shares of Gérard López – who also owned Boavista and Royal Excel Mouscron, and who would then buy the Football Club des Girondins de Bordeaux – to the Merlyn Advisors fund.

There are cases now everywhere, even in Spain, where Atletico Madrid has just acquired 35 percent of Racing Club de Lens, a French team playing in Ligue 2 after acquiring Atlético de San Luis in Mexico. Thus, Ajax is the majority shareholder of Ajax Cape Town in South Africa and Monaco is the owner of Cercle Brugge. The Duchâtelet group has acquired control of four

companies in Europe: Charlton in England, Carl Zeiss Jena in Germany, Alcorcón in Spain and Újpest in Hungary. The same goes for Vincent Tan's Malaysian group, which owns Cardiff City in the Premier League, Fudbalski klub Sarajevo in Bosnia, Kortrijk in Belgium and shares in Los Angeles FC in the USA. Among the multi-owners there is also King Power, which owns Leicester City, the Belgian club Oud-Heverlee Leuven. Canadian entrepreneur Joey Saputo, after founding Impact de Montréal in 1992, bought Bologna F.C. 1909.

These are not always success stories. Between the end of 2021 and the beginning of 2022, the "777 Partners" fund bought four football clubs in Europe and South America, with the result that Standard Liege finished fourteenth in the standings (worst result ever), Genoa C.F.C. was relegated to Serie B after fifteen seasons in Serie A, and currently Vasco da Gama is in the middle of the table in the Brazilian second division. Or there is the case of Chien Lee's NewCity Capital fund, which owns Barnsley, Nancy, Thun, Oostende, Esbjerg, Den Bosch and Kaiserslautern: seven teams put together in five years, with which it has collected four relegations.

The reasons for investments are diverse: for Red Bull, for example, it is primarily to enhance the brand of beverages produced worldwide; for Arabs, it's to invest petrodollars; for others, it's about diversifying revenue, mitigating risks, and maximizing the economic boom of modern football. Owning a football team means entering into relationships with the economy of the respective country, establishing commercial ties that go well beyond the realm of sports. It's no coincidence that in the major capitals of Western finance, clubs are mostly in foreign hands and linked to MCO (Media Company): Suning's Inter (which until 2021 also owned Jiangsu), the aforementioned A.C. Milan by RedBird, New York Red Bull, New York City FC, Rocco Commisso's New York Cosmos (who also owns Fiorentina), Paris Saint-Germain of the Qatari royal family (which, through the Aspire Academy, manages various minor teams in Austria, Spain, and Belgium), Red Star FC of the "777 Partners" fund (which also controls Genoa C.F.C., Standard Liege, and Vasco da Gama), not to mention the numerous London teams.

The reasons for the investments are varied: for Redbull, for example, it is first and foremost to strengthen the brand of beverages produced in the world, for the Arabs to invest petrodollars, for others it is to diversify revenues, amortize risks, make the most of the economic boom of modern football. Owning a football team means entering into a relationship with the economy of the respective country, weaving business relationships that go far beyond sport. It is no coincidence that in the great capitals of Western finance, the clubs are all, or almost all, in foreign hands and linked to MCO: Suning's Inter Milan (which owned Jiangsu until 2021), RedBird's

aforementioned A.C. Milan, New York Red Bull, New York City FC, Rocco Commisso's New York Cosmos (which also owns Fiorentina), Paris Saint-Germain of the Qatari royal family (which, through the Aspire Academy, manages various minor teams in Austria, Spain and Belgium), Red Star FC of the "777 Partners" fund (which also controls Genoa C.F.C., Standard Liege and Vasco da Gama), not to mention the numerous London teams.

The only thing that these realities have in common is the fact that they are football clubs that share the same owner as others, and that are experiencing very rapid growth, so much so that it is now not difficult to provide a list of all the existing ones without having to update it after a short time, also due to plots and factual situations. In 2017, when UEFA first began to feel the need to register timeshares, 26 European clubs belonging to MCO had been identified. Four years later, there were at least 56, and globally World Soccer magazine counted 117, divided into 45 groups and covering 37 countries.

It is clear that the numbers are impressive, especially in Europe where there is the richest and most developed market and in particular in the United Kingdom, which is structured on several leagues (England, Scotland, Northern Ireland and Wales with four separate federations and competitions). It is epiphanic, however, that in second place there are two "minor" nations such as Belgium and Denmark, where it is easy to buy clubs at reduced prices, without debt problems. Two realities that are experiencing a great phase of development of young talents, which can then be resold abroad in projects based on player trading, especially if accompanied by the contemporary ownership of teams playing in one of the five main UEFA leagues. It is also a strategy aimed at downsizing the role of prosecutors by arriving first on young talents, moving them from one country to another, controlling their career progression until they are mature to become assets capable of generating capital gains.

The next target country will be Brazil, where Red Bull and the 777 Partners fund have already invested. American billionaire John Textor – who already owns half of Crystal Palace and a majority stake in RWD Molenbeek – has acquired Botafogo de Futebol e Regatas and Clube de Regatas do Flamengo. In fact, the first group to carry out this type of operation was Tanzi's Parmalat at the beginning of the 90s, which after sponsoring – as a function of the expansion of the multinational company in South America – C.A. Boca Juniors, C.A. Penarol and S.E. Palmeiras, acquired the shareholding control of the latter Brazilian club, starting a decade of success with synergistic relationships with the *Parma Calcio*.

It is also a strategy aimed at downsizing the role of prosecutors by arriving first on young talents, moving them from one country to another, controlling their career progression until they are mature to become assets capable of generating capital gains.

The fact is that in 2022, MCO clubs won three of UEFA's top five leagues, and only resistance from countries such as Germany and Spain allows the comparison to be kept in balance. This is the real problem: progressively the power of football is going to converge in the hands of an increasingly small number of subjects, creating a sort of de facto Super League.

The great success of the practice of "multi-club ownerships" (MCO), unfortunately, lies in the way in which the rules are circumvented or waived by national and international institutions.

In September 2018, Salzburg and RB Leipzig were drawn in the same Europa League group and faced each other twice, without UEFA doing anything to prevent it.

MCOs have managed to make themselves unavoidable, proving to be the most effective way to attract investors capable of giving economic stability to clubs. Faced with this undoubted advantage, which theoretically minimizes the risk of bankruptcy and favors greater circulation of money, the football government has chosen to turn a blind eye at the cost of circumventing its own rules on fair sporting competition. Which is the same reason why clubs like PSG and Manchester City have violated Financial Fair Play several times without suffering any real sanctions.

Yet, art. Article 18(2) of the FIFA Statutes unequivocally states: "Each affiliate is responsible for ensuring that its affiliated clubs are able to make all decisions regarding membership autonomously and independently of any external body. This obligation applies regardless of the corporate structure of the subsidiary. In any case, the affiliate shall ensure that no person or entity (including parent and subsidiary companies) exercises control over more than one club where the integrity of a match or competition may be compromised".

The criticalities caused by timeshare are obvious, especially when it comes to contemporary shareholdings in the same country, and even more clear when it comes to the same competition. Apart from conflicts of interest in the performance of sporting activities and the violation of competition rules, there are also "anomalous" advantages in different cases, i.e. when the timeshare concerns clubs operating in different countries, as demonstrated by the circumvention of UEFA's financial sustainability rules.

In particular, in order to circumvent the rules on cost containment, a club transfers one or more players to another club in the same group, valuing them in the balance sheet according to conventional valuations, which do not correspond to the real ones, so as to be able to configure (fictitious) capital gains and losses modulated according to the rules of that country and the needs of the individual club concerned.

In this way, the parent company, if it finds itself in a state of loss, or in

any case with costs greater than profits, will still be able to reduce any loss if not, even, result in profit, in order to be able to circumvent the penalties provided for in the event of high costs (in the face of lost revenues), and therefore be able to register for the next championship. The case history is varied and articulated and often even contemplates the use of players from the youth sector or from minor leagues around the world who are improperly valued and sometimes loaned back to the same selling clubs.

4. International institutions searching for a solution

It is key to look at the international picture on multiple football club ownership and conflict of interest.

First of all, FIFA in Article 18(2) of the Federal Statute lays down, on a very general level, the obligation for world member associations to ensure "that no natural or legal person (including parent and subsidiary companies) exercises control over more than one club where the integrity of a match or competition may be compromised".

UEFA deals with the issue of the multi-ownership of football clubs in the European logic and context in a more specific way. The recent regulations in force since the 2000/2001 sports season arise from a case, which we have talked about and which concerned the ENIC group in the acquisition of a minority shareholding in AEK Athens FC and a majority in Slavia Prague FC, sports clubs that qualified, in the 1999/2000 season, for the same European competition, the Europa League.

On the basis of the decision of the CAS (The Court of Arbitration for Sport), UEFA has ruled that a natural or legal person is in a position of conflict of interest when, having owned an absolute majority of the shares of a club, he acquires the absolute majority of the shares of another club taking part in the same UEFA competition or has "the right to appoint or remove the officers of the said club".

The legislation was very mild and less rigid in the evaluation of positions of interest, requiring the acquisition of a high "formal" shareholding and excluding, at least so it appeared, forms of indirect participation. As a result of the obvious criticisms, UEFA has introduced an additional and flexible parameter, namely that of the exercise of "decisive influence" within the club, which is equated, in essence, to a majority shareholding, applicable according to the criterion of the specific case, which prevents the acquisition of further positions of interest.

The issue is regulated by Article 5 of the "Regulations of the UEFA Champions League", which talks about "Integrity of the competition/multi-

club ownership". Such a situation has already occurred in the past, with Leipzig and Salzburg, companies controlled by Red Bull at the time, participating in UEFA club competitions. An in-depth investigation by UEFA, however, had led to a positive verdict: the green light for the two clubs to participate in the Champions League.

Surely, according to UEFA, Red Bull's influence on Salzburg had been significantly reduced: some people linked to Red Bull (who were also involved with Leipzig at the same time) had been removed from the board, as well as the chairman of the board, linked to Red Bull, had resigned. In addition, the sponsorship agreement between Salzburg and Red Bull had been modified (with reduced spaces and figures), as well as the collaboration agreement between the two clubs and the various existing loans. In essence, according to the Investigative Chamber of the UEFA Club Financial Control Body, the relationship between Red Bull and Salzburg, following the changes, had become a standard sponsorship relationship, thus establishing that Article 5 (concerning the integrity of competitions) had not been violated and admitting both teams to the same competition.

5. The abuse of position by sports agents. The Practice of Third Party Ownership

The worldwide explosion of football has been accompanied, as mentioned, by the formidable growth of economic interests related to what is now the world's most important entertainment industry. And in this complex phenomenal jumble made up of entertainment, sport, finance, communication, advertising and marketing, the figure of the sports agent has emerged, half attorney and half mediator who has progressively acquired a barycentric and in some ways anomalous role, as it is much more relevant and composite than what it should be.

The professionalization of the athlete has made it necessary for someone on the sidelines to take care of his legal, administrative and contractual interests, but he has gradually cannibalized the various operational areas of the sector, going beyond the ancient role and becoming more and more often a mediator, brasseur d'affaires and trait d'union between the parties, paid directly by the clubs on behalf of all the parties involved, as it is able to condition the choices of athletes.

The original function of "attorney", i.e. professional (similar in some ways to a lawyer) to which the player relied for the management of his typically partisan activities and interests, has in fact overlapped over time that of intermediary between the selling club, the player and the acquiring club with

a clear distortion of roles. A professional figure who should act in the interests of everyone, even the opposing parties, and who therefore in the end only serves his own business interests. In fact, the same agent often ends up taking care of the position of the players but also of the clubs, receiving commissions from both (and sometimes even from third parties) and thus giving rise to double or triple representations and mediations with consequent and obvious conflicts of interest. A sort of "de facto dominant position" that not even the so-called multi-owner groups have been able to stem.

On the other hand, if we compare the turnover of the "football market" at a global level with the amounts invoiced for various reasons by agents and with the balance sheets of most clubs, the volume of commissions received by the sector is objectively disproportionate to the point of becoming paradoxical. The FIFA indeed published on January 26, 2023, the 2022 edition of the Global Transfer Report, stating that in the year, there was an absolute record of 71,002 cross-border transfers, of which 21,764 involved professionals (to which 49,238 amateurs are to be added), marking an 11.6% increase compared to the previous year. The total expenditure reached 6.5 billion dollars, a 33.5% increase from 2021, but still below the historical peak of 2019.

These transfers involved 4,770 clubs from 182 federations, compared to the 4,538 clubs in 2021. Of the 2,843 transfers that included commissions, the first 100 accounted for half of all commissions. For the first time, the expenditure for this item exceeded the $2 billion threshold, reaching the record level of almost $2.2 billion.

And clearly this is reflected in a more or less specular way in all national markets, also due to the new and decisive item of commissions for players hired on a free transfer, yet another practice that is anything but virtuous that has spread in recent years and which produces extra-profits to the agent to determine the choice of the athlete.

This implies that the zero parameter is such for the club that the player leaves, but not for the new club that pays a series of anomalous bonuses and commissions, with the effect of producing yet another sectoral criticality, distorting the very purposes of the aforementioned Bosman judgment. Paradoxically, the increase in fees is directly proportional to the debt ratio of companies. This is not to mention the role of the same in the increasingly sensational cases of abuse of player trading.

The degeneration, in truth, reached its peak a few years ago with the gradual emergence, in the sector, of the practice of Third Party Ownership (so-called Third Party Ownership). TPO) originated mainly in South American and Eastern European countries. These commercial operations, which often saw direct or indirect involvement of attorneys, consisted (although in reality

they still exist under the radar) in the acquisition of a percentage of the future valuation of a player's contract. From a legal point of view, this is a phenomenon that is difficult to define. The subject matter of the transaction is not tangible property or even the right to the player's sporting performances, since the latter remain the exclusive property of the club. What is then purchased by third parties is the economic right attributable to a future revaluation of the player. The definition of Third Party Ownership appears to be misleading; in fact, it would be more appropriate to speak of Third Party Investment (thus, of investment and not ownership). It is, therefore, a real "bet," given that the player may not prove his value. Investment TPOs (or also called Recruiting TPOs) and Financial TPOs can be distinguished. Investment TPOs involve economic support – from an external investor – to a football club to conclude the acquisition of the right to the sporting performances of a player. Financial TPOs, on the other hand, consist of an economic intervention – again by external investors – to support the club's finances, through the acquisition of credit rights on future proceeds from the transfer of a player.

FIFA had left it to the individual national federations to regulate the phenomenon of TPO, thus creating a regulatory disorder whereby in some countries what was forbidden in others was allowed. The international federation limited itself to providing – in art. 18 bis of the Regulations on the Status and Transfers of Players – that "no club may enter into contracts that allow any other party or third party to interfere with employment or transfer relationships, with political choices, or with the activity of its own team". However, following a series of sensational events, on 22 December 2014 the FIFA Executive Committee finally issued Circular No. 1464 banning TPO operations as of 1 May 2015. This intervention was aimed at protecting the safety of young players (who were often the most involved) and preventing obvious conflicts of interest.

Hence, art. 18b in the FIFA Regulations has been introduced and claims: 'No club or player shall enter into an agreement with a third party whereby a third party is being entitled to participate, either in full or in part, in compensation payable in relation to the future transfer of a player from on club to another, or is being assigned any rights in relation to a future transfer or transfer compensation'. In essence, therefore, any type of agreement entered into by a club or a player with an external company which provides for assigning to third parties, rights or participation in the remuneration to be paid for the future transfer of a player, is now prohibited.

In 2016, the Court of Arbitration for Sport recognized the full compatibility of the prohibition provided for by art. 18b with the Community competition rules. Finally, as of June 2019, the FIFA disciplinary committee

clarified that players should not be considered as a "third party agent" and are entitled to hold a percentage of their card, and therefore to derive any gain from the value of their transfer.

Despite this, the Centre for International Sport Studies (CIES), in an analysis commissioned by UEFA, highlighted that at the heart of the control exercised by super-agents there are still TPOs which, although made illegal by FIFA, "are still a well-established reality and allow the most influential agents substantial control over the careers of players and greater decision-making power than that exercised by clubs".

6. FIFA regulations and the prospect of a global regulation of the phenomenon

The matter of agents must be regulated globally, as transactions are now increasingly international. The differences between the different national regulations have created enormous asymmetries in the labour market, favouring by far those countries that apply substantial deregulation to the detriment of the professionalism and ethics of aspiring agents and in fact encourage predatory behaviour.

On the basis of this unavoidable need, the Council of the Fédération Internationale de Football Association, held in Doha on 16 December 2022, finally approved the new Football Agent Regulations (FFAR) in force from 9 January 2023 for the general provisions concerning the issuance of the licence necessary to provide agent services (Articles 1 to 10 and 22 to 27) and from 1 October 2023 with regard to all other rules, These include the obligation to practise the profession exclusively by official FIFA licence holders (after passing an exam), the introduction of a cap on fees and limits on multiple representation to avoid conflicts of interest.

This is aimed at strengthening contractual stability, improving the training of young players, protecting minors, limiting situations of conflict of interest, protecting the integrity of the transfer system, safeguarding the integrity of competitions, protecting the market, setting adequate professional and ethical standards for agents and ensuring maximum transparency (financial).

The scope covers all representation agreements with an international dimension, related to the transfer of the worker from one federation to another or to an international transaction between clubs belonging to different Federations. Where, on the other hand, there is no international dimension, the internal regulations dictated by the national Federations will apply, which by 30 September 2023 will have to adopt regulations in accordance with the FFAR.

In particular, the Federations – as provided for by article 3 – without their own Regulations, they will be required to draw it up incorporating the provisions of art. 11 and 21 of the Regulation and to provide for references to any mandatory element of national law and to confer competence on an internal body for the settlement of any disputes and the adoption of disciplinary measures. FIFA, in Article 24 entitled 'Recognition of national law licensing system' is, in essence, without prejudice to national licensing systems, provided that eligibility conditions are met and that a qualifying examination has been passed.

Article 4 of the Regulation provides that in order to become an agent (a term that is reintroduced in place of an intermediary) a natural person must submit an application through the electronic platform set up by the International Federation. By applying, the interested party also undertakes to comply with the FIFA Regulations, the Statute, the Code of Ethics and the so-called RSTP (Regulations on the Status and Transfer of Players).

In addition, the candidate must meet the requirements at the time of application and maintain them following the issuance of the license. Finally, except in cases of exemption, it is necessary to pass the qualifying exam at the National Sectoral Federation. An obligation of continuing professional training, which is necessary for the maintenance of the licence, is also introduced.

FIFA has in fact followed the Italian legislation, providing training courses to combat the phenomenon of the so-called football trafficking. In a mirrored way, the agent is allowed to request a temporary suspension of his license which does not expire and is in no way transferable.

Paragraph 3 of Article 11 provides for the possibility of practising the profession of agent in the form of a company. However – with an even more stringent provision than the Italian one – the employees of the club who have not obtained the agent's license cannot carry out any service related to the profession of agent of players.

Article 12 – entitled "Representation" – regulates the content of the representation agreement, also in terms of minimum requirements, which must be filed on the platform to be valid and take effect within 14 days. Paragraph 8 prohibits, on the Italian model, double representation, except in the case where there is express written consent of the parties involved (club and player/coach). Any clauses in the agreement that penalise or limit the ability of a player/coach to negotiate and conclude an employment contract independently without the involvement of an agent are null and void.

Representation contracts between football agent and player/coach will be valid for a maximum period of two years and may not contain automatic renewal clauses; On the other hand, for agreements between agent and

company (transferor or buyer) there is no maximum duration and more than one representation agreement may also be signed with the same clubs, provided that they refer to different transactions.

In the case of underage players, the agent – provided that he has attended the appropriate FIFA course for the representation of minors – may enter into an agreement no earlier than 6 months after reaching the age at which the minor can sign his first professional contract, in accordance with the provisions of the applicable law in the country in which the young person will be employed. In any case, the negotiation must have the written consent of the minor's guardian who must sign the contract with him.

We now come to one of the most articulated and critical aspects of the new Regulation concerning the remuneration of agents. First of all, paragraph 2 of art. 14, that the payment of the agent's fee must be made exclusively by the customer; The latter will not be able to authorise a third party to make the payment. Another rule, perhaps the most feared (and which will be the most fought) is the imposition of a well-defined ceiling on the commissions received complete with anti-avoidance provisions. In fact, there is a maximum limit to the fees that a qualified person can receive in the performance of Football Agent Services, understood as activities aimed at the transfer of sports services to another club or the conclusion, renewal or termination of a contract, depending on whether the same individual acts in the transaction on behalf of the player/coach (Individual) and/or the acquiring club (Engaging Entity), i.e. the selling club (Releasing Entity). In fact, if the representation is in favour of the player/coach or the acquiring club, the commission paid to the agent may not exceed a certain percentage of the gross annual remuneration (including signing bonuses and any other consideration due to the fulfilment of contractually pre-established conditions, such as variable remuneration linked to the player's performance) agreed in the employment contract, five percent up to $200,000 and three percent on the portion exceeding that limit.

In the case of a joint assignment (i.e., activity provided for the benefit of the player/coach and the acquiring club), the maximum recognizable fee will take into account both of the aforementioned limits, increasing to ten percent for the portion of gross annual remuneration within $200,000 and six percent for the excess part. The payment of fees must be made after the closing of the transfer window, divided into quarterly instalments for the duration of the contract signed by the player with the new club. In addition, the right to commission will only accrue if the club provides for the payment of salaries; otherwise, nothing will be due to the agent (in proportion to the unpaid salary).

If, on the other hand, the activity is lent to the selling club, the upper limit

for the commission to the agent is equal to ten percent of the transfer value (Transfer compensation), net of percentages on the future resale in favour of the transferor company. As far as the payment terms are concerned, these will follow the collection of the consideration due to the customer (transferring club). Therefore, in the case of payment in instalments, the agent's commission must also be made within the same terms.

Article 15.2 provides that the maximum amount of the agent's commission must be identified by excluding variable fees, including any sell-on fee, from the calculation basis. Given the widespread practice of subjecting significant portions of the considerations, especially in relation to transfer transactions, to future circumstances, even if they are easily verified, this provision must be carefully interpreted because the wording of the provision seems to open up the possibility of derogating from it.

Moreover, if the player/coach moves to another club before the natural end of the employment contract (or terminates it without just cause), the agent's fees not yet accrued will no longer be due. The rule is intended to discourage the practice of agents to promote the transfer of their clients in order to receive additional commissions, but risks having the harmful effect of encouraging clubs to transfer players who carry "hefty" agency fees, with the aim of getting rid of them retroactively. In addition, in the case of representation of a player, if the contract negotiated has a duration of more than one term of office, the remuneration accruing to the agent is due even after the end of the mandate, provided that the contract is still in force, but only where this is expressly provided.

All payments must be made through the FIFA Clearing House, which is a real financial clearing house, a sort of transfer bank through which both the sums of the transfers and the commissions to be turned over to intermediaries must be paid, ensuring maximum transparency also with respect to criminal cases and tax evasion. Also because the payment of the fee must be made only by the person who has signed the mandate of representation with the agent.

Regarding possible disputes, jurisdiction over representation agreements with an international dimension and international transfers – without prejudice to the right of a players' agent and a client to bring an action in ordinary court – is entrusted to the Agents Chamber attached to the Fifa Football Tribunal.

The new Regulations, which revolutionise the sector and finally put their hand to a normalisation of the hysteria, have been welcomed by a large part of the clubs, while it has been criticised by the European Football Agents Association and the international association The Football Forum, which complain about the excessive and discriminatory restrictions and, on the other hand, state that the caps would affect small agents more and not the most influential ones, to which the work of moralization would be directed.

Several legal actions have already been proposed, including a precautionary one against FIFA and KNVB (Dutch Federation) aimed at suspending the first examination session of the new course, rejected by the Utrecht Court on May 10, 2023 and then by the Central Court of the Netherlands. Another, filed by two members of the DFVV (the German equivalent of the Asso Agenti), was upheld on 24 May 2023 by the Dortmund District Court, which issued an injunction against the regulation, which consequently cannot be enforced at least for the time being in Germany, given that it is a provisional restraining order. The same happened for Spain based on the ruling of the Commercial Court number 3 of Madrid on 6 November.

On 24 July 2023, the Court of Arbitration for Sport (CAS) in Lausanne had ruled rejecting all claims of the Professional Football Agents Association and clarifying that FIFA enjoys a "technical" and "democratic" legitimacy to regulate sports agent services, not only on the basis of EU case law but also in view of the importance of harmonising the regulations of a global sport such as football.

Finally, the District Court of Mainz preferred, in the context of a similar case, to refer a question to the Court of Justice of the European Union for a preliminary ruling, proposing 12 different questions, on which it will rule in the coming months.

It remains to be seen how the individual Federations will adapt to the new course and, above all, in what timeframe, given the many open disputes and given the urgency of reclaiming such an important industrial sector not only economically, but also politically and socially. The FIGC has decided to transpose, on 28 September 2023, the changes provided for in the FIFA regulations (access to the profession, protection of minors, double representation, and cap on commissions), but to wait for the publication (and therefore the entry into force) at the end of the checks within the competence of CONI, the analysis of the international uniformity of FIFA transpositions into national regulations, the issuance by the Government of the implementing decrees provided for by Legislative Decree nos. 36 and 37, and finally the observations of the components also at the end of the aforementioned checks, with the reservation therefore of making further amendments.

References

Anastasi A. (1996). *Annotazioni sul caso Bosman*, Edizioni Officina Grafica.

Antignani F. (2014). Gli intermediari: ruolo e portata nella regolamentazione calcistica internazionale, *Rivista di Diritto ed Economia dello Sport*, 2: 13-19.

Barbarito Marani Toro A. (1972). *Discorso generale sul diritto sportivo,* Milano.

Bastianon S. (1996). La libera circolazione dei calciatori e il diritto della concorrenza alla luce della sentenza Bosman, *Rivista di Diritto Sportivo*, 508-539.
Bastianon S. (2021). La Superlega e il modello sportivo europeo, *Rivista di Diritto Sportivo*, 2: 288-315.
Bernoldi A., Sottoriva C. (2011). La disciplina della redazione del bilancio di esercizio delle società di calcio. Confronto con l'esperienza internazionale ed impatto del c.d. Financial Fair Play, *Rivista di diritto ed economia dello sport*, 7(1): 147-191.
Capasso A., Rossi M. (2013). Systemic Value and Corporate Governance: Exploring the Case of Professional Football Teams, *Business Systems Review*, 2(2): 216-236. DOI: 10.7350/BSR.V11.2013
Carboni G.G. (2021). L'ordinamento sportivo italiano nel diritto comparato, *Federalismi.it*, 12: 49-50.
Cataliotti J.C., Fabretti T. (2015). *Analisi dei modelli organizzativi e gestionali delle società di calcio*, Mursia: Milano.
Coccia M., Nizzo C. (1998). Il dopo Bosman e il modello sportivo europeo, *Rivista di Diritto Sportivo*, 335-350.
Colucci M., Rapacciuolo D. (2016). FIFA Regulation on working with intermediaries, *Rivista di diritto ed economia dello sport,* 3: 73s.
De Dios Crespo Peréz J. (2008). Il caso Webster: un nuovo Bosman? *Rivista di diritto ed economia dello sport*, 4: 13s.
Dello Strologo A., Celenza D. (2019). UEFA versus IFRS. I diritti alle prestazioni sportive dei giocatori professionisti: dalla rilevazione al costo a quella al fair value, *Rivista di Diritto Sportivo,* 2: 296.
Dièz-Holchleitner J., Martinèz Sanchez A. (1996). Le conseguenze giuridiche della sentenza Bosman per lo sport spagnolo ed europeo, *Rivista di Diritto Sportivo*, 469 s.
Di Girolamo F. (2019). Il "fair play" finanziario nella giurisprudenza della Corte Arbitrale dello Sport, *Rivista di Diritto Sportivo,* 405s.
Fimmanò F. (2022a). La crisi delle società di calcio all'esito delle riforme tra NOIF, diritto comune e casi giurisprudenziali, *Diritto fallimentare e delle società commerciali,* 97(6): 1081-1126.
Fimmanò F.R. (2022b). Il fenomeno delle "multi-club ownerships" (MCO). Le pluriproprietà delle società di calcio, *Rivista di Diritto Sportivo*, 120s.
Fimmanò F.R. (2022c). Le società di calcio professionistico in bilico tra diritto speciale e diritto comune all'esito delle recenti riforme*, Rassegna di Diritto ed Economia dello Sport*, 1: 68 s.
Fimmanò F.R. (2022d). L'abuso di player trading: il caso delle "plusvalenze fittizie" nelle società di calcio professionistico*, Rivista della Corte dei Conti*, 5: 83s.
Galasso M., Scannapieco M.B. (2022). Fintech ed opportunità di finanziamento per i club di calcio, in Zambrano V. (a cura di), *Sport e rivoluzione digitale*, Milano: Cedam.
Geey D., Multiple football club ownership: disparities between rules. In *www.danielgeey.com/post/multiple-football-club-ownership-disparities-between-rules*.
Greppi E., Vellano M. (2010). *Diritto internazionale dello sport*, Torino: Giappichelli.

Indraccolo E. (2019). Il complesso mondo dello sport tra professionismo e dilettantismo, *Rassegna di Diritto ed Economia dello Sport*, 235-248.
Ioannoni Fiore F. (2022). Le plusvalenze incrociate tra "giusto prezzo" ed esigenze di certezza delle transazioni*, Rivista di Diritto Sportivo*, 1: 240-258.
Hamil S., Holt M., Michie J., Oughton C., Shailer L. (2004). The corporate governance of professional football clubs, *Corporate Governance: The international journal of business in society*, 4(2): 44-51. DOI: 10.1108/14720700410534967
Maggiolino M. (2016). Calcio e trasferimenti: un'analisi economica, *Rivista di Diritto Sportivo*, 103-125.
Maio E. (2020). Le sponsorizzazioni, il fenomeno sportivo e la nuova era digitale. Sponsorship, the sporting phenomenon and the new digital age*, Rassegna di Diritto ed Economia dello Sport*, 1: 185-200.
Marchini P.L., Lugli E. (2019). La Corporate Governance delle società di calcio professionistiche: un'analisi empirica nel contesto italiano dal 2012 al 2017, *Rassegna di Diritto ed Economia dello Sport*, 1: 13-38.
Martínez J.H. (2007). Cláusulas de rescisión: el caso de Ricky Rubio, jugador del DKV Juventud de Badalona, in *Recopilación Iusport*.
Pedilarco E. (2005). Regolamento FIFA e diritto comunitario della concorrenza. *Diritto pubblico comparato ed europeo*, 871-875.
Prigge S., Tegtmeier L. (2019). Market valuation and risk profile of listed European football clubs. *Sport, Business and Management: An International Journal*, 9(2): 146-163. DOI: 10.1108/SBM-04-2018-0033
Rossi G., Tessari A. (2017). *The professionalization of the sport agents: cartels, networks and enterprises within the football industry in a comparative perspective, 1950s -2010*, University of East London.
Sacco Ginevri A. (2017). Società calcistiche quotate e informativa al mercato in *Rivista di Diritto Sportivo*, 2: 336-348.
Sélinsky V., Rizzo F. (2006). Activité des agents de joueurs: la réglementation FIFA validée par le TPICE, *Revue Lamy de la Concurrence: droit, économie, régulation*, 6: 119-122.
Spagnolello E. (2016). Il Financial Fair Play alla prova del diritto antitrust dell'Unione europea, *Rivista di Diritto Sportivo,* 2: 383-394.
Stella Richter M. Jr. (2008). Considerazioni sulle società sportive quotate, *Rivista di Diritto Societario,* 2: 361-367.
Tiscini R., Dello Strologo A. (2016). What drives the value of football clubs: An approach based on private and socio-emotional benefits, *Corporate Ownership & Control*, 14(1): 673-683.
Tortorano G. (2017). Le società quotate nel mondo del calcio. Profili di bilancio e della governance, *Rassegna di Diritto ed Economia dello Sport*, 1: 67-71.
Zylberstein J. (2008). La specificità dello sport nell'Unione Europea, *Rassegna di Diritto ed Economia dello Sport*, 1: 59-70.

The football industry. A literature review and future research avenues in the risk management perspective

Antonio Renzi[*], *Pietro Taragoni*[**]

Received 10 December 2023 – Accepted 12 January 2024

Abstract

The transformation of the professional football industry into a multi-billion-dollar industry has attracted increasing attention from regulators, investors and academics in recent years. Such interest has also been reflected in the exponential growth of economic-managerial scientific production on the subject. However, there is still no comprehensive overview of the literature. The objective of this paper is to achieve a systematisation of the scientific research conducted in the period between 1977 and 2023, identifying the current state of production, emerging research areas, and future research trajectories in the risk management perspective of football clubs. To this end, a bibliometric and systematic review were developed on 1.081 and 18 papers published during this period, respectively. Statistical processes useful for developing the analysis were conducted using Bibliometrix on data retrieved from the Scopus database. The results revealed the need to further investigate the declination of endogenous and exogenous determinants of risk drivers and their relationship with volatility of sports performance for professional football clubs.

Keywords: football industry, bibliometric analysis, systematic review, bibliometrix, scopus, risk management.

[*] Full Professor of Business Management. Department of Management. Sapienza, University of Rome. antonio.renzi@uniroma1.it

[**] Ph.D. Candidate of Management, Banking and Commodity Sciences. Department of Management. Sapienza, University of Rome. pietro.taragoni@uniroma1.it

Corporate Governance and Research & Development Studies, n. 2-2023
(ISSN 2704-8462-ISSNe 2723-9098, Doi: 10.3280/cgrds2-2023oa16952)

Sommario

La trasformazione dell'industria del calcio professionistico in un settore multimiliardario ha attirato negli ultimi anni una crescente attenzione da parte di regolatori, investitori e accademici. Tale interesse si è riflesso anche nella crescita esponenziale della produzione scientifica economico-manageriale sull'argomento. Tuttavia, non esiste ancora una panoramica completa della letteratura. L'obiettivo del presente studio è quello di realizzare una sistematizzazione della ricerca scientifica condotta nel periodo compreso tra il 1977 e il 2023, individuando lo stato attuale della produzione, le aree di ricerca emergenti e le traiettorie di ricerca future nella prospettiva della gestione del rischio delle società calcistiche. A tal fine, sono state sviluppate una *review* bibliometrica e sistematica rispettivamente su 1.081 e 18 articoli pubblicati nel periodo considerato. I processi statistici utili allo sviluppo dell'analisi sono stati condotti utilizzando Bibliometrix sui dati ottenuti dal database Scopus. I risultati hanno evidenziato la necessità di approfondire la declinazione delle determinanti endogene ed esogene dei *driver* del rischio e la loro relazione con la volatilità delle performance sportive per le società di calcio professionistiche.

Parole chiave: industria del calcio, analisi bibliometrica, review sistematica, bibliometrix, scopus, risk management.

1. Introduction

Professional football or soccer is more than just a sport, but a cultural, social, political and economic phenomenon that attracts millions of fans worldwide. The football industry has undergone numerous changes in recent decades, becoming the driving force behind the entertainment industry and drawing the attention of regulators, investors and academics.

Football's transformation into a multi-billion-dollar industry has its first origins in the Bosman ruling in 1995. Prior to the Bosman ruling, out-of-contract players could only be transferred between two clubs in different European countries if there was a transfer agreement with a fee in favour of the transferring club (Simmons, 1997). The new ruling triggered a structural change in the players' transfer market, ultimately leading to an increase in the salaries of professional footballers and the loosening of boundaries between European leagues (Galariotis *et al.*, 2018; Dobson & Gerrard, 1999).

The so-called "Big Five" are the most popular and capital-intensive European football leagues, namely the English Premier League, the German Bundesliga, the Spanish La Liga, the Italian Serie A, and the French Ligue 1 (Wagner *et al.*, 2021). According to the Annual Review of Football Finance 2023 (Deloitte, 2022), during the 2021-2022 season, these leagues generated aggregate revenues of approximately €17,2 billion, exceeding the maximum

threshold set by pre-pandemic revenues. The revenues of the "Big Five" clubs mainly relate to three streams: i) matchday revenues, primarily associated with ticket sales; ii) commercial revenues, derived from advertising and sponsorships; iii) broadcasting revenues, from the sale of TV rights.

The increase in revenues, especially those associated with TV rights, is paradoxically the main cause of the financial crises of many European clubs. The competition for a greater market share leads clubs to "gamble" corporate assets for future success, making the football industry financially unstable (Lago *et al.*, 2006). As the line between the football industry and money becomes increasingly blurred, it is ever more common to witness highly indebted clubs, pharaonic player contracts, billion-euro TV rights deals, and prices of football franchises unrelated to their intrinsic value. Added to this are threats from non-European leagues, especially, from the Saudi Pro League (SPL). The SPL, officially known as the Roshn Saudi League, represents the top professional level of the Saudi football league. The SPL includes four clubs 75% owned by the Saudi Public Investment Fund (PIF), one of the leading sovereign wealth funds in the world. It was precisely the PIF-owned SPL club Al-Hilal that presented a record €300 million bid for French national team and Paris Saint-German (PSG) star Kylian Mbappé, and a contract offer of €700 million for one year (Forbes, 2023).

With the increasing financial instability of the football industry, part of the literature highlights the importance of quality governance practices in the context of professional football clubs. Dimitropoulos (2011) suggests that clubs with independent board members, increased ownership of managers, officers and institutions achieve greater alignment of interests between managers and stakeholders that ultimately translates into better quality of published accounting information. Quality of corporate governance also results in higher levels of profitability and viability (Dimitropoulos & Tsagkanos, 2012) and reduced levels of financial instability (Dimitropoulos, 2014). In general, the need for good governance practices as an essential prerequisite for clubs to be effectively managed and to survive the difficult economic conditions surrounding the football world is an argument supported by several studies (Michie, 2020; Michie & Oughton, 2005; Dimitropoulos, 2010; Scafarto & Dimitropoulos, 2018).

Other studies highlight governance as the main cause of financial instability in the football industry and specifically in European clubs. Considering the case of Italy as an example, Hamil *et al.* (2013) argue that many clubs are controlled directly by individuals or families or indirectly through corporate groupings. Such structures often present little evidence of separation between ownership and control. In this context, the decision-making process is influenced by less pressure for external monitoring and the maximisation of

owners' utilities. The owners are in fact ultimately those who control their own decisions and bear the associated financial impacts. As a result, owners may either favour better performance or profitability, in the former case leading to the emergence of unsustainable business models inspired by poor managerial and financial rationality.

In response to emerging trends, UEFA has intervened with the Financial Fair Play (FFP) regulation to improve the financial health of European clubs. This creates a balance between the investments of clubs participating in UEFA competitions and their revenues, preventing the accumulation of debt. Among the top European leagues, Italy figures as the most financially unstable and characterized by the highest mismanagement (Dimitropoulos & Scafarto, 2021). For the fifth consecutive season, Serie A records the second highest wages/revenues ratio among the "Big Five" leagues, with 14 clubs having a ratio higher than 80% in the 2021/2022 season. For the fourth consecutive year, Lega Seria A also presents operating losses with a record negative €0,4 billion in 2021/2022 (Deloitte, 2022).

The purpose of this paper is to achieve a systematisation of the literature on the professional football industry through the main techniques of the literature review in order to identify literature gaps in the field of risk analysis of professional football clubs. The paper is structured as follows.

Section 2 presents the methodology adopted to conduct the reviews, i.e. the bibliometric techniques, the systematic literature review and the software employed. Section 3 presents and discusses the results of the bibliometric analysis conducted on a sample of 1.081 papers dealing from an economic-managerial perspective with topics related to the football industry, published between 1977 and 2023. Furthermore, moving from the aforementioned relevance of the topic of the financial performance of professional football clubs, the results of a systematic review of documents specifically focused on the topic are presented. In this regard, the paper highlights, with reference to professional football clubs, the need to investigate the decomposition of internal (e.g., operating leverage and financial leverage) and external (e.g., intrinsic business risk) risk drivers. In Section 4, conclusions to the present study and the future research trajectories identified are presented.

2. Methodology

The present paper is based on a bibliometric analysis. Bibliometrics can be defined as a branch of computer science that aims to measure the impact of scientific publications and the relative level of knowledge dissemination through statistical techniques (Broadus, 1987; Cuccurullo *et al.*, 2016;

Merigó *et al.*, 2015). This type of analysis allows researchers to examine a greater amount of data than systematic literature reviews, while maintaining a high level of rigor, scientific soundness, transparency and replicability (Dada, 2018; Rey-Martí *et al.*, 2016).

The use of bibliometric techniques in this paper is aimed at analysing publications, citations and information sources in academia to identify the main trends with reference to the field of the professional football industry. To characterise the bibliographic data, number of publications, citations, citations per country, authors, this paper uses bibliometric indicators. In addition, the article examines intellectual structures that show the impact of papers in the scientific community, as well as social networks that highlight collaboration between authors and countries.

In the present study, a systematic review was also conducted on a sub-set of papers. According to Keele (2007), a systematic review is used to "identify, analyse and interpret all available evidence related to a specific research question in a way that is unbiased and (to a degree) repeatable" (p. 6). The literature review thus serves to map and evaluate the current intellectual territory (Tranfield *et al.*, 2003) with the aim of providing a complete source for scholars to work within the analysed field (Fan *et al.*, 2022). Statistical processes were performed using Bibliometrix, a RStudio bibliometric package developed by Aria and Cuccurullo (2017), to obtain a scientific mapping of the literature under investigation, primarily from a conceptual perspective.

The analysis process follows three steps:

1. Data collection;
2. Bibliometric analysis by levels;
3. In-depth systematic review on selected papers.

2.1. Data collection

The primary data source employed for the present paper is Elsevier's Scopus database, usually included among the most complete in the business and management discipline (Zupic & Čater, 2015). The time period considered ranges from 1977 to 2023. The choice responds to the need to consider the widest possible interval to give a global and comprehensive perspective to the research. In fact, 1977 is the date of the first economic-managerial publication indexed in Scopus on the professional football industry. The search query adopted, involving title, abstract and keywords fields, to identify pertinent corpus of research (Crossan & Apaydin, 2010; Pisani *et al.*, 2017) is presented in Table 1.

Table 1. Search query in Scopus. Source: our own elaboration

Search Terms in Scopus		
Field Tag	Title, Abstract and Keywords	TITLE-ABS-KEY (“football*” OR “soccer*”)
Boolean		AND
Field Tag	Title, Abstract and Keywords	TITLE-ABS-KEY (management OR value* or governance*)
Boolean		AND NOT
Field Tag	Title, Abstract and Keywords	TITLE-ABS-KEY (“American football*” OR “NFL”)
Boolean		AND
Subject Area	Business, Management and Accounting, Decision Sciences, Economics, Econometrics and Finance	LIMIT-TO (SUBJAREA, “BUSI”) OR LIMIT-TO (SUBJAREA, “DECI”) OR LIMIT-TO (SUBJAREA, “ECON”)
Boolean		AND
Language		LANGUAGE(ENGLISH)
Boolean		AND
Document Type	Article, Review	LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “re”)

Keywords’ selection was informed by (García & Welford, 2015; Rodríguez *et al.*, 2022). Three sets of keywords were searched in various combinations using the “advanced search” function. Whenever relevant and appropriate, words were taken in both singular and plural forms, and contracted and extended forms, by the usage of asterisks.

Such a wide range of keywords was deemed useful to ensure that the collection of literature was as broad and inclusive as possible. Conversely, subject areas were limited to those most covered by scholarly works in business and management.

To identify articles for inclusion in our review, we conducted a comprehensive multi-stage search (Haddaway *et al.*, 2022). The overall process is illustrated in Figure 1. The preliminary selection phase involved screening the titles and abstracts of the papers obtained, and only those deemed relevant were assessed for eligibility with bibliometric analysis. Specifically, only papers in the fields of business and management and written in English were included. Regarding exclusion criteria, only research papers published in regular journals were considered. Furthermore, the initial number of papers was changed at each sub-stage, starting from an initial number of 1.438 papers obtained from Elsevier’s Scopus Database and arriving at a final number of papers eligible for bibliometric analysis of 1.081. To arrive at this cluster

of results, a further twofold screening effort was conducted.

Firstly, it was deemed appropriate to address the issue of linguistic ambiguity. For instance, the word "football" is often also referred to American football. Although this variable was included in the search query, it was nevertheless necessary to conduct a systematic analysis of the abstracts of each paper to exclude those that did not refer by linguistic ambiguity to football as intended in the present study. As a result of this revision process, 175 papers initially selected for linguistic ambiguity and mainly referring to American football (professional and collegiate) and Australian football were excluded.

Secondly, 182 papers were excluded for lack of relevance. In this case, still following a systematic abstract analysis approach, those papers deemed unrelated to the economic-managerial debate were excluded. As a result, a total number of 357 papers were exempted from the bibliometric analysis.

In addition, a screening was conducted to identify papers to be included in the systematic review. These papers deal with topics related to decisions on the financial structure and risk of football clubs. The complete process followed four stages.

Firstly, the 1.081 papers used for the bibliometric analysis were clustered by subject area.

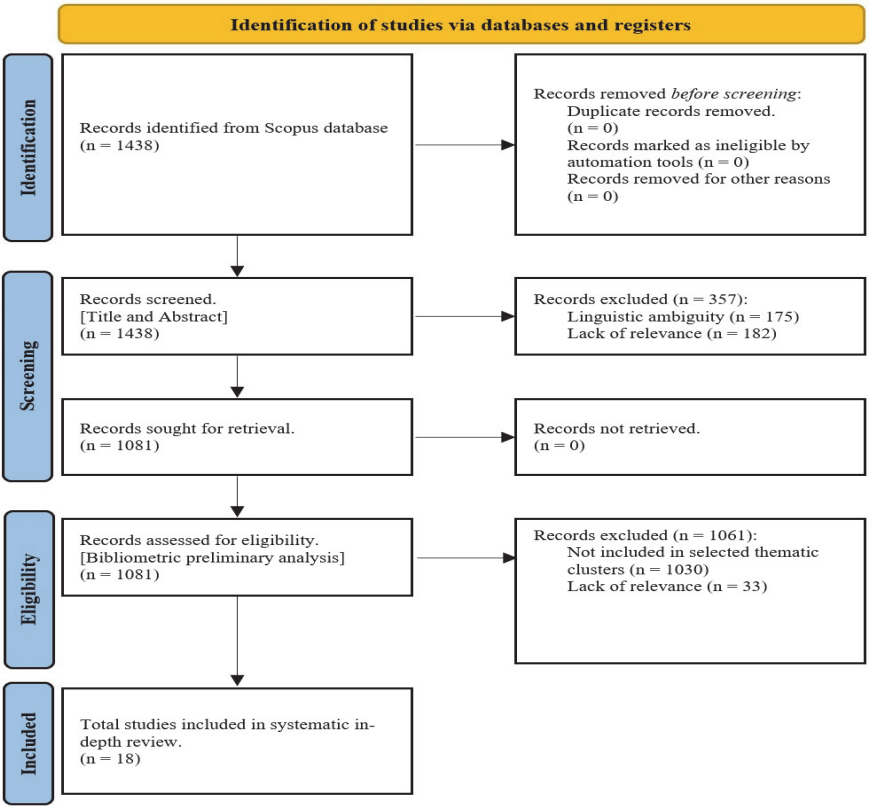
Secondly, the clusters of interest were identified, namely those denoted as "risk management", "financial performance", "financial crisis", "financial management", "financial value", "financial sustainability", "financial distress", "capital structure" and "accounting".

Thirdly, all papers with relevance within the identified clusters were selected.

Finally, as a result of this screening, which led to a total of 51 results, the systematic analysis of the abstracts identified the papers on the topics of risk, financial performance, and capital structure decisions in football clubs, leading to a final result of 18 papers. A systematic review was conducted on these papers to identify existing gaps in the literature on football club risk drivers' decomposition and to elaborate possible future research trajectories in the field.

The bibliometric and systematic reviews, considered as a whole, highlight the lack in the current state of production of a theoretical systematisation of managerial issues in the professional football industry. Specifically, with the exception of the marketing area, for all management topics there is room for new research projects.

Figure 1. PRISMA flowchart. Source: own elaboration



2.2. Analysis

Descriptive analyses were conducted at each level on the sample of papers eligible for bibliometric analyses. Subsequently, bibliometric techniques were implemented using conceptual, intellectual or social structures at each level of analysis. Co-citation indicates the existence of direct citation links and corresponds to an intellectual connection in a specific research field (Small, 1973). A co-citation relationship is formed when two or more papers are simultaneously cited by subsequent papers. Therefore, co-citation is established by the citing authors and the strength of the network is determined by the frequency with which two papers are cited by a third party. Often, when two papers have strong co-citation strength, then they are also frequently cited individually (Rodríguez-Soler *et al.*, 2020).

Co-author analysis defines collaboration between authors and can identify links on both an intellectual and social level. Furthermore, it can serve to identify research groups in universities or organisations not previously known to the researchers (Peters & Van Raan, 1991). Adopting a cross-national perspective, the same analysis can be replicated by identifying collaboration relationships between different countries (Glänzel & Schubert, 2004). In collaboration networks, nodes represent authors or countries and linkages the co-authorship. Keyword Co-occurrence Analysis (KCA) and Science mapping were used to extract a clustering of topics based on the keyword coupling of the papers. For these purposes, Bibliometrix package offers a variety of techniques, including the Latent Dirichlet Allocation (LDA) method for topic modelling (Jelodar *et al.*, 2018).

The aim of KCA is to construct a Keyword Co-occurrence Network (KCN), which is a network of keywords that co-occur in a collection of publications, and to employ it as a means for examining the associations between research topics in various fields. KCA is suitable for preliminary research work that endeavours to offer "a knowledge map and insights prior to conducting a rigorous traditional systematic review" (Radhakrishnan *et al.*, 2017, p. 1). This is achieved by assessing the co-occurrence of keywords (both author and index keywords were selected) with a full counting method. Furthermore, since the distance of two keywords in a KCN is approximately inversely proportional to their co-occurrence similarity, the clustering function categorizes keywords that frequently co-occur in the publications sample. This facilitates a visual representation of the relationships between keywords and the comprehension of how they are connected. In other words, the clustering is based on the similarity (relatedness) of the keywords, with keywords that have a higher co-occurrence rate being positioned closer to each other (Waltman *et al.*, 2010; Bornmann *et al.*, 2018).

Science mapping is aimed at representing the dynamic and structural aspects of a research field (Börner *et al.*, 2003; Noyons *et al.*, 1999). The main themes emerged in the literature can be represented in a Strategic Diagram, i.e. a two-dimensional space that classifies themes according to their centrality (plotted on the X-axis) and density (plotted on the Y-axis; Cobo *et al.*, 2011). Centrality measures the degree of interaction of one network with another, ultimately representing the importance of a theme in the development of a certain field of research. Conversely, density measures the strength with which words within a network are related to each other and thus measures the degree to which a topic is developed in the literature. The matrix shown defines four types of themes:

1. *Motor themes*, which present high centrality and high density, are both well developed and able to structure a field of research;

2. *Basic themes*, characterised by high centrality and low density, are important for a research area but are poorly internally developed;
3. *Emerging or Declining themes*, defined by low centrality and density, represent themes that are emerging or disappearing;
4. *Niche themes*, manifesting a low centrality but a high density, have a scarce ability to influence a given research field and are well-developed internally.

Once the statistical analyses inherent to bibliometric techniques had been implemented, which revealed the spread of knowledge and the main trends with reference to the professional football industry, a systematic literature review was conducted on an identified sub-set of papers. By reviewing the relevant literature, it is possible to identify the depth and breadth of existing scientific production to identify gaps to be filled (Xiao & Watson, 2017).

3. Results and discussion

3.1. General Statistics

The sample of the study subjected to the preliminary bibliometric analysis consisted of a total of 1.081 publications written by 2.231 authors affiliated with 1.012 institutions in 68 countries; they were published in 349 different academic sources and referred to 51.323 cited references (Table 2).

Database interrogation results were updated as of 07 November 2023.

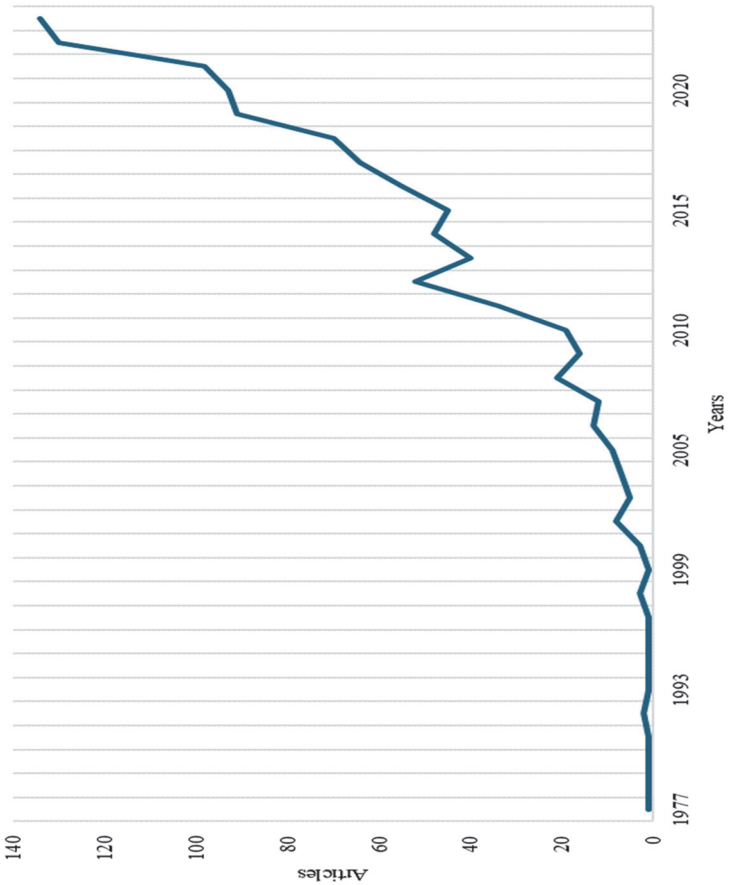
Table 2. Descriptive statistics of resulting publications. Source: own elaboration on Literature Selection phase data

Statistics of selected sample of papers	
Publications	1.081
Article	*1.037*
Review	*44*
Authors	2.231
Sources	349
Institutions	1.012
Countries	68
Cited references	51.323

3.2. Production

Figure 2 depicts the publications distribution in our sample by year: according to Bibliometrix output data, scholarly production, starting from its inception in 1977, has marked an Average Annual Growth rate of 11,23%. It's also relevant to note the novelty of the field under investigation, testified by the fact that most contributions in the sample have been published in the last 6 years (Document Average Age is 6,03, according to Bibliometrix output data) despite the much wider time span. The peak in the prolificacy of scholarly output in our sample occurred in 2015-2022 timeframe.

Figure 2. Publications distribution in the sample by year



Source: own elaboration on Scopus data

3.3. Sources

Regarding the Sources level, the pioneer journal is *Management Decision*, having published first on the subject in 1977. *Sport, Business and Management: an International Journal* and *European Sport Management Quarterly* represent the two most relevant sources, constituting about 15% of the total publications in the period considered (Table 3).

With reference to citations by sources not all the most prolific sources listed in Table 3 are also the most cited (Table 4). Emblematic in this sense is the case of the *Long Range Planning*, which despite accounting for only two contributions is the third most cited journal in our sample. Specifically, *European Sport Management Quarterly*, *Sport Management Review* and *Long Range Planning*, represent the three most cited sources with a total number of citations of 3.513, constituting 21% of the total number of citations on the subject.

According to the dynamics of the sources, which highlights the cumulative production on the football industry over time, the evolution of the 10 most productive journals is shown in Figure 3. In general, the cumulative production of the journals considered shows a steady growth. It can be noted that *Sport, Business and Management: An International Journal* is the source that has seen the greatest increase in terms of the number of papers, followed by *European Sport Management Quarterly*. Around 2010, the two journals outpaced the growth of all other journals by continuing to grow exponentially. Conversely, *Science and Medicine in Football* is the source that has reduced its output on the topic the most.

With respect to the source co-citation network (Figure 4), three clusters were delineated. From a conceptual point of view, the journals at the extremes of each cluster show a lower relationship with the other clusters. Instead, the size of the nodes refers to the level of interaction (Rodríguez-Soler et al., 2020). It should be noted that the Cluster 2 is located in the centre connecting Cluster 1 and 3. Within Cluster 2 are, in accordance with what was stated above, *European Sport Management Quarterly* and *Sport Management Review*, which are the two most cited and among the most prolific in terms of publications. According to the co-citation network and the journal titles represented, Cluster 1 refers to journals that mainly deal with marketing topics with reference to the football industry. This cluster features newspapers such as *Sport Marketing Quarterly*, *European Journal of Marketing* and *International Journal of Sports Marketing and Sponsorship*. Some of the most relevant topics covered are the importance of customer-based brand equity in professional football clubs (Bauer et al., 2005), the relationship between brand emotion and brand extension among fans of professional

football clubs (Abosag *et al.*, 2012), the effects of social media interactions on brand associations with reference to fan clubs of football clubs (Parganas *et al.*, 2017) and topics related to sponsorships of football clubs (Woisetschläge et al., 2014; Grohs *et al.*, 2015). Cluster 2, the middle one, as already specified, deals with topics that are more transversal and shows connections with both extreme clusters. Finally, Cluster 3 deals with topics mainly related to financial literature, with a focus on the risk and financial performance of football clubs. In this regard, considering the major nodes represented by the *Journal of Sports Economics* and the *International Journal of Sport Finance*, among the most relevant papers on the topic can be mentioned Andreff, 2007; Dietl & Franck, 2007; Madden, 2015; Barajas & Rodriguez, 2014.

Table 3. Most prolific sources (Top 10). Source: own elaboration on Scopus data

Most Prolific Sources (Top 10)	Papers
Sport, Business and Management: An International Journal	101
European Sport Management Quarterly	60
International Journal of Sports Marketing and Sponsorship	46
Journal Of Sports Economics	33
Sport Management Review	32
Managing Sport and Leisure	30
Frontiers In Sports and Active Living	28
International Journal of Sport Management and Marketing	28
Accounting, Auditing and Accountability Journal	22
Science And Medicine in Football	18

Table 4. Most cited sources (Top 10). Source: own elaboration on Scopus data

Most Cited Sources (Top 10)	Citations
European Sport Management Quarterly	1.324
Sport Management Review	1.154
Long Range Planning	1.035
Journal of Sports Economics	982
Sport, Business and Management: An International Journal	976
Journal of Sport Management	720
Tourism Management	555
Applied Economics	438
International Journal of Forecasting	394
Science And Medicine in Football	364

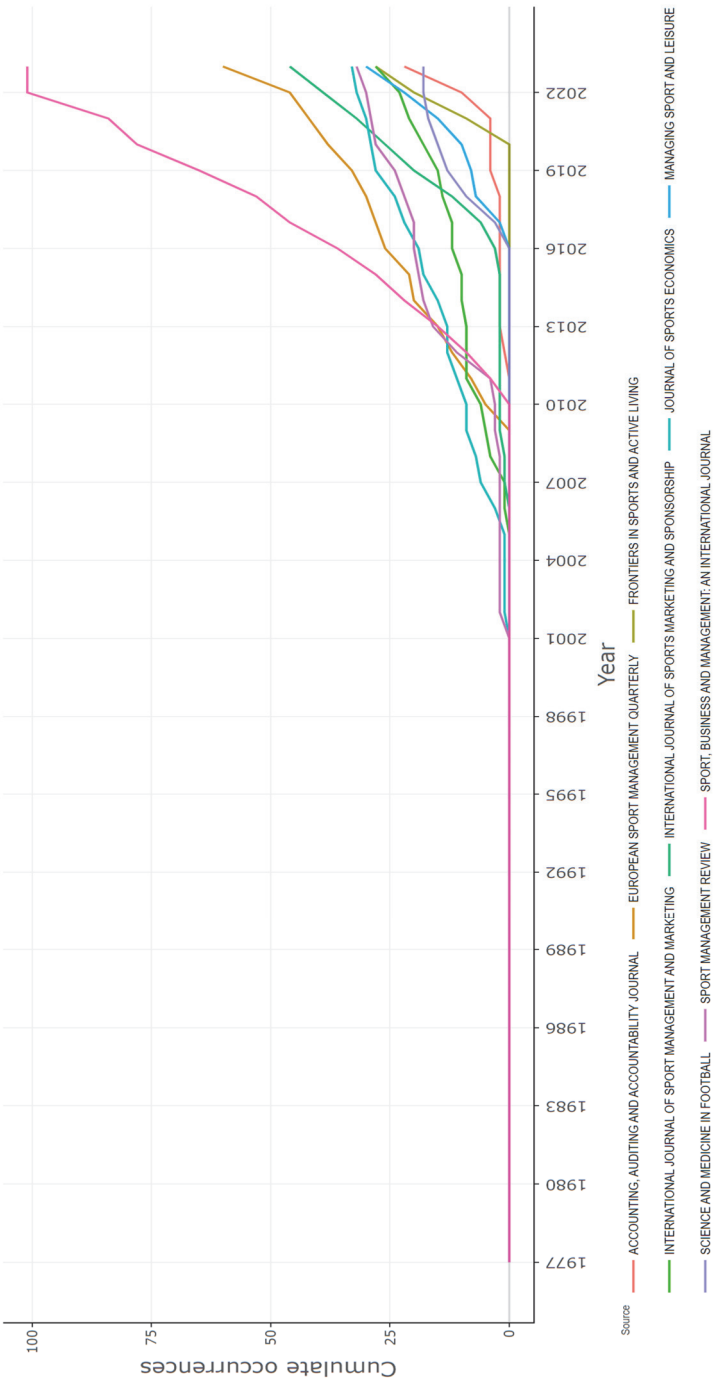
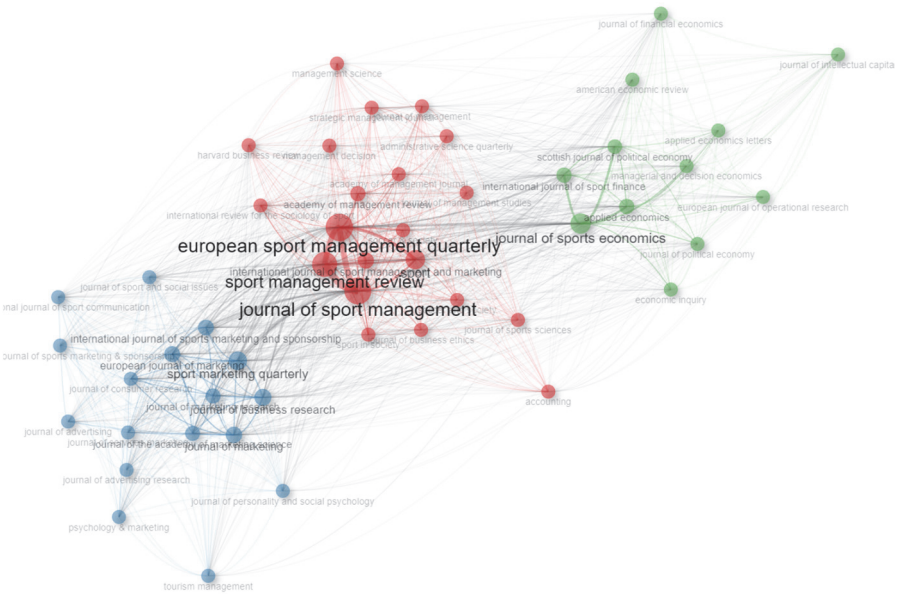


Figure 3. Growth in sources (Top 10). Source: Bibliometrix output on Scopus data

Figure 4. Sources co-citation network. Blue Cluster = Cluster 1; Red Cluster = Cluster 2; Green Cluster = Cluster 3. Source: Bibliometrix output on Scopus data



3.4. Authors

With reference to the Authors' level, the results show firstly the most relevant authors (Table 5), secondly the most cited ones (Table 6), thirdly the production of the main authors over time (Figure 5), and finally the collaboration network between authors (Figure 6).

As can be noted from Tables 5 and 6 below, not all the most prolific authors are also the most cited. In this regard, the case of Anagnostopoulos G. is emblematic. With 9 total publications, 5 less than the most prolific authors, he is the second most cited author.

The productivity of the top 10 authors is depicted in Figure 5. Morrow S. and Chadwick S. are the most continuous authors over time. Although Plumley D. and Wilson R. only started writing on the topic in 2013, the two authors present a very concentrated production from 2018 to 2022.

With reference to author collaboration to produce papers, considering the main 100 authors, all papers were written by more than two authors (Figure 6). The author collaboration network shows the groups of authors who published together. The colours identify different groups while the node size identifies the productivity of the authors. Based on the size of the nodes, the

most relevant clusters from a scientific production point of view were ordered. Cluster 1 presents two of the first three most productive authors, namely Plumley D. and Wilson R. The research topics of this cluster mainly concern the competitive balance and finances of professional football clubs and leagues. Cluster 2, with Morrow S. and Walters G. as the most productive authors, focuses on topics close to marketing and the study of the women's professional football industry. Finally, Cluster 3 has Chadwick S. and Anagnostopoulos C. as its most productive authors. In this case, the most discussed topics refer to the management of sports brands through social media and the effects of social media on club brand associations.

Table 5. Most prolific Authors (Top 10). Source: own elaboration on Scopus data

Most Prolific Authors (Top 10)	Papers
MORROW S	14
PLUMLEY D	14
WILSON R	14
CHADWICK S	12
WALTERS G	10
ANAGNOSTOPOULOS C	9
WICKER P	9
BREUER C	8
MANOLI AE	8
SCELLES N	8

Table 6. Most cited Authors (Top 10). Source: own elaboration on Scopus data

Most Cited Authors (Top 10)	Citations
MORROW S	320
ANAGNOSTOPOULOS C	362
PLUMLEY D	301
WILSON R	285
CHADWICK S	416
DIMITROPOULOS P	173
SCELLES N	164
WALTERS G	215
WICKER P	186
BREUER C	131

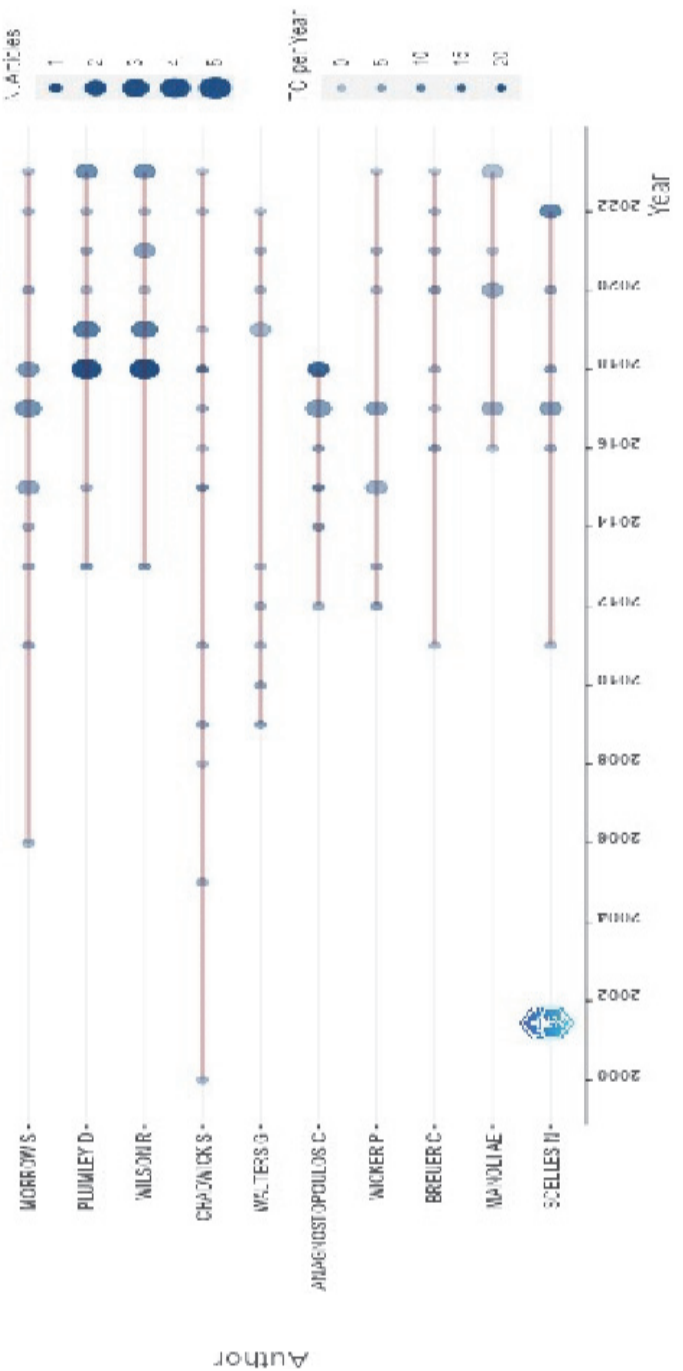
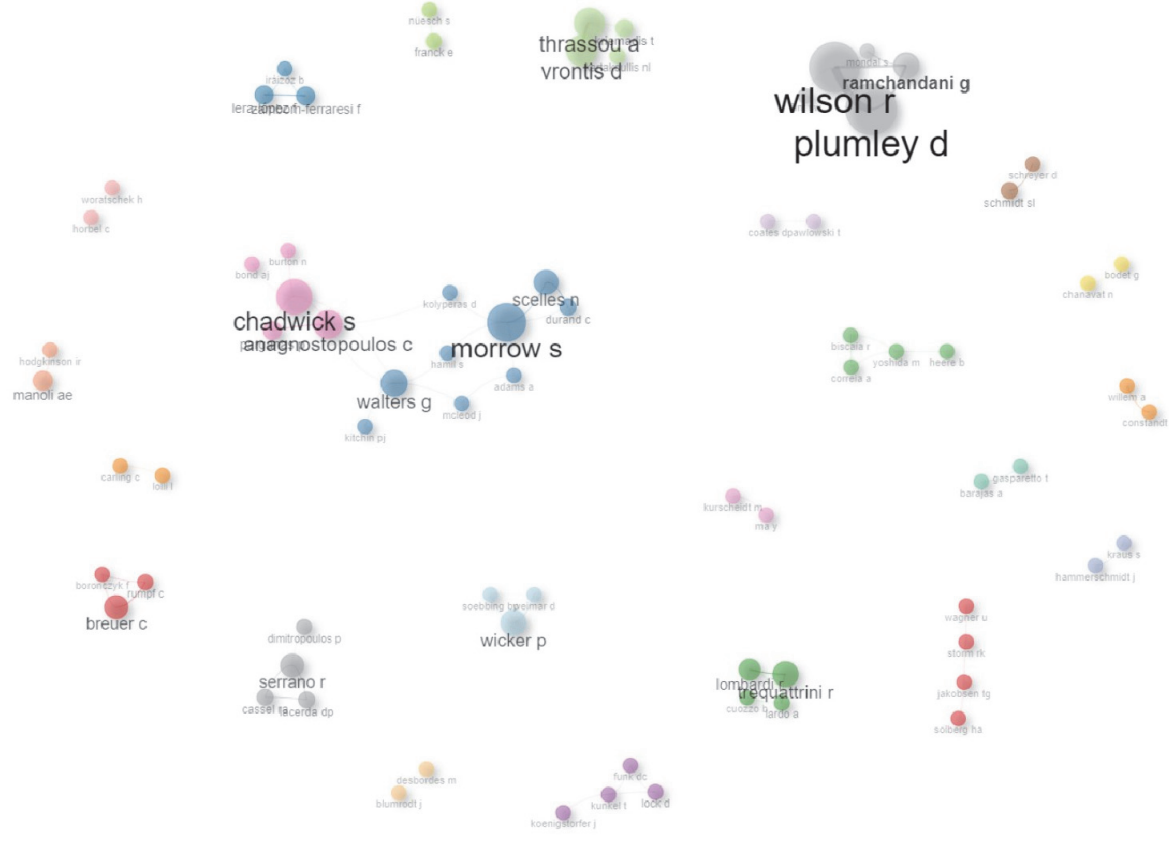


Figure 5. Production of top Authors over time. Source: Bibliometrix output on Scopus data

Figure 6. Collaboration network of Authors. Grey Cluster = Cluster 1; Blue Cluster = Cluster 2; Pink Cluster = Cluster 3. Source: Bibliometrix



3.5. Country collaboration, production and citations

The analysis of the most productive countries was conducted by delving into authors' countries of affiliation, country collaboration social networks, national and international collaboration, and countries' citations.

Country-wise and institutional, the distribution in the sample is rather unbalanced, with European countries accounting for the vast majority of scholarly output in the sample (Table 7).

The ratio of Single Country Publications/Multiple Country Publications (SCP/MCP) shows that most of the contributions in the sample are written by authors from the same country (Figure 7).

From the analysis of collaborative networks between countries, Figure 8 shows collaboration networks between all countries. Multiple country publications occur mainly between the United Kingdom, Germany and the US. The most frequent collaborations occur between UK and France amounting to 18; Germany and Australia, and UK and US both amounting to 12; UK and Australia, and US and Australia both amounting to 11.

With reference to the most cited countries, Table 8 shows that the UK, Germany and US still prevail over the other countries in terms of total citations, with the UK having the highest total number of citations amounting to 2.970.

Table 7. Most prolific institutions (Top 10). Source: own elaboration on Scopus data

Most Prolific Institutions (Top 10)	**Papers**
Sheffield Hallam University	57
Loughborough University	29
German Sport University Cologne	27
University of Stirling	25
Manchester Metropolitan University	23
University of Cassino and Southern Lazio	20
Leeds Beckett University	19
University of Peloponnese	18
University of Southern Denmark	18
University of Bayreuth	17

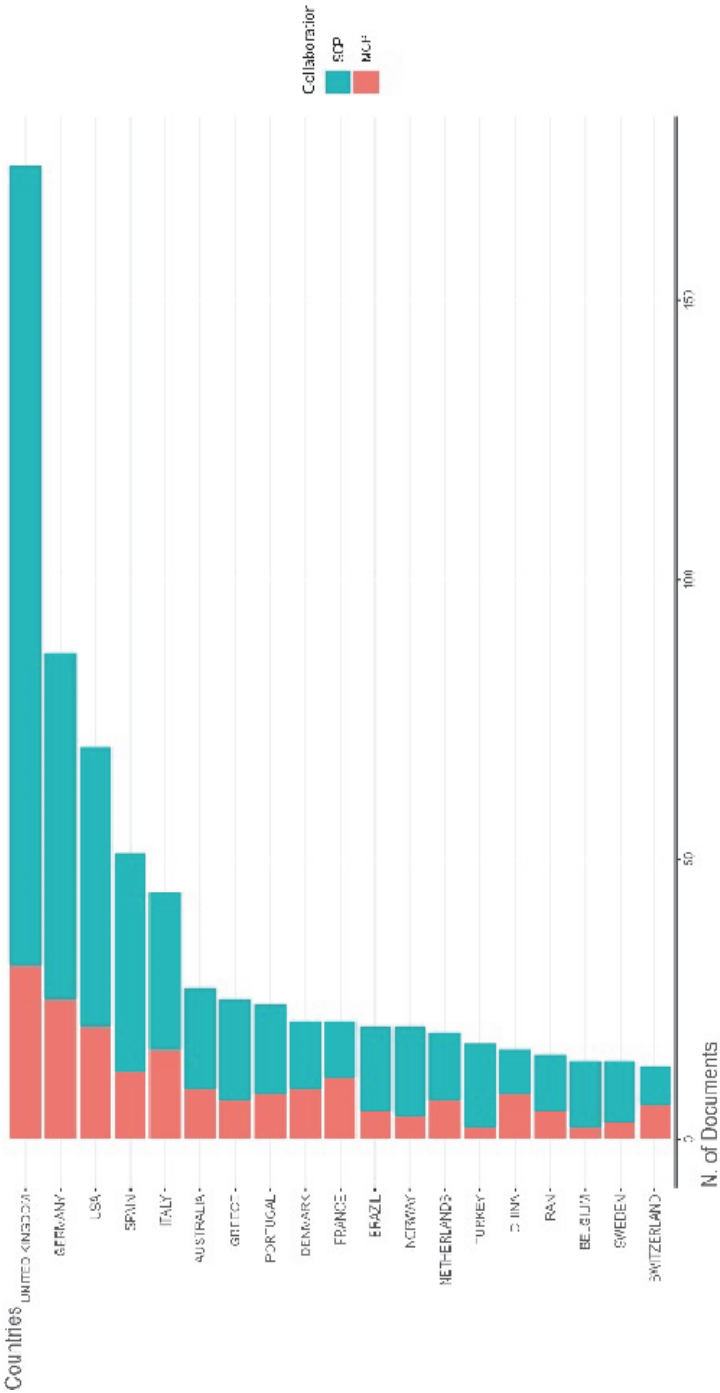


Figure 7. Corresponding Authors' Countries. Source: Bibliometrix output on Scopus data

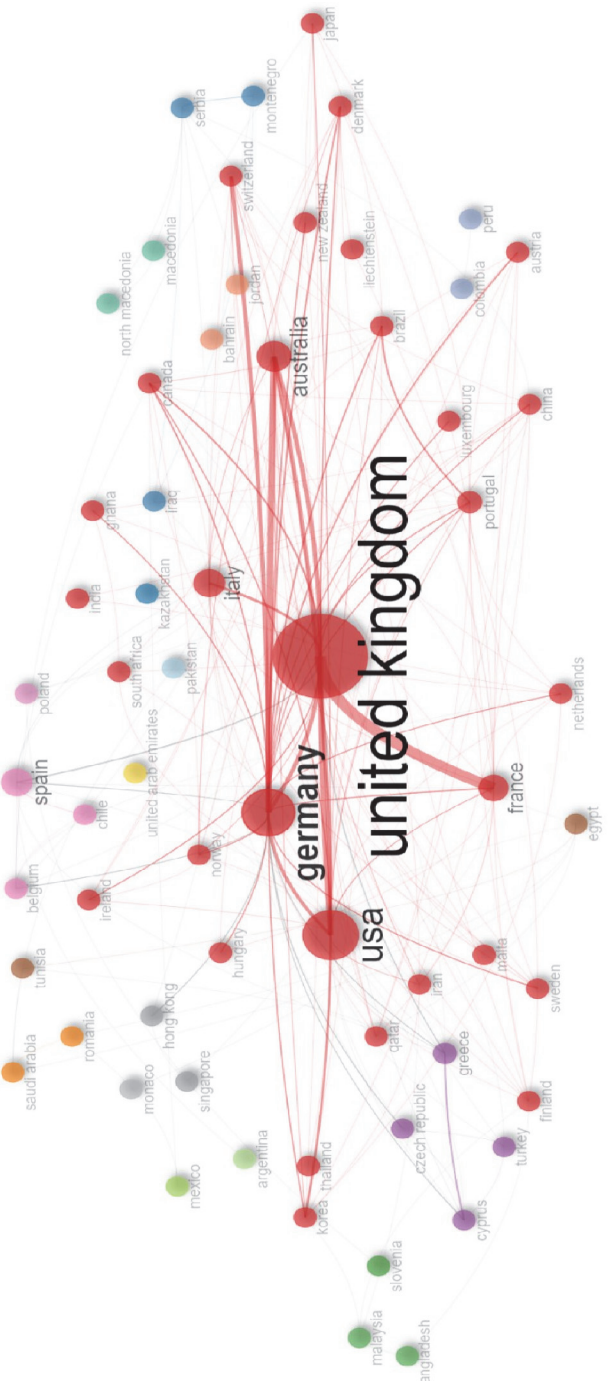


Figure 8. Country collaboration network. Source: Bibliometrix output on Scopus data

Table 8. Most cited countries (Top 10). Source: own elaboration on Scopus data

Most Cited Countries (Top 10)	Citations
United Kingdom	2.970
Germany	1.353
USA	1.162
Spain	860
Greece	630
Portugal	598
Denmark	555
Italy	479
France	403
Australia	392

3.6. Keywords

The analysis of the conceptual structure makes it possible to highlight the relationship between keywords and to identify macro-themes and main trends of literature.

The most frequent words used by the authors are soccer, sport, sponsorship, performance, corporate social responsibility, governance, competitive balance and so forth (Figure 9).

From the analysis of the research trends over time, Figure 10 shows that the themes related to the World Cup, governance, marketing, and stakeholder theory in football clubs appear to be the most treated.

Furthermore, it was decided to consider the co-occurrences between the 50 most recurrent words in the publications, shown in the network in Figure 11. The size of the network nodes represents the occurrence of the single keyword: the larger the size, the more the authors resort to this word. The length and robustness of the arcs refer to the frequency of joint use of the words by the authors. Jointly used words result in short and robust arcs and vice versa. Finally, the colours represent the thematic clusters. In Figure 12, mainly three differently coloured clusters are highlighted, which relate to three macro-themes:

1. Among others, marketing in football clubs, the use of social media to fuel brand equity and corporate social responsibility – Cluster 1;
2. The governance of football clubs – Cluster 2;
3. The financial equilibrium of football clubs, financial fair play regulations and so forth – Cluster

Figure 9. Word cloud for keywords. Source: Bibliometrix output on Scopus data

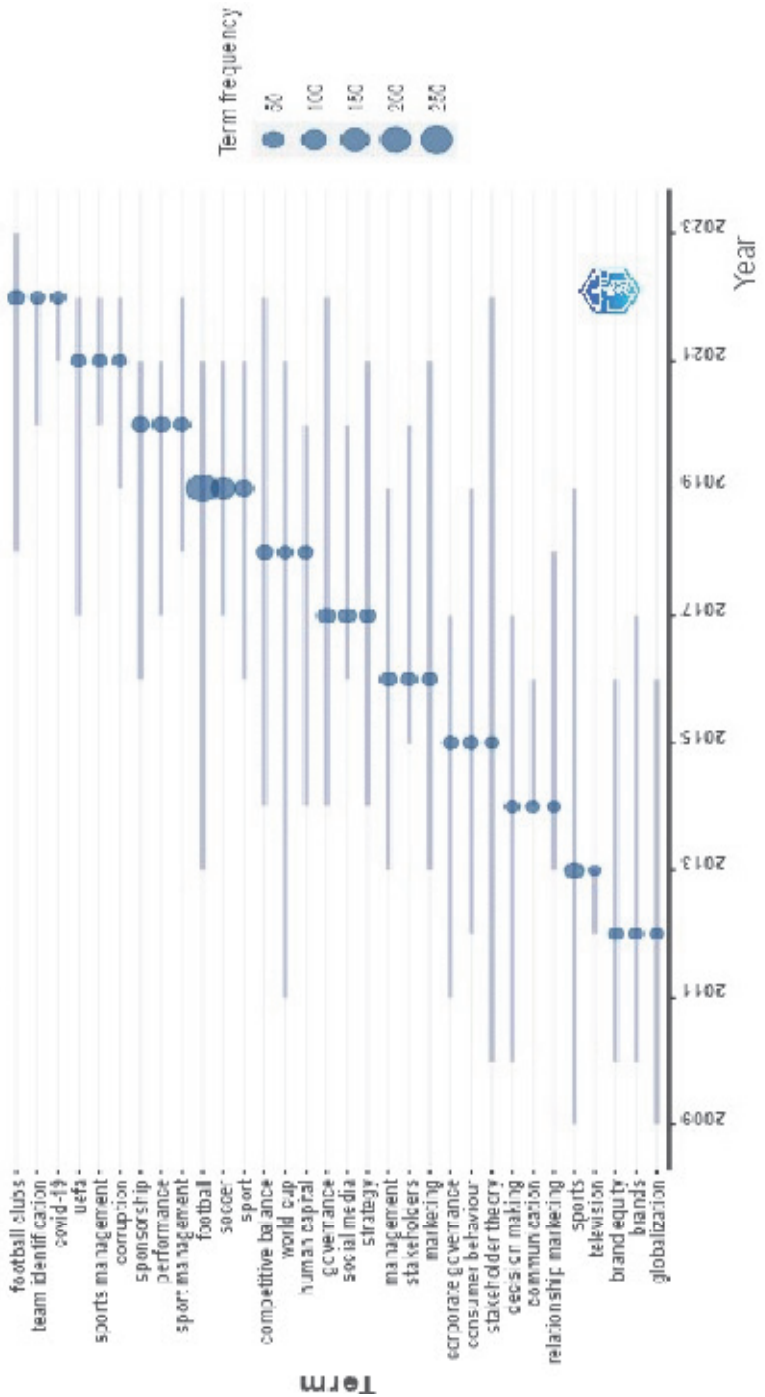
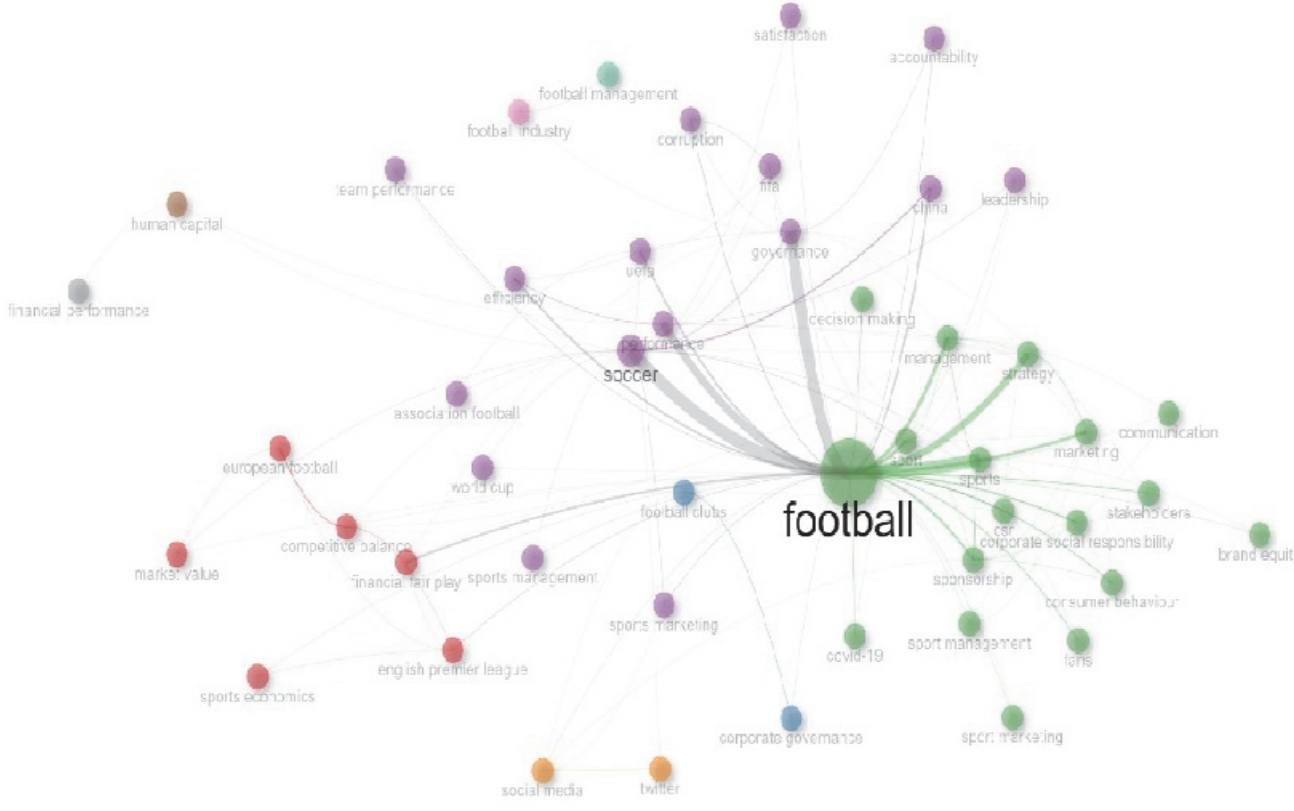


Figure 10. Trend topics over time. Source: Bibliometrix output on Scopus data

Figure 11. Keywords Co-occurrence Network. Green Cluster = Cluster 1; Purple Cluster = Cluster 2; Red Cluster = Cluster 3



Source: Bibliometrix output on Scopus data

3.7. Theme map and thematic evolution

A further in-depth analysis consists of the representation of the cognitive structure of the economic-managerial literature on the professional football industry by means of a science map. The matrix shown in Figure 12 represents through the above-mentioned Strategic diagram the word clusters in the four different quadrants. For the purposes of this work, it should be emphasised that the topics related to the financial and sporting performance of football clubs are placed among the Niche themes. These themes manifest a high density but low centrality. They are therefore internally consolidated but scarcely able to influence a certain field of research due to their low centrality.

Figure 13 shows the temporal evolution of the themes identified in the three periods 1977-2010, 2011-2020 and 2021-2023. In this regard, in the first period considered, the most discussed topics appear to be mainly related to corporate governance and marketing. Furthermore, it should be noted, for the purposes of this study, that the topics related to the financial performance of professional football clubs are absent in the first two periods, being addressed only in 2021-2023. Consistently, topics related to the impacts of the Covid-19 pandemic only appear in the last period under review.

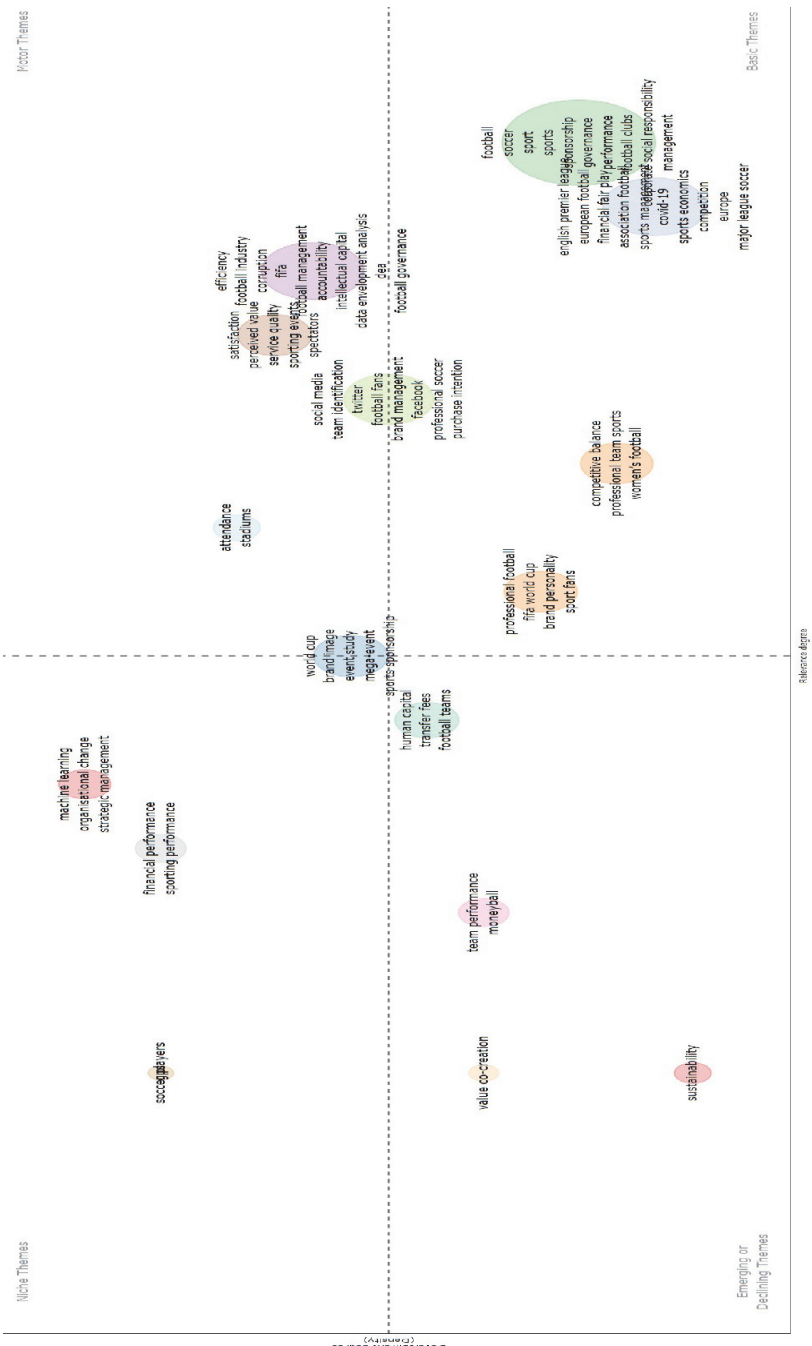


Figure 12. Strategic diagram. Source: Bibliometrix output on Scopus data

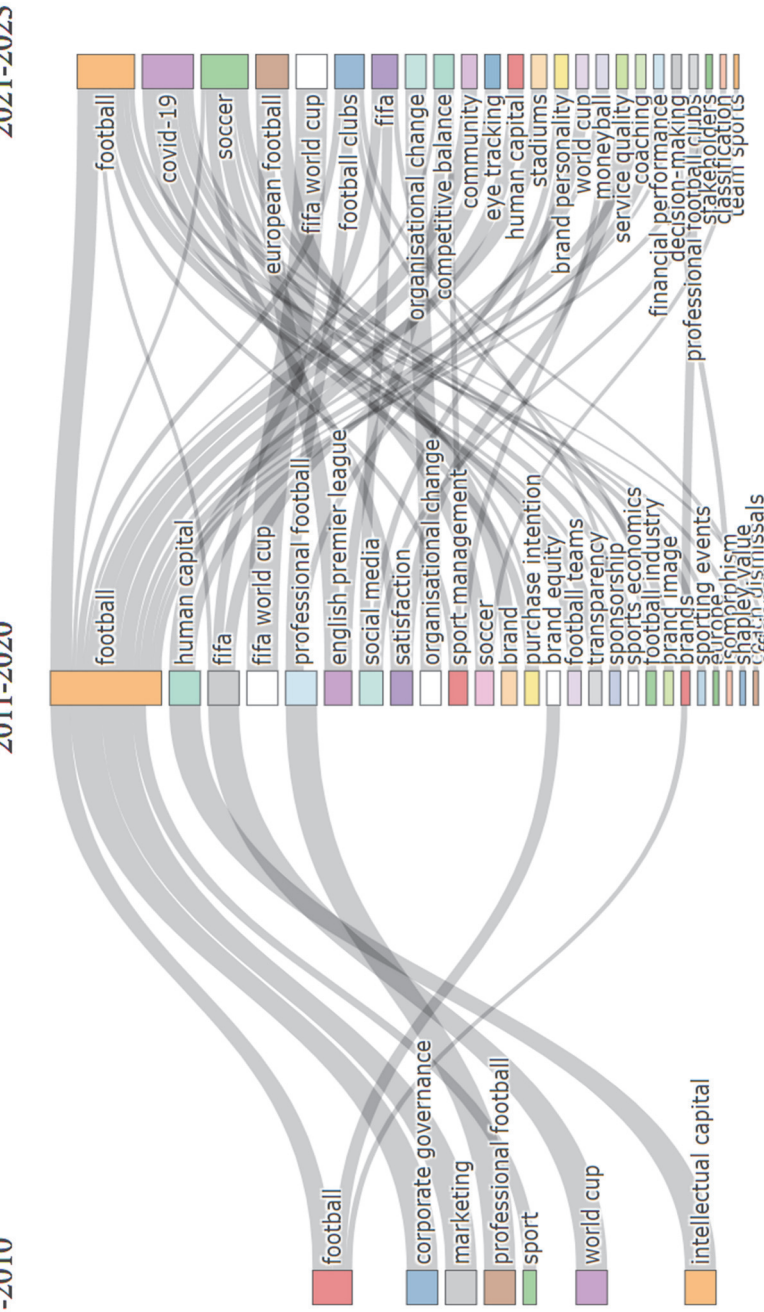


Figure 13. Thematic evolution (Sankey diagram). Source: Bibliometrix output on Scopus data

3.8. Systematic review

The bibliometric analysis enabled a systematisation of the economic-managerial literature on the football industry.

As a further in-depth analysis, a review was conducted on the papers from the cluster elected for bibliometric review that address issues related to the financial performance of football clubs and their capital structure decisions. In this regard, the procedure previously described in Section 2 on Methodology was followed. Table 9 shows the 18 papers selected for the in-depth review with title, authors, journal, research questions and main findings.

The analysis of the selected sub-set of papers revealed that there is a lack of specific studies with reference to the analysis of the operating (or unlevered) and financial (or levered) risk of professional football clubs. The former risk configuration is determined by the intrinsic business risk and the degree of operational leverage. Every football club, as well as every business, bears an intrinsic business risk related to revenue volatility induced by business choices and/or environmental factors. Chung (1989) argues that every business experience intrinsic business risk due to the cyclicality of its industry. The intensity with which intrinsic business risk acts on the volatility of operating results depends on the structural profile of the firm in terms of fixed costs and thus operating leverage (Renzi *et al.*, 2017). Further considerations regarding this area of risk for football clubs should also concern the role of slack resources and their interaction with investment projects and innovation (Esposito De Falco & Renzi, 2015). Conversely, the latter risk configuration is influenced by the degree of financial leverage.

Most of the reviewed studies link the financial performance of clubs to various factors, without delving into the declination of endogenous and exogenous risk drivers and their relationship to the volatility of sporting performance considering the aforementioned emerging trends in the football industry. For instance, the most cited paper of the identified subset links the financial success of football clubs to domestic and international sporting success and brand value, identifying as drivers of sporting success team investments that in turn are driven by foreign private majority investors (Rhode & Breuer, 2016). Furthermore, other empirical research shows that efficient governance mechanisms can reduce the financial instability of clubs (Dimitropoulos, 2014) and that intellectual capital measured through the value-added intellectual coefficient (VAIC) positively impacts performance (Dimitropoulos & Koumanakos, 2015). Other studies attempt to identify a relationship between financial, sport and share performance (Abbas, 2022; Emerald, 2022), while according to a more recent study profitability, age and sport performance are not deemed relevant for capital structure decisions (Pacheco, 2022).

Table 9. Selected papers for in-depth review. Source: own elaboration on Scopus data

#	Title	Authors	Year	Journal
1	*THE OTHER ISL: ANALYSING THE FINANCES OF THE INDIAN SUPER LEAGUE (FOOTBALL) AND ITS FRANCHISEES*	MONDAL S;PLUMLEY D;WILSON R	2023	*MANAGING SPORT AND LEISURE*
2	*THE IMPACT SPORTING AND FINANCIAL PERFORMANCE OF FOOTBALL CLUBS ON THEIR STOCK PRICE: AN ANALYTICAL STUDY OF EUROPEAN CLUBS SAMPLE LISTED IN THE FINANCIAL MARKET*	ABBAS NH	2023	*REVIEW OF BEHAVIORAL FINANCE*
3	*THE OTHER SIDE OF THE "LEAGUE OF STARS": ANALYSIS OF THE FINANCIAL SITUATION OF SPANISH FOOTBALL*	URDANETA-CAMACHO R;GUEVARA-PÉREZ JC;MARTÍN VALLESPÍN E;LE CLECH N	2023	*INTERNATIONAL JOURNAL OF FINANCIAL STUDIES*
4	*HOW MUCH ARE FANS WILLING TO PAY TO HELP "THEIR" SOCCER CLUBS TO OVERCOME A CRISIS? AN ANALYSIS OF CENTRAL EUROPEAN FANS DURING THE COVID-19 PANDEMIC*	LINTUMÄKI P;WALCHER C;SCHNITZER M	2022	*JOURNAL OF RISK AND FINANCIAL MANAGEMENT*
5	*PERFORMANCE AND REVENUES IN EUROPEAN FOOTBALL: CLUBS' MEDIA VISIBILITY AND BRAND VALUE*	AGUIAR-NOURY A;GARCIA-DEL-BARRIO P	2022	*INTERNATIONAL JOURNAL OF THE ECONOMICS OF BUSINESS*
6	*ARE SPORTING, FINANCIAL AND SHARE PERFORMANCES LINKED?: EVIDENCE FROM LEADING EUROPEAN FOOTBALL CLUBS*	[NO AUTHOR NAME AVAILABLE]	2022	*STRATEGIC DIRECTION*
7	*GENDER DIVERSITY AND FINANCIAL SUSTAINABILITY IN PROFESSIONAL FOOTBALL: A COMPETITIVE STRATEGY AND PROPOSED INTERDISCIPLINARY RESEARCH AGENDA*	CLARKSON B;PHILIPPOU C	2022	*MANAGING SPORT AND LEISURE*
8	*CAPITAL STRUCTURE OF IBERIAN FOOTBALL CLUBS: DOES SPORT PERFORMANCE MATTER?*	PACHECO LM	2022	*INTERNATIONAL JOURNAL OF SPORT MANAGEMENT AND MARKETING*
9	*TOO BIG TO FAIL? ACCOUNTING FOR PREDICTIONS OF FINANCIAL DISTRESS IN ENGLISH PROFESSIONAL FOOTBALL CLUBS*	PLUMLEY D;SERBERA J-P;WILSON R	2021	*JOURNAL OF APPLIED ACCOUNTING RESEARCH*
10	*IMPACT AND EFFICIENCY RANKING OF FOOTBALL MANAGERS IN THE ITALIAN SERIE A: SPORT AND FINANCIAL PERFORMANCE*	BUZZACCHI L;CAVIGGIOLI F;MILONE FL;SCOTTI D	2021	*JOURNAL OF SPORTS ECONOMICS*
11	*TRANSFER POLICY AND FOOTBALL CLUB PERFORMANCE: EVIDENCE FROM NETWORK ANALYSIS*	COATES D;NAIDENOVA I;PARSHAKOV P	2020	*INTERNATIONAL JOURNAL OF SPORT FINANCE*
12	*HUMAN CAPITAL AND FINANCIAL PERFORMANCE IN PROFESSIONAL FOOTBALL: THE ROLE OF GOVERNANCE MECHANISMS*	SCAFARTO V;DIMITROPOULOS P	2018	*CORPORATE GOVERNANCE (BINGLEY)*
13	*EUROPE'S ELITE FOOTBALL: FINANCIAL GROWTH, SPORTING SUCCESS, TRANSFER INVESTMENT, AND PRIVATE MAJORITY INVESTORS*	ROHDE M;BREUER C	2016	*INTERNATIONAL JOURNAL OF FINANCIAL STUDIES*
14	*INFLUENCE OF ORGANIZATIONAL SUPPORT ON RETIREMENT PLANNING AND FINANCIAL MANAGEMENT OF PROFESSIONAL SOCCER PLAYERS*	SURUJLAL J	2016	*POLISH JOURNAL OF MANAGEMENT STUDIES*
15	*INTELLECTUAL CAPITAL AND PROFITABILITY IN EUROPEAN FOOTBALL CLUBS*	DIMITROPOULOS PE;KOUMANAKOS E	2015	*INTERNATIONAL JOURNAL OF ACCOUNTING, AUDITING AND PERFORMANCE EVALUATION*
16	*SPANISH FOOTBALL IN NEED OF FINANCIAL THERAPY: CUT EXPENSES AND INJECT CAPITAL*	BARAJAS A;RODRIGUEZ P	2014	*INTERNATIONAL JOURNAL OF SPORT FINANCE*
17	*CAPITAL STRUCTURE AND CORPORATE GOVERNANCE OF SOCCER CLUBS: EUROPEAN EVIDENCE*	DIMITROPOULOS P	2014	*MANAGEMENT RESEARCH REVIEW*
18	*UDINESE CALCIO SOCCER CLUB AS A TALENTS FACTORY: STRATEGIC AGILITY, DIVERGING OBJECTIVES, AND RESOURCE CONSTRAINTS*	DI MININ A;FRATTINI F;BIANCHI M;BORTOLUZZI G;PICCALUGA A	2014	*EUROPEAN MANAGEMENT JOURNAL*

#	Research question	Main findings
1	What are the finances of the ISL and its franchisees?	Many franchisees have reported poor financial performance for the period under study showing debt and profitability issues.
2	What is the nature of the relationship between sporting, financial performance and stock price of football clubs?	There is a positive correlation between stock returns and sports performance. The study also revealed the impact of a win, a draw and a loss on stock returns and explained that this impact is linked to the club's final result at the end of the sports season.
3	How effective is the financial control system implemented by the Spanish Professional Football League?	The economic control measures imposed by the Spanish football league have helped to improve the financial situation of Spanish football in the short term, but may foster imbalances between clubs that undermine the sustainability of the current management model and, therefore, the competition system.
4	How much are fans willing to contribute financially to help their favourite teams overcome the financial difficulties caused by Covid-19?	Fans would be willing to participate in fundraising campaigns to support their favourite teams and could help overcome the current crisis, showing that the inclusion of fans in future risk management strategies is a promising approach.
5	What is the financial situation of European football clubs and the role of their media visibility and historical brand status?	The study argues that: (i) there is a positive relationship between revenue and performance in domestic leagues; (ii) current domestic points have a relatively greater impact on club revenue than performance in the previous season; (iii) current performance in the UEFA Champions League has a greater positive effect on club revenue than performance in the UEFA Europa League; (iv) brand value has a significant impact on the ability of clubs to generate revenue; and (v) the ability of clubs to generate revenue is directly related to the ability of the team roster to attract media attention.
6	What is the relationship between sporting, financial and share performances for European football clubs?	Leading football clubs with successful sports results are able to generate additional revenue from various sources and improve their overall financial performance. Sustained success in these two performance areas can increase the possibility of a favourable impact on the share price of a particular club.
7	What are the financial benefits of a greater gender diversity in professional football clubs' boards?	Further research in this field is imperative to ensure all areas of potential improvement are considered by governing bodies, executives, and government in addressing the financial sustainability concerns in football.
8	What are the capital structure determinants of the major Spanish and Portuguese football clubs?	Size, total liquidity and asset intangibility are key factors affecting the capital structure and that pecking order theory seems more suited to those companies, whereas sport performance variables are irrelevant.
9	How to anticipate financial distress with specific reference to footballs' Financial Fair Play (FFP) regulations for EPL and EFL clubs?	The results show significant cases of financial distress amongst clubs in both divisions and that Championship clubs are in significantly poorer financial health than EPL clubs.
10	What is the contribution of managers to the performance of football teams in the Italian Serie A?	Managers exert a significant influence on both sport and financial performances with differences between top and worst coaches.
11	How do the characteristics of a football club's player transfer network activities influence club performance?	Club management can find an optimal transfer policy to balance sport and financial performance by having a limited number of club partners and focusing on international deals.
12	What is the relationship between human capital investments and financial performance in the professional football industry?	Clubs with CEO duality and a high degree of family board representation manage to profit from investments in player contracts as opposed to clubs which lack these governance mechanisms.
13	What drives revenues and investments in Europe's elite football clubs?	National sporting success positevely impacts revenues and is primarily driven by team investments. Also, international sporting success and brand management drive revenues. Finally, there is a positive impact of private majority investors on team investments.
14	What is the influence of organizational support on retirement planning and financial management of professional soccer players?	Organizational support strongly influences retirement planning and financial management.
15	What is the impact of intellectual capital on the profitability of European listed football clubs?	Intellectual capital is a significant determinant of club's profitability and specifically football clubs with enhanced human capital efficiency achieve higher levels of financial performance.
16	What is the financial health of Spanish football clubs?	Spanish football is in a very bad financial condition and to improve its situation requires a substantial injection of financing capital through the issuance of shares or the solicitation of substantial contributions from members, an increase in revenues, the reduction of wages and salaries, and the reduction of current liabilities.
17	What is the impact of corporate governance quality on the capital structure of European soccer clubs?	Efficient corporate governance mechanisms such as the increased board size and independence and the existence of more dispersed ownership (managerial and institutional) result in a reduction in the level of leverage and debt, thus reducing the risk of financial instability.
18	How strategic agility can nurture economic value creation and ensure long term survival even in highly competitive environments?	Udinese has managed to implement a business model requiring balance of diverging strategic objectives, under severe resources constraints, thanks to its strategic agility. The analysis shows that strategic agility depends on three meta-capabilities, namely resource fluidity, strategic sensitivity and leadership unity.

The current research therefore does not appear convincing in terms of the methods and variables examined. The literature analysed does not propose models for monitoring and managing risk in light of new trends in the football industry. Specifically, to the best of our knowledge, no research investigates the relationship between the volatility of sporting results from that of financial results, isolating the former from the latter and vice versa. Such an approach may allow research to be extended into new business models aimed at maximising sporting and financial results in a more risk-aware management perspective.

Ultimately, this study highlights the need to identify and deepen, considering emerging trends in the professional football industry, the structural and external determinants of football club risk and to establish a theoretical framework that consistently links the volatility of financial and sporting performance.

4. Conclusions and future research avenues

The aim of the present study was to achieve a systematisation of the economic-managerial literature on the professional football industry and to identify gaps to be filled by future research in terms of risk-return modelling. For this purpose, a bibliometric analysis was conducted, subsequently supported by an in-depth analysis on a sub-set of selected papers, to analyse the scientific production from 1977 to 2023. The main results are summarised below. In terms of scientific production on the subject, it was highlighted that most of the research was published in the period 2015-2022.

At the Sources level, it was shown that the journal *Sport Business and Management: An International Journal* represents the most productive and fastest growing source over time but not the most cited, which is *European Sport Management Quarterly*. Furthermore, *Long Range Planning*, which does not appear in the ten most productive sources, is the third most cited source.

The analysis at Authors level did not show a close correlation between the most productive authors and the most cited ones. In addition, the collaboration networks among the most productive authors focused on the topics of competitive balances and finances of football clubs, marketing and management of sports brands through social media.

Regarding the analysis of production at the Countries level, it emerged that European countries have the largest production of research on the subject. However, as far as cross-country collaborations are concerned, multiple country publications occur mainly between UK, Germany and the US. The

Keywords level revealed that the most recurring words over time are the World Cup, governance, marketing and stakeholder theory. The analysis of the co-occurrences of the words revealed three thematic clusters that mainly refer to marketing, corporate governance and the financial balance of football clubs.

From the analysis of the themes through the Strategic diagram, emerged that the topics related to the financial performance of football clubs are clustered among the Niche themes. Furthermore, the representation of the evolution of the themes over time by means of the Sankey diagram showed that the themes related to the financial performance of football clubs only appear from 2021 onwards, thus representing an attractive field for future research. The analysis of the sub-set of papers selected for the systematic review and focused on the financial performance of football clubs revealed a lack of specific studies with reference to the declination of endogenous and exogenous drivers of risk and their relationship with the volatility of sports performance.

In this regard, this study offers an opportunity for future researchers to delve into certain areas not yet researched. Specifically, possible research avenues can be outlined by proposing specific questions:

- How do the typical endogenous (e.g. operating leverage and financial leverage) and exogenous (e.g. intrinsic business risk) drivers of risk decline in a professional football club?
- To what extent can clubs manipulate such drivers to manage and control operational and/or financial risk?
- What is the correlation between the volatility of sporting and financial performance and how can the volatility associated with each be analysed separately?
- How do these factors impact the value of sports clubs in terms of capital remuneration and how can the relationship between value and prices of football clubs' franchisees be justified?

This work therefore has implications from both a practical and scientific perspective. Ultimately, future research in this area may concern the construction of one or more models for risk management in the context of the professional football industry.

4.1. Limitations

The present study relies on certain limitations that should be considered. First, the literature search was conducted using Elsevier's Scopus database. Although it is included among the most comprehensive and influential software in business and management disciplines, some publications may not be

indexed. Second, as it is a constantly updated database, a bibliometric analysis concerning an emerging topic may be subject to substantial variations in some years. Third, the systematisation approach adopted, relying on only one database, could be improved and extended by the combined use of more than one software package. Finally, the systematic review depends on a few papers. This is the consequence of the process described in section 2.1. Specifically, other thematic clusters could have contained topics related to risk management in professional football clubs.

However, the presented limitations do not affect the general assessment of the current intellectual territory and its implications for future research areas.

References

Abbas N. H. (2022). The impact sporting and financial performance of football clubs on their stock price: an analytical study of European clubs sample listed in the financial market. *Review of Behavioral Finance*, 15(3): 340-354. DOI: 10.1108/rbf-11-2021-0242

Abosag I., Roper S., Hind D. (2012). Examining the relationship between brand emotion and brand extension among supporters of professional football clubs. *European Journal of marketing*, 46(9): 1233-1251. DOI: 10.1108/03090561211247810

Aria M., Cuccurullo C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4): 959–975. DOI: 10.1016/j.joi.2017.08.007

Andreff W. (2007). French football: A financial crisis rooted in weak governance. *Journal of Sports Economics,* 8(6): 652-661. DOI: 10.1177/1527002506297021

Börner K., Chen C., Boyack K. W. (2003). Visualizing knowledge domains. *Annual review of information science and technology*, 37(1): 179-255. DOI: 10.1002/aris.1440370106

Barajas Á., Rodríguez P. (2014). Spanish football in need of financial therapy: Cut expenses and inject capital. *International Journal of Sport Finance*, 9(1): 73.

Bauer H.H., Sauer N.E., Schmitt P. (2005). Customer-based brand equity in the team sport industry: Operationalization and impact on the economic success of sport teams. *European Journal of Marketing*, 39(5/6): 496-513. DOI: 10.1108/03090560510590683

Börner K., Chen C., Boyack K.W. (2003). Visualizing knowledge domains. *Annual review of information science and technology*, 37(1): 179-255. DOI: 10.1002/aris.1440370106

Bornmann L., Haunschild R., Hug S.E. (2018). Visualizing the context of citations referencing papers published by Eugene Garfield: A new type of keyword co-occurrence analysis. *Scientometrics*, 114(2): 427–437. DOI: 10.1007/s11192-017-2591-8

Broadus R. N. (1987). Toward a definition of "bibliometrics". *Scientometrics*, 12(5–6): 373–379. DOI: 10.1007/BF02016680

Chung K.H. (1989). The impact of the demand volatility and leverages on the systematic risk of common stocks. *Journal of Business Finance & Accounting*, 16(3): 343-360. DOI: 10.1111/j.1468-5957.1989.tb00023.x

Crossan M.M., Apaydin M. (2010). A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies*, 47(6): 1154–1191. DOI: 10.1111/j.1467-6486.2009.00880.x

Cobo M.J., López-Herrera A. G., Herrera-Viedma E., Herrera F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of informetrics*, 5(1): 146-166. DOI: 10.1016/j.joi.2010.10.002

Cuccurullo C., Aria M., Sarto F. (2016). Foundations and trends in performance management. A twenty-five years bibliometric analysis in business and public administration domains. *Scientometrics*, 108(2): 595–611. DOI: 10.1007/s11192-016-1948-8

Dada O.L. (2018). A Model of Entrepreneurial Autonomy in Franchised Outlets: A Systematic Review of the Empirical Evidence: Entrepreneurial Autonomy in Franchised Outlets. *International Journal of Management Reviews*, 20(2): 206–226. DOI: 10.1111/ijmr.12123

Deloitte (2022). Annual Review of Football Finance. Text available at the website: https://www.deloitte.com/global/en/Industries/tmt/research/gx-annual-review-of-football-finance.html

Dietl H.M., Franck E. (2007). Governance failure and financial crisis in German football. *Journal of sports economics*, 8(6), 662-669. DOI: 10.1177/1527002506297022

Dimitropoulos P. (2010). The Financial Performance of the Greek Football Clubs. *Choregia*, 6(1). DOI: 10.4127/ch.2010.0042

Dimitropoulos P. (2011). Corporate governance and earnings management in the European football industry. *European Sport Management Quarterly*, 11(5): 495-523. DOI: 10.1080/16184742.2011.624108

Dimitropoulos P. (2014). Capital structure and corporate governance of soccer clubs: European evidence. *Management Research Review*, 37(7): 658-678. DOI: 10.1108/mrr-09-2012-0207

Dimitropoulos P.E., Koumanakos E. (2015). Intellectual capital and profitability in European football clubs. *International Journal of Accounting, Auditing and Performance Evaluation*, 11(2): 202-220.

Dimitropoulos P.E., Tsagkanos A. (2012). Financial Performance and Corporate Governance in the European Football Industry. *International Journal of Sport Finance*, 7(4).

Dimitropoulos P., Scafarto V. (2021). The impact of UEFA financial fair play on player expenditures, sporting success and financial performance: Evidence from the Italian top league. *European Sport Management Quarterly*, 21(1): 20-38. DOI: 10.1080/16184742.2019.1674896

Dobson S., Gerrard B. (1999). The determination of player transfer fees in English professional soccer. *Journal of Sport Management*, 13(4): 259-279. DOI: 10.1123/jsm.13.4.259

Emerald (2022). Are sporting, financial and share performances linked? Evidence from leading European football clubs. *Strategic Direction*, 38 (10): 30-32. DOI: 10.1108/SD-09-2022-0095

Esposito De Falco S., Renzi A. (2015). The role of sunk cost and slack resources in innovation: A conceptual reading in an entrepreneurial perspective. *Entrepreneurship Research Journal*, *5*(3): 167-179. DOI: 10.1515/erj-2015-0019

Fan D., Breslin D., Callahan J.L., Iszatt-White M. (2022). Advancing literature review methodology through rigour, generativity, scope and transparency. *International Journal of Management Reviews*, 24(2): 171-180. DOI: 10.1111/ijmr.12291

Forbes (2023). *PSG Accept €1 Billion Mbappe Package from Al-Hilal To Smash World Transfer Record: Reports*. Text available at the website: https://www.forbes.com/ sites/tomsanderson/2023/07/24/psg-receive-300-million-mbappe-bid-from-al-hilal-to-smash-world-transfer-record-reports/?sh=e17a0414802e

Galariotis E., Germain C., Zopounidis C. (2018). A combined methodology for the concurrent evaluation of the business, financial and sports performance of football clubs: the case of France. *Annals of Operations Research*, 266(1-2), 589-612. DOI: 10.1007/s10479-017-2631-z

García B., Welford J. (2015). Supporters and football governance, from customers to stakeholders: A literature review and agenda for research. *Sport Management Review*, 18(4): 517-528. DOI: 10.1016/j.smr.2015.08.006

Glänzel W., Schubert A. (2004). Analysing scientific networks through co-authorship. In Moed H.F., Glänzel W., Schmoch U: (Eds), *Handbook of quantitative science and technology research: The use of publication and patent statistics in studies of S&T systems*. Dordrecht: Springer Netherlands, 257-276. DOI: 10.1007/1-4020-2755-9_12

Grohs R., Reisinger H., Woisetschläger D. M. (2015). Attenuation of negative sponsorship effects in the context of rival sports teams' fans. *European Journal of Marketing*, 49(11/12): 1880-1901. DOI: 10.1108/ejm-01-2013-0010

Haddaway N.R., Page M.J., Pritchard C.C., McGuinness L.A. (2022). PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. *Campbell Systematic Reviews*, 18(2): e1230. DOI: 10.1002/cl2.1230

Hamil S., Morrow S., Rossi G., Faccendini S. (2013). The governance and regulation of Italian football, in D. Hassan, S. Hamil (eds.), *Who Owns Football?* Routledge Ed., 31-71.

Jelodar H., Wang Y., Yuan C., Feng X., Jiang X., Li Y., Zhao L. (2018). Latent Dirichlet Allocation (LDA) and Topic modeling: Models, applications, a survey (arXiv:1711.04305). DOI: 10.48550/arXiv.1711.04305

Keele S. (2007). *Guidelines for performing systematic literature reviews in software engineering*, Kitchenham Ed., 1-53.

Lago U., Simmons R., Szymanski S. (2006). The financial crisis in European football: An introduction. *Journal of sports economics*, 7(1): 3-12. DOI: 10.1177/1527002505282871

Madden P. (2015). Welfare economics of "Financial Fair Play" in a sports league with benefactor owners. *Journal of Sports Economics*, 16(2): 159-184. DOI: 10.1177/1527002512465759

Merigó J.M., Mas-Tur A., Roig-Tierno N., Ribeiro-Soriano D. (2015). A bibliometric overview of the Journal of Business Research between 1973 and 2014. *Journal of Business Research*, 68(12): 2645–2653. DOI: 10.1016/j.jbusres.2015.04.006

Michie J. (2000). The governance and regulation of professional football. *The Political Quarterly*, 71(2): 184-191. DOI: 10.1111/1467-923x.00293

Michie J., Oughton C. (2005). The corporate governance of professional football clubs in England. Corporate governance: *An international review*, 13(4): 517-531. DOI: 10.1111/j.1467-8683.2005.00446.x

Noyons E.C., Moed H.F., Luwel M. (1999). Combining mapping and citation analysis for evaluative bibliometric purposes: A bibliometric study. *Journal of the American society for Information Science*, 50(2): 115-131. DOI: 10.1002/(sici)1097-4571(1999)50:2<115::aid-asi3>3.0.co;2-j

Pacheco L.M. (2022). Capital structure of Iberian football clubs: does sport performance matter? *International Journal of Sport Management and Marketing*, 22(5-6): 336-360. DOI: 10.1504/IJSMM.2022.10053761

Parganas P., Anagnostopoulos C., Chadwick S. (2017). Effects of social media interactions on brand associations: A comparative study of soccer fan clubs. *International Journal of Sports Marketing and Sponsorship*, 18(2): 149-165. DOI: 10.1108/ijsms-05-2017-087

Peters H., Van Raan A. (1991). Structuring scientific activities by co-author analysis: An expercise on a university faculty level. *Scientometrics*, 20(1): 235-255. DOI: 10.1007/bf02018157

Pisani N., Kourula A., Kolk A., Meijer R. (2017). How global is international CSR research? Insights and recommendations from a systematic review. *Journal of World Business*, 52(5): 591–614. DOI: 10.1016/j.jwb.2017.05.003

Radhakrishnan S., Erbis S., Isaacs J.A., Kamarthi S. (2017). Novel keyword co-occurrence network-based methods to foster systematic reviews of scientific literature. *PLOS ONE*, 12(3): e0172778. DOI: 10.1371/journal.pone.0172778

Renzi A., Sancetta G., Orlando B. (2017). Risk patterns, structural characteristics, and organizational configurations. *Strategic Change*, 26(4): 373-383. DOI: 10.1002/jsc.2138

Rey-Martí A., Ribeiro-Soriano D., Palacios-Marqués D. (2016). A bibliometric analysis of social entrepreneurship. *Journal of Business Research*, 69(5): 1651–1655. DOI: 10.1016/j.jbusres.2015.10.033

Rodríguez M.S., Ortega Alvarez A.M., Arango-Vasquez L. (2022). Worldwide trends in the scientific production on soccer players market value, a bibliometric analysis using bibliometrix R-tool. *Team Performance Management: An International Journal*, 28(5/6): 415-440. DOI: 10.1108/tpm-02-2022-0015

Rodríguez-Soler R., Uribe-Toril J., Valenciano J.D.P. (2020). Worldwide trends in the scientific production on rural depopulation, a bibliometric analysis using bibliometrix R-tool. *Land use policy*, 97: 104787. DOI: 10.1016/j.landusepol.2020.104787

Rohde M., Breuer C. (2016). Europe's elite football: Financial growth, sporting success, transfer investment, and private majority investors. *International Journal of Financial Studies*, 4(2): 12. DOI: 10.3390/ijfs4020012

Scafarto V., Dimitropoulos P. (2018). Human capital and financial performance in professional football: the role of governance mechanisms. *Corporate Governance: The international journal of business in society*, 18(2): 289-316. DOI: 10.1108/cg-05-2017-0096

Simmons R. (1997). Implications of the Bosman ruling for football transfer markets. *Economic Affairs*, 17(3), 13-18. DOI: 10.1111/1468-0270.00036

Tranfield D., Denyer D., Smart P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British journal of management*, 14(3): 207-222. DOI: 10.1111/1467-8551.00375

Small H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for information Science*, 24(4): 265-269. DOI: 10.1002/asi.4630240406

Wagner F., Preuss H., Könecke T. (2021). A Central Element of Europe's Football Ecosystem: Competitive Intensity in the "Big Five". *Sustainability*, 13(6): 3097. DOI: 10.3390/su13063097

Waltman L., van Eck N.J., Noyons E.C.M. (2010). A unified approach to mapping and clustering of bibliometric networks. *Journal of Informetrics*, 4(4): 629–635. DOI: 10.1016/j.joi.2010.07.002

Woisetschläger D. M., Haselhoff V. J., Backhaus C. (2014). Fans' resistance to naming right sponsorships: Why stadium names remain the same for fans. *European journal of Marketing*, 48(7/8): 1487-1510. DOI: 10.1108/ejm-03-2012-0140

Xiao Y., Watson M. (2019). Guidance on conducting a systematic literature review. *Journal of planning education and research*, 39(1): 93-112. DOI: 10.1177/0739456x17723971

Zupic I., Čater T. (2015). Bibliometric Methods in Management and Organization. *Organizational Research Methods*, 18(3): 429–472. DOI: 10.1177/1094428114562629

FrancoAngeli/Riviste

tutte le modalità
per sceglierci in digitale

Più di 80 riviste consultabili in formato digitale su **pc** e **tablet**:

1. in *abbonamento annuale* (come ebook)
2. come *fascicolo singolo*
3. come singoli *articoli (*acquistando un *download credit)*

Più tempestività, più comodità.

Per saperne di più: **www.francoangeli.it**

SOMMARIO 2. 2023

FrancoAngeli
La passione per le conoscenze

Edizione fuori commercio

ISSNe 2723-9098