

The Evolution of the Music Industry in Light of Information and Communication Technologies

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Abstract: This paper examines the transformative role of Information and Communication Technologies (ICTs) in shaping contemporary music industry structures, practices and economies. Drawing on a systematic literature review, the study maps how digital tools, from digital audio workstations, streaming platforms, recommendation algorithms to technologies such as AI and Virtual Reality, have changed the creative agency, altered revenue streams and reconfigured audience engagement. Findings indicate a double-sided transformation, as ICTs have made music production more participatory and lowered market entry barriers, enabling diverse voices, while concentrating attention and value through platform-mediated algorithms that favor scale and discoverability. Monetization has shifted from ownership to access, creating new micro-revenue models, also raising concerns about artist remuneration, copyright enforcement and market oversaturation. Using a dataset of 5300 scientific sources published between 2015 and 2025, the analysis conducted in the VOSviewer program shows the thematic architecture of the field and reveals how scholars, institutions, countries and conceptual domains interact. The results offer a structural overview and validate the relevance of this topic as a rapidly expanding research frontier. The paper reviews current trends in the literature and outlines future research agendas on AI authorship, immersive live experiences and data governance, aiming to guide academics, industry stakeholders, specialists in the field of Computer Sciences and policymakers navigating the digital music ecosystem. Finally, it discusses regulatory, ethical and business-model implications, emphasizing the need for policy interventions that balance innovation with fair compensation and cultural diversity

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INTRODUCTION

Understanding the relationship between Information and Communication Technologies (ICT) and the cultural industries starts with acknowledging the central role these technologies now play in driving innovation and digital transformation. A study from 2014 already pointed out that cultural industries rely on ICT as practical tools and as environments in which creative work actually takes place, making technological innovation and cultural production increasingly inseparable (Moore, 2014). Within this broader infrastructure, digital platforms have become especially influential. As Magaúda and Solaroli note, they now act as key mediators in the production, circulation and consumption of cultural content (Magaúda & Solaroli, 2020). Another contribution underlines the fact that ICT-enabled digitalization opens up new possibilities for diversity and experimentation, broadening access and encouraging more active public participation (Snowball, Tarentaal, & Sapsed, 2021).

More recent research goes even further, proposing that ICT have come to shape every stage of the artistic process, from the initial act of creation to production, distribution and ultimately the ways audiences engage with cultural goods. In this sense, ICT have become a driving engine of innovation (Ortiz-Ospino, González-Sarmiento, & Roa-Perez, 2025). Because of this, it is no longer accurate to think of them as mere technical instruments; they should instead be understood as foundational infrastructures that influence how culture is made, communicated and experienced in today's digital environment.

LITERATURE REVIEW

When speaking about digitalization, there must also be considered a series of tools that increasingly define musical life: algorithms that predict listeners' preferences on streaming platforms, sentiment-analysis systems that interpret audience reactions across environments like YouTube or Spotify and digital tools that extend directly into the act of musical creation itself. Many musicians today compose using software such as MuseScore for Western notation, a program equipped with systems that can generate audio from the written score, effectively "performing" what the composer has imagined. Alongside these tools, researchers are investigating how Artificial Intelligence (AI) can contribute to composition through prototype applications capable of generating melodies by adjusting the parameters of specific algorithms, such as Ant Colony Optimization (ACO), or by experimenting with alternative compositional

strategies. These studies trace the full arc of the process, from theoretical grounding and system design to implementation, experimentation and the conclusions that is drawn from them (Boryczka, Boryczka, & Chmielarski, 2023).

From around 2015 onward, researchers began speaking more openly about the ways ICT has been reshaping the music industry. Robert Prey, for instance, argues that the shift from Napster, the early file-sharing platform often seen as the forerunner of today's streaming services, to the dominance of Spotify or YouTube signals a kind of return to industry control, a moment where the sector once again has a say in how people listen to music in digital form. He interprets this shift through Henri Lefebvre's idea of "abstract space", suggesting that platforms transform listening into something measurable and, in turn, marketable. What used to be a simple act of listening becomes a form of data production, feeding back into new workflows and revenue structures across the industry (Prey, 2015). Fleischer describes the contemporary listening experience as part of an "age of abundance". By this, he refers to the way technology has made access to music almost effortless. What started with the collecting of MP3 files slowly evolved into unlimited streaming, moving listening habits away from physical formats (vinyl, tapes) and toward interfaces shaped by algorithms. On Spotify, for example, listening often turns into navigating menus and playlists tailored to moods or moments, where "seeking and sharing playlists" replaces the old sense of scarcity with a form of perpetual availability (Fleischer, 2015, p. 259). Ko and Lau approach these shifts from an economic point of view. They propose a model that helps firms decide on pricing and promotional strategies over time, showing that listeners weigh the value of owning music against the convenience of streaming. Companies, they argue, can strategically use discounts or timed advertising to influence consumer decisions (Ko & Lau, 2016, pp. 277-279, 281).

Around this period, we also begin to see early discussions about AI's influence on music production. Birtchnell examines how AI infiltrates the mastering stage, the final step before a track's release. The process shifts from what the author calls a "pre-digital workflow" to an "AI workflow," where decisions are generated algorithmically (Birtchnell, 2018, pp. 5-8). While this reduces costs and turnaround time, it also changes professional roles: engineers focus more on "critical listening" and on communication with artists (Birtchnell, 2018, p. 9). At the same time, artists themselves can collaborate directly with the system—uploading files, receiving a draft master, giving feedback—

creating a hybrid interaction between human judgment and machine processing (Birtchnell, 2018, pp. 10-13).

In parallel, Luca Turchet and his team introduce the “Internet of Musical Things” (IoMusT), a framework composed of smart instruments, mobile devices, wearables and sensor-equipped headphones that communicate with one another and with online services. This network opens possibilities such as remote rehearsals, interactive performance and even AR-based music lessons. However, the system depends on extremely low latency (under 10 ms), precise synchronisation and strong privacy and security mechanisms. Because these devices collect sensitive data about users and their interactions, privacy safeguards must be embedded into their design. The authors, therefore, propose technical rules ensuring that each device includes privacy policies readable both by humans and by other machines (Turchet, Fischione, Essl, Keller, & Barthet, 2018, pp. 62012–62013).

During this period marked by musical abundance, Jansson and Hracs point out that the challenge is no longer scarcity but rather the opposite: there is simply too much music available (Jansson & Hracs, 2018). Similarly, Moschetta and Vieira note that by 2018, playlists had become the dominant way listeners discover and organise music on platforms like Spotify. These playlists may be curated algorithmically or by humans, but listeners still tend to favour the human-made ones for their creativity and personal touch, even though algorithmic recommendations often prove more accurate (Moschetta & Vieira, 2018). Saragih and colleagues bring yet another angle, discussing how innovation in music increasingly involves multiple contributors like artists, fans and communities. Their model outlines four collaborative stages: co-discovery, co-creation, co-delivery and co-capture (Saragih, Simatupang, & Sunitiyoso, 2019, pp. 1-6). Taken together, these stages show that musical value is no longer produced solely by the industry, but it rises up through interaction with the audience as well (Saragih, Simatupang, & Sunitiyoso, 2019, pp. 7-11, 17).

Meanwhile, Luca Turchet continues to expand the IoMusT framework by focusing on smart musical instruments. These devices integrate sensors, micro-processors, networking capabilities and intelligent software. They can analyse performance in real time, communicate with other instruments or cloud services and support new modes of interaction between musicians and audiences (Turchet, 2019, p. 8948). Features like digital routing, very low latency and built-in connectivity (Bluetooth LE, Wi-Fi 802.11ac, MIDI/OSC) allow these instruments to react almost instantly, much like acoustic ones

(Turchet, 2019, pp. 8949–8950). Their design also reduces setup time and makes real-time remote collaboration viable (Turchet, 2019, pp. 8953–8954, 8963).

By 2020, the term “music cities” begins to appear more often in the literature (Bennett, 2020, p. 2). Bennett shows that the idea extends beyond cultural branding to encompass concrete investments in infrastructure: concert halls, studios, rehearsal spaces. His account of the policy workflow includes conducting musical audits, preparing reports and assembling “business cases” for funding, turning the music-city model into a template adopted internationally (Bennett, 2020, pp. 4-6). Camilleri and Falzon highlight how digital platforms and interactive tools offer audiences virtually limitless access to musical resources. What once required being physically present in a rehearsal room or buying recordings can now happen with a single click. These technologies support both passive listening and active engagement, enabling students and young musicians to collaborate online, create music using accessible software and share their work instantly (Camilleri & Falzon, 2021).

Rodgers and colleagues revisit their earlier theme, studying how AI combined with “musical biometrics”, tracking bodily and facial reactions, can shape consumer behaviour in a music store (Rodgers, Yeung, Odindo, & Degbey, 2021, pp. 402–405). Their experiment in China shows that when AI selects music based on real-time interpretation of customer reactions, people tend to linger longer and, not surprisingly, purchase more (Rodgers, Yeung, Odindo, & Degbey, 2021, pp. 409–410). Michèle Duguay introduces a way of analysing what she calls “recorded virtual space”, the imagined space in which voices and instruments seem to sit when the public listens through headphones or speakers. By looking at elements such as vocal width, reverb, left–right placement and layered harmonies, her approach shows how producers construct feelings of warmth, closeness, sensitivity, or, at times, grandeur (Duguay, 2022).

China has become an important space for studying the digitalization of music. Zhang and Xiao, for instance, show how platforms such as ShowStart have reshaped the national live-concert scene. Concerts are no longer only cultural events; they also become hybrid “urban spaces”, in which digital technology ties together the artists, the audience and the organisers (Zhang & Xiao, 2023, pp. 2–3, 8). Their discussion of the “live house” phenomenon (Zhang & Xiao, 2023, p. 10) illustrates how small clubs, once part of underground or alternative cultures (Thornton, 1995) have, through these platforms, turned into mainstream urban venues. Still, this platformisation also brings intense

commercial pressure and increased state oversight (Zhang & Xiao, 2023, pp. 3-4).

A different point of view appears in the work of Shin and Lim, who look at how a digital karaoke experience might function in a post-pandemic world. They propose a mobile karaoke system designed for people who wanted to share musical moments even when they were physically apart. Their solution relies on a cloud-based music service and modern smartphones, allowing groups to sing and listen together in real time. It uses a “Voice/Touch-Based User Interface” (Shin & Lim, 2023, pp. 2–5) and fast transmission protocols like UDP (Shin & Lim, 2023, pp. 10–11), making it possible to form spontaneous online karaoke groups (Shin & Lim, 2023, pp. 8-9).

Author Hu offers yet another perspective by examining how “cloud ensemble technology” enabled orchestras to continue performing when concert halls shut down. Musicians recorded their parts individually at home and these were later synchronised digitally to produce a collective online performance (Hu, 2024, pp. 2-3). Beyond being a temporary solution, this practice shows how ICT is gradually becoming the backbone of the contemporary music market. The system described brings together cloud-storage platforms, mobile apps and algorithms that match the supply and demand for online performances (Hu, 2024, pp. 5-7). And while such concerts may not match the emotional intensity of in-person performances, they offer clear benefits such as lower costs, global accessibility and the chance to reach new audiences (Hu, 2024, p. 3).

Wei and his colleagues go a step further by arguing that AI is increasingly regarded as a “co-creator” in music, not merely a technical assistant. Their article reviews systems capable of generating melodies, accompaniments and even personalised interpretations for listeners (Wei, Yu, Qin, & Zhang, 2025). This shift inevitably challenges the traditional role of the composer and raises broader questions about copyright and the nature of human creativity. In a related direction, Cotton and his team examine how artists interact with “musical-AI agents”, which are algorithmic systems able to compose or perform music. These encounters, the authors suggest, involve ongoing negotiation, as sometimes AI is welcomed as a creative partner, other times it is treated more as a tool and occasionally it becomes a kind of artistic provocation (Cotton, Kaila, Jääskeläinen, Holzapfel, & Tatar, 2025).

Lovett, meanwhile, turns toward blockchain-based streaming. He shows that platforms such as Resonate or Musicoin use models where users pay per listen or via digital tokens and the money goes

straight to the artist. Rights management is handled through “smart contracts”, without passing through labels or intermediaries. In this sense, ICT developments create the possibility of an ecosystem where artists are paid directly and almost instantly for each listen (Lovett, 2020). Chalmers and his co-authors extend this idea, arguing that blockchain could fundamentally reshape the relationships among artists, audiences and intermediaries. The technology, they say, has the power to remove traditional gatekeepers and allow musicians “to receive direct and almost instantaneous payments from fans” (Chalmers, Matthews, & Hyslop, 2021, p. 582). They describe blockchain as enabling “trustless exchange”, where transactions are secured by algorithms rather than external authorities (Chalmers, Matthews, & Hyslop, 2021, pp. 582–583). While this might solve issues such as opaque royalty systems or unequal revenue distribution, the authors also note the challenges posed by cryptocurrency volatility and unclear legislation (Chalmers, Matthews, & Hyslop, 2021, p. 583).

Finally, Luca Turchet sketches a framework for what he calls the “Musical Metaverse”, a dedicated musical dimension of the broader digital metaverse (Turchet, 2023, pp. 1811–1814). He shows how technologies like extended reality (XR), the Internet of Musical Things (IoMusT), blockchain and NFTs could transform the ways music is composed, performed, taught and experienced. With smart contracts, royalties could be distributed automatically and NFTs would allow artists to sell unique digital versions of songs or event tickets, strengthening their direct relationship with audiences (Turchet, 2023, pp. 1814–1815).

METHODOLOGY

Bibliometric methods have become indispensable for understanding how research areas evolve, fragment or converge across time. In the case of digital transformation within the music industry, an interdisciplinary field situated between technology, business, culture and the arts, such methods are particularly valuable. Using a dataset of 5300 scientific sources published between 2015 and 2025, the VOSviewer analysis conducted here uncovers the thematic architecture of the field and reveals how scholars, institutions, countries and conceptual domains interact. The results offer a structural overview, validating in the same time the relevance of this topic as a rapidly expanding research frontier. To identify the relevant literature, a search strategy was used and it was formulated in the specific query language of bibliographic databases (Scopus, Web of Science, etc.), which was then adapted to the

requirements of each database. The search combined keywords associated with the music industry, digital technologies, ICT and transformation processes, together with time filters and disciplinary filters. The Boolean search string schema is represented in Figure no. 1.

To obtain a clearer picture of the digital evolution of the music field, a Bibliometric Literature Review (BLR) approach was adopted, method that combines bibliometric (quantitative) analysis with qualitative content analysis. This method maps the field through quantitative indicators (authors, organisations, countries, co-citation and co-occurrence networks), allowing the results to be interpreted in context, by relating them to theoretical frameworks and debates in the specialist literature.

The research methodology was therefore structured along two complementary directions:

1. Quantitative level, based on bibliometric analysis carried out with the VOSviewer software;
2. Qualitative level, centred on content analysis and interpretation of the selected literature, in order to highlight contributions, limitations and future research directions (as presented above in the 2nd part of this article - 2. Literature Review)

The Bibliometric Literature Review process is represented in Figure no. 2.

RESULTS AND DISCUSSIONS BASED ON THE BIBLIOMETRIC ANALYSIS

The results that were obtained after the bibliometric analysis validate the relevance and timeliness of the presented research topic. They show that digitalization in music is an active field of debate, one whose complexity demands exactly the kind of integrative approach the study proposes, linking bibliometric evidence with qualitative interpretation.

Keyword Co-Occurrence: thematic foundations of the field

Based on the co-occurrence of author and index keywords, the first VOSviewer visualization offers a panoramic view of the main thematic directions. From 17,238 keywords, only 127 met the inclusion threshold. VOSviewer selected 100 terms based on total link strength, forming a remarkably coherent network of six clusters, results shown in Figure no. 3 and Figure no. 4.

These clusters capture the conceptual backbone of the literature:

- Cluster 1 (red) focuses on music and digital technologies (AI, deep learning, recommender systems, computer music), reflecting the surge of

computational methods applied to creation, distribution and listening.

- Cluster 2 (green) addresses digital transformation and socio-economic change, with terms such as “business models,” “digital economy,” and “creativity,” highlighting how industry structures adapt to technological shifts.
- Cluster 3 (blue) tackles copyright, piracy and digital commerce, underscoring persistent legal and economic debates surrounding rights and monetization in the digital era.
- Cluster 4 (yellow) is centered on music industry and digital consumption, particularly using social media and streaming platforms like Spotify and YouTube.
- Cluster 5 (purple) points to blockchain and security technologies, a more exploratory but significant line of inquiry on transparency, smart contracts and rights management.
- Cluster 6 (cyan) includes human-centered and methodological terms, functioning as a small but meaningful reminder of the social research dimension.

Across the network, the keyword “music” stands out as the central node, connected to performance, computer music, streaming and AI. Meanwhile, “music industry” forms a second nucleus tied to popular music, social media and major platforms. AI-related terms cluster tightly, confirming how algorithmic mediation has become a defining feature of contemporary music ecosystems. Equally notable are the links between “blockchain” “copyright” and “piracy” which map ongoing concerns around property rights and digital circulation.

The density visualization shown in Figure no. 4 further sharpens these insights. The “hot” zones, colored with yellow and red, accumulate around music, music industry, social media and artificial intelligence, revealing the areas with the highest concentration of scholarly attention. Cooler zones, such as blockchain and piracy, suggest topics of interest that remain niche but rapidly evolving.

These clusters mirror precisely the conceptual terrain of the current study: technological innovation, transformation of industry models, legal frameworks, consumer behavior and socio-cultural dynamics. The VOSviewer results confirm that the field is not dominated by a single narrative, but instead divided into interconnected subfields that together show the complexity of digital evolution in music.

Co-Authorship among Authors: a fragmented but structured community

The co-authorship map represented in Figure no. 5 provides another layer of insight, revealing the human architecture behind the literature. Out of

10,288 authors, only 374 met the criteria for inclusion (≥ 3 publications, ≥ 10 citations). VOSviewer identified only 24 interconnected authors forming the largest collaborative component, divided into four clusters:

- The Dutch cluster (red), including Berkers, Hitters, Mulder, Rutten, Schaap and van der Hoeven, indicates strong internal cohesion and a thematic focus on sociology, cultural industries and digitalization.
- The international green cluster, with authors such as Bennett, Guerra, Sousa and Nowak, explores digital culture, identity and local music scenes.
- The blue Anglo-Saxon cluster (Frith, Cloonan, Strong, Homan, Brennan) represents foundational scholarship in cultural policy, popular music and creative labor.
- The yellow interdisciplinary cluster (Negus, Street, Behr, Hamilton, Schroff) focuses on copyright, cultural policy and the socio-economic implications of the digital shift.

Despite the substantial output in the field, scholarly collaboration remains limited and localized. The presence of strong regional clusters, especially the Dutch and Anglo-Saxon groups, suggests that theoretical traditions and national research cultures shape how digital music studies evolve. The limited interconnections highlight a fragmented domain, where several parallel conversations develop without converging into a unified research community. As the present research advances, this fragmentation represents both a challenge and an opportunity: there is room for conceptual integration and methodological innovation.

Co-Authorship among Countries: global poles of research activity

When shifting the unit of analysis to countries, the picture becomes broader. Out of 115 countries, 67 met the thresholds for inclusion (≥ 5 documents and ≥ 10 citations). The resulting map, represented in Figure no. 6, points toward three global poles:

- The United States and United Kingdom dominate collaboration networks and occupy central, high-density positions.
- China and India are fast-growing contributors, marked by strong regional and cross-continental partnerships.
- Germany and the Nordic countries constitute a vibrant European hub with dense internal collaborations.

This landscape confirms the highly international nature of digital music research but also shows geographic asymmetry. The Anglo-American axis remains a major driver, while Asia's increasing presence aligns with broader global trends in digital innovation. Europe's distributed but dense clusters

reflect its longstanding engagement with cultural and creative industries research.

Co-Authorship among Organizations: eight institutional clusters

At the institutional level, VOSviewer identifies 52 interconnected organizations, grouped into eight clusters and linked through 108 direct co-authorship ties. The total link strength of 151 indicates a moderately dense network, though still divided into identifiable regional blocs.

These clusters reveal clear geographical patterns. For example, the British and Commonwealth universities dominate one cluster (e.g., Leeds, Glasgow, Toronto), while prestigious Western institutions form another (Oxford, UCL, Columbia). Nordic and continental European institutions gather around London and Stockholm, while Holland–Belgium–Germany form their own interconnected group. Additional clusters map collaborations across the Iberian Peninsula, Australia and Asia.

Institutional collaboration appears more structured than individual author collaboration, suggesting that while researchers may work independently within thematic niches, universities and research centers increasingly engage in cross-border projects. This structural observation aligns with how the global music industry itself operates: internationally connected but locally differentiated.

Term Co-Occurrence (Titles & Abstracts): a complementary conceptual map

To broaden the conceptual analysis, terms extracted from titles and abstracts were analyzed using binary counting and filtered to a minimum of 100 occurrences, producing a set of 100 highly relevant terms. VOSviewer generated four major thematic clusters, visible in Figure no. 7: innovation and technology, culture and creative industries, digital music and online platforms and COVID-19–related transformations.

This second map reinforces the findings of the keyword analysis but goes further in showing dominant research vocabularies and methodological trends (“design methodology approach”, “originality value”, “practical implications”). The presence of pandemic-related terms confirms how COVID-19 reshaped scholarly inquiry into digital cultural practices.

Taken together, the VOSviewer visualizations paint a compelling and multifaceted picture of research on the digital transformation of the music industry. They demonstrate that the field is deeply interdisciplinary, spanning technology, economics, cultural studies, management, law and media studies. Its conceptual structure revolves around six major research themes, with AI, streaming, digital

platforms and rights management at the center. Scholarly collaboration is fragmented at the individual level, but better structured at organizational and national levels. Global research is concentrated around several academic hubs, yet still-developing regions are gaining prominence. Pandemic-related shifts have accelerated digitalization trends both in industry practice and academic inquiry.

CONCLUSIONS

The overall picture that is drawn from this study is that digital technologies have become inseparable from the contemporary music ecosystem. What once functioned as a set of auxiliary tools has evolved into a complex technological infrastructure that shapes how music is created, produced, distributed and experienced. Digital platforms, networked audio systems, algorithmic recommendation, AI-assisted creativity and blockchain-based models all contribute to a landscape in which artistic practice, economic models and cultural participation are being continuously redefined.

The VOSviewer analysis gives structure to the vast research conducted based on these developments. The thematic clusters identified across the dataset reveal a field anchored in several major domains: Artificial Intelligence and computer music, digital consumption through streaming and social media, business models and digital transformation, copyright and rights management, blockchain innovation and the social and cultural dimensions of music in a digital environment. These clusters mirror long-standing academic debates, pointing to areas of interest that are beginning to change the scholar-approach to the study of music and technology.

Collaboration patterns show a field that is both global and uneven. While institutions and countries form powerful networks, individual researchers tend to work within smaller, often regionally concentrated clusters. This fragmentation reflects the diversity of perspectives, disciplines and methodological approaches that make up the field, but it also highlights opportunities for greater integration and cross-disciplinary dialogue. At the same time, the growing engagement of diverse regions signals that digital music research is expanding beyond its traditional academic centres. Taken as a whole, the findings confirm that digitalization is not a linear process. It is a multifaceted transformation driven by rapid technological innovation, shifting listener behaviours, new forms of cultural production and ongoing debates around value, rights and creative autonomy. These changes bring both opportunities -

broader access, new tools for creation, alternative revenue models - and challenges, such as questions of transparency, ethical governance, sustainability and the evolving role of human creativity in relation to AI.

Several promising directions arise from the analysis conducted in this study:

- Future work can benefit from bringing together technological, economic and socio-cultural perspectives rather than treating them separately;
- Rapid shifts in technology and consumption call for research that compares different time periods, regions and regulatory environments;
- More qualitative, practice-based research can show how artists, producers and audiences use digital tools in their daily work;
- Expanding discussions on privacy, algorithmic fairness, authorship and rights is essential as digital systems become more common;
- Digital tools increasingly shape how young people learn, collaborate and form communities around music, which represents an area with great potential for further study;
- Economic, environmental and labour implications of platform-based music ecosystems deserve deeper examination, especially as new technologies continue to reshape the industry.

Digital transformation in music is ongoing, uneven and full of open questions. Rather than offering a single coherent narrative, it appears through interconnected yet distinct developments across technology, culture, industry and society. The combination of bibliometric mapping and literature review used in this study demonstrates the value of approaching the field as a whole, acknowledging its complexity. As music continues to evolve alongside digital innovation, the academic conversations that seek to understand it will do the same, making this a fertile and necessary area for future research.

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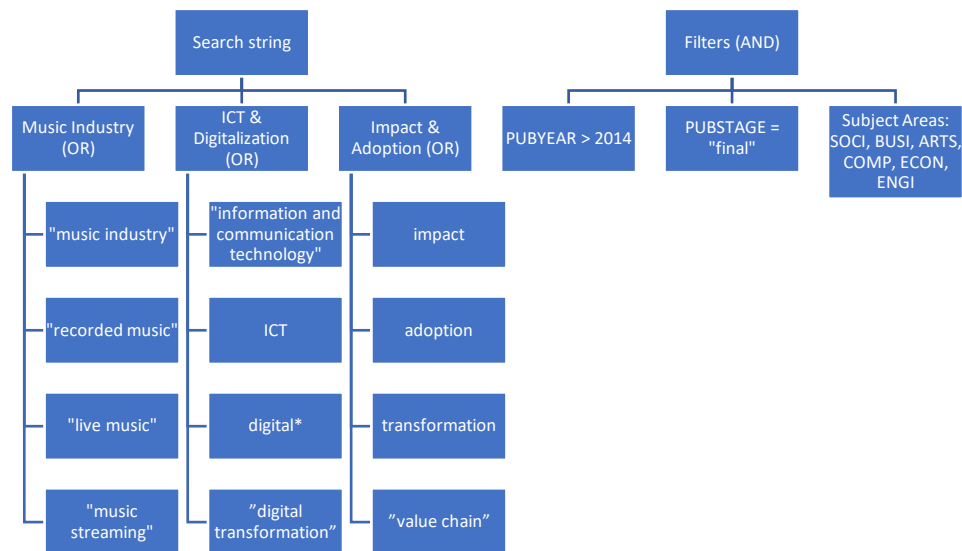


Figure no. 1
Boolean search string schema
Source: Author's processing

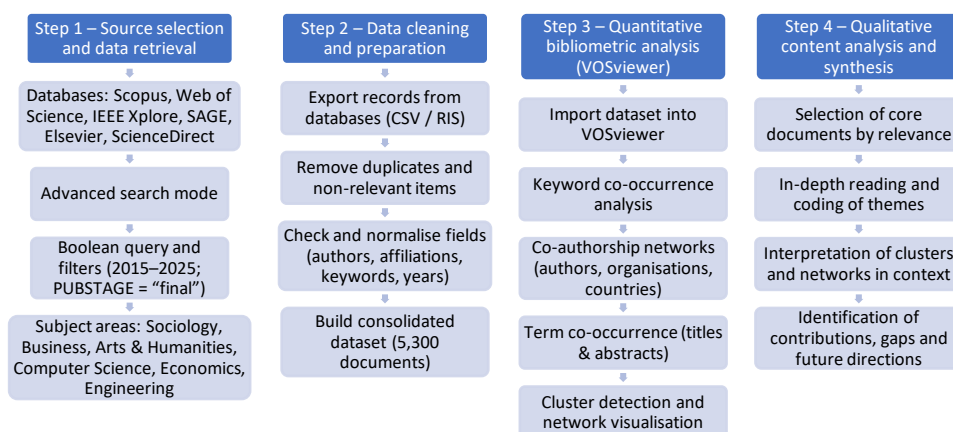


Figure no. 2
Bibliometric Literature Review process
Source: Author's processing

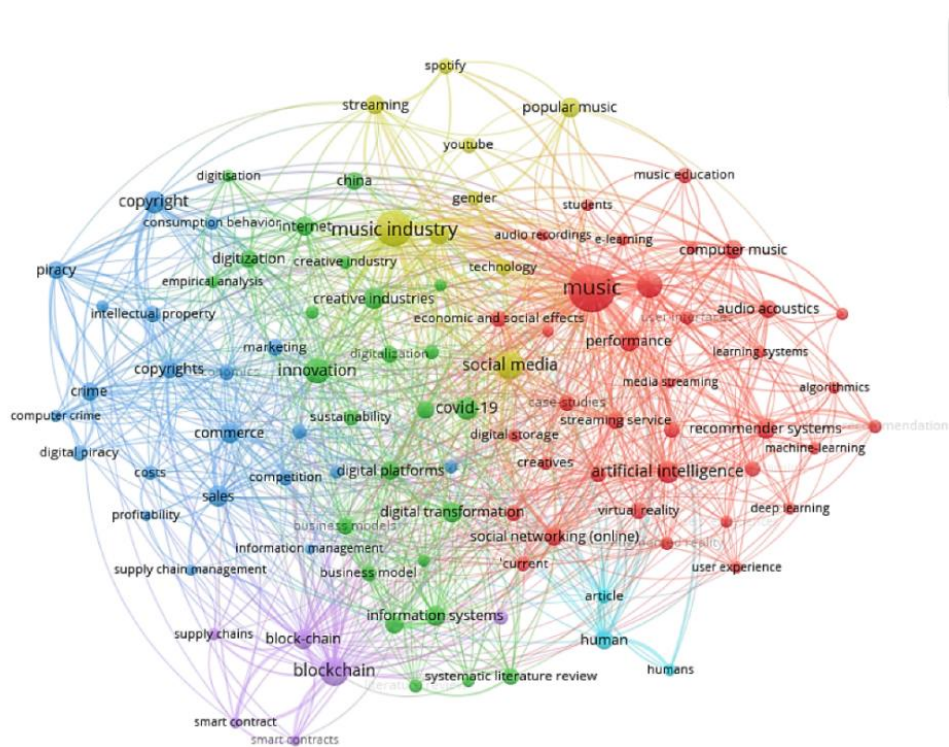


Figure no. 3

Keywords co-occurrence - Network Visualization

Source: Author's processing in VOSviewer software

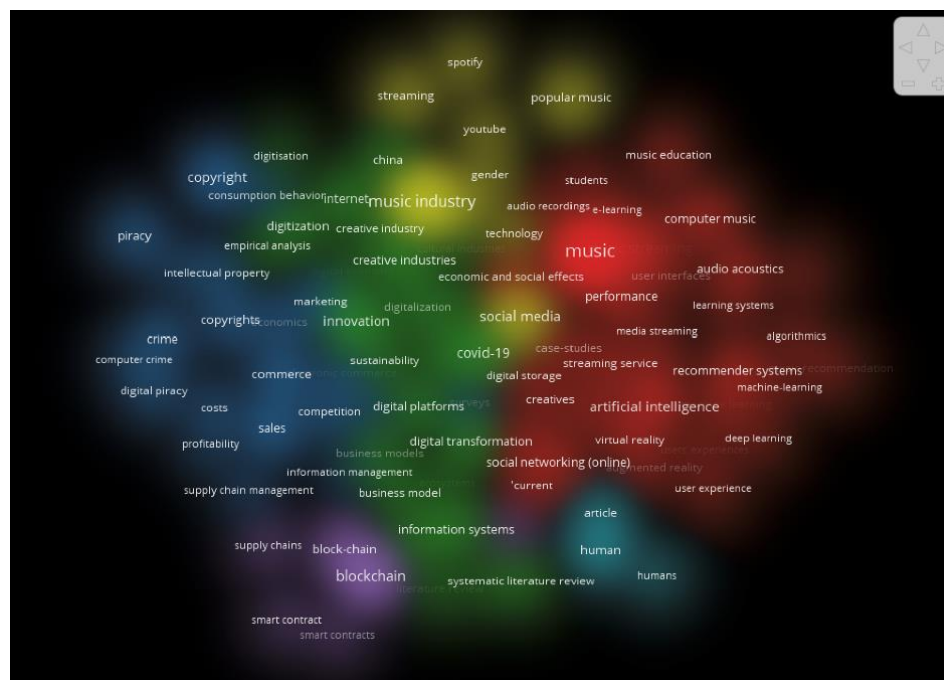


Figure no. 4

Keywords co-occurrence - Density Visualization

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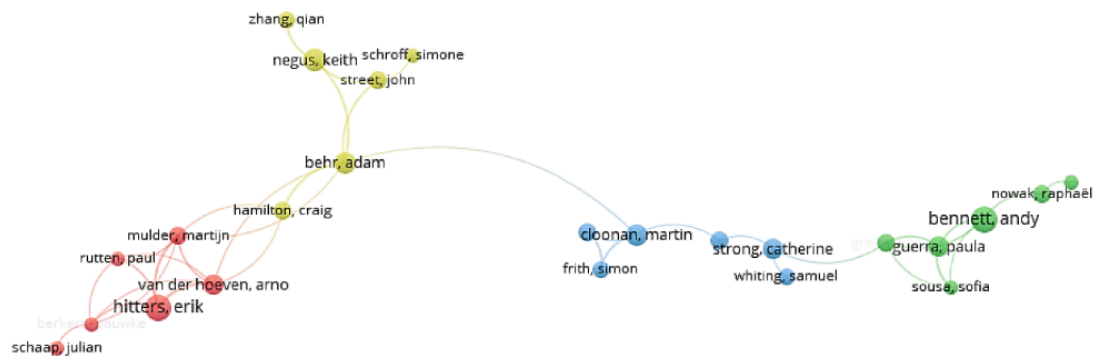


Figure no. 5
Co-authorship - Network Visualization
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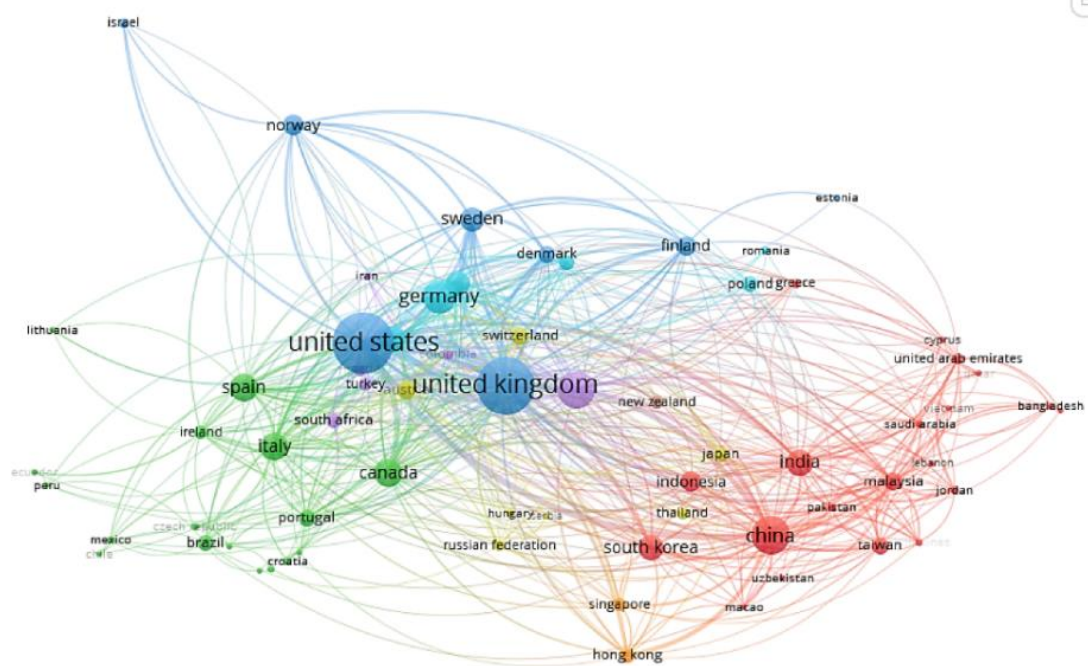


Figure no. 6
Co-citation. Countries - Network Visualization
Source: Author's processing in VOSviewer software

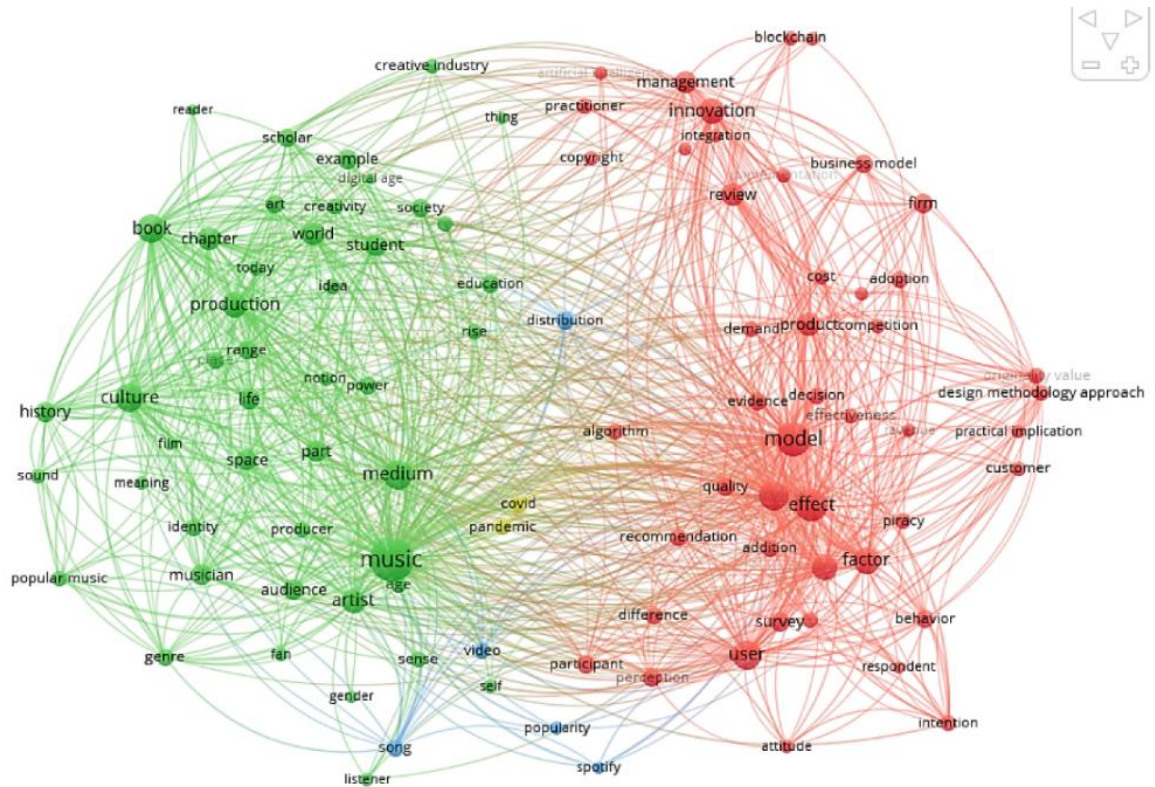


Figure no. 7
Co-occurrence. Terms title & abstract - Network Visualization
Source: Author's processing in VOSviewer software