



Future of Artificial Intelligence in Music Industry: The Connection Between Generative AI And Music Production

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Abstract

In the era of digitalization and technological progress, artificial intelligence is a fast-developing technology which plays a significant role in our lives. Nowadays AI is incorporated in many business fields, including music industry. Generative AI has been a dominating type of artificial intelligence in music business, creating new opportunities as well as causing unexpected challenges. Thus, contribution of AI and how it is implemented in music industry should be studied.

The research objectives were focused on examining generative AI, assessing the significance of its role in music production process as well as studying the contribution of artificial intelligence to the future of music industry.

First, in order to meet the established objectives, theoretical framework was created through examining the existing literature related to the topic. Additionally, data for the research was obtained from two online discussion forums to conduct qualitative research. The research was conducted through carrying out content analysis of the collected data.

Achieved results consisted of insightful views and opinions of users regarding merits and demerits of generative AI in music production and future role of artificial intelligence in music industry. The study revealed the nature of users' predictions regarding future implementations of AI in music industry as well as how generative AI benefits the music production process and what issues in the production process were caused by AI.

Keywords/tags (subjects)

Artificial intelligence, music industry, music production

Miscellaneous (Confidential information)

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Contents

1	Introduction and background.....	5
1.1	Motivation for the research	5
1.2	Research objectives and questions	6
1.3	Thesis structure	7
2	Literature review	8
2.1	The concept of artificial intelligence	8
2.1.1	Analytical Artificial intelligence	8
2.1.2	Descriptive Artificial intelligence	9
2.1.3	Generative Artificial intelligence	9
2.2	AI in music	10
2.2.1	Implementation of AI in music	10
2.3	Music industry.....	15
2.4	Music production	16
2.5	Future of music industry	19
3	Implementation of the study	22
3.1	Research method	22
3.2	Data collection.....	23
3.3	Data description and analysis	24
3.4	Ethical considerations	26
3.5	Credibility and trustworthiness of the research	26
3.6	Limitations of the method.....	27
4	Research results	27
4.1	Benefits of implementing AI.....	28
4.2	Demerits of using AI	30
4.3	Future of AI in music industry	33
5	Discussion.....	36
5.1	Main findings of the research	37
5.2	Practical implications	41
5.3	Assessment of the research results and research process	41
5.4	Limitations of the research	42
5.5	Recommendations for the future research	43

References	44
Appendices	48
Appendix 1. Discussion forums	48

Figures

Figure 1. A visual explanation of a GAN model (Bitarães et al., 2022)	11
Figure 2. Graphic representation of AI implementation in music	15
Figure 3. Music production as a part of music industry structure (Weng and Chen, 2020)	17
Figure 4. Visualization of how an IMP tool operates (Moffat and Sandler, 2019, September) .	18
Figure 5. Model of global streaming music subscription market (Chatsri, 2021)	20
Figure 6. Current and future trends of music industry	22
Figure 7. Summary on advantages and disadvantages of using AI in music industry	33
Figure 8. Respondents' views on the future of AI in music industry in percentage terms	36

1 Introduction and background

In the current era of digitalization, many industries and businesses are learning how to adapt to the changes brought by technological progress. Technological advancements can vary from subtle improvements to phenomenal breakthroughs and our everyday lives change accordingly: sometimes humans have to rely on technology and explore the benefits it offers (Baidoo-Anu & Owusu Ansah, 2023). It is a well-known fact that the breakout of COVID-19 and the following pandemic have forced many of us to drastically change the common rhythm of life, and this is when the technology was improved or taken to another level.

However, even before the pandemic, the implementation and development of artificial intelligence (AI) started to grow immensely. According to Surden (2019), various bots, search algorithms, digital assistants, smart homes, face recognition techniques, and other examples of AI started to appear long before 2020. What is more, the implementation of AI in our everyday lives caused various changes across multiple business industries. Music industry is no exception: nowadays AI plays an important role in the life of music artists, creators, producers, and amateurs, and heavily impacts the process of music production.

Thus, this study examines the contribution of generative artificial intelligence to music industry, focuses on its merits and demerits in music production, and explores the future role of AI in the industry.

1.1 Motivation for the research

Music industry is continued to be influenced by AI. Especially after COVID-19 pandemic, when most artists did not have direct access to music studios or live interaction with producers, many keep relying on technology and AI or using it for their benefit.

As a technology business student, I have always been interested in artificial intelligence development and how it affects businesses in various industries. Moreover, generative AI is widely incorporated in hardly every company nowadays, which makes it more fascinating to study. To narrow my research, I decided to pick music industry since the topic seemed the most interesting and intriguing for me.

My motivation in this research is concentrated in exploring how generative AI affects music production process, what benefits and disadvantages it brings, and investigating its role in the future of music industry. Additionally, AI has been developing so rapidly in the last years that now it is being implemented in many aspects of our everyday life, as well as many business aspects and operations, thus, it must be studied.

1.2 Research objectives and questions

This paper focuses on analyzing and finding out how generative AI contributes to music industry. To provide a decent study, research objectives should be stated and research questions must be addressed. The objectives of this study can be formulated as:

- To analyze and understand generative AI
- To evaluate the contribution of AI to the music production process
- To examine the role of generative AI in the music industry.

Based on the research objectives, following research questions were developed:

RQ1. What are advantages and disadvantages of using generative AI for music production process?

In order to gain a better understanding of how and in what way generative artificial intelligence is connected to the music production, the first question was formulated.

RQ2. What is the future of generative AI in the music industry?

In order to examine insights and predictions and assess the role of generative AI in the future music industry, the second question was formulated.

To answer the research questions, I have collected secondary data and conducted qualitative research based on it.

1.3 Thesis structure

In order to give a reader a better understanding of how this study was written and carried out, this chapter provides a brief overview of the study's structure and contents.

This thesis contains five chapters which fully describe the conducted research.

Introduction is the first chapter as it is in any other academic paper. There author provides the background information, their motivation for conducting this research in the first place, as well as formulates research objectives and questions.

Then the reader is introduced to the Literature review, the second chapter. It contains analysis and explanation of crucial concepts that are required for this research and backed up with multiple academic sources. Theoretical framework is based on the examination of the literature that corresponds to the topic of the research.

Moving forward to the third chapter, Implementation of the study describes the methodology used for the research, meaning that it outlines selected research context and methods. The chapter contains the clarifications on data collection and analysis, credibility and trustworthiness of the research, ethical considerations as well as the limitations of the chosen method.

The fourth chapter is Results, which describes the results and findings of the study in detail. It provides visualization of the findings as well.

Lastly, the final chapter is called Discussion. In the last part of the study the findings are used to answer the research questions. In addition, the evaluation of the results and research process is carried. Such things as practical implications, limitations of the study and implications for future research are being discussed.

2 Literature review

In this chapter essential literature sources are examined, and overviewed in order to gather findings, theories, and acknowledged facts, related to the topic of the study. Theoretical background is formed based on the overview and backed up with the evidence from previous researches.

2.1 The concept of artificial intelligence

In order to understand differences between the types of AI, first we need to define and describe its concept. "Artificial intelligence is the culmination of computers, computer-related technologies, machines, and information communication technology innovations and developments, giving computers the ability to perform near or human-like functions" (Chen et al., 2020, p.2).

According to Surden (2019), the term artificial intelligence means a technology that is typically used for automatization of the tasks which require human intelligence. Another understanding of AI refers to it as a field of computer science which connects multiple disciplines, linking techniques and ideas from various fields, such as statistics, electrical engineering, mathematics, and others.

In other words, artificial intelligence is the ability of machines to adapt to new situations and circumstances, solve problems, deal with emerging issues, answer questions and perform other activities, which require human intelligence. Such innovation was achieved after years of research, studies and development of information and computer communication technologies (Chen et al., 2020).

There are different types of artificial intelligence but in this paper, we will focus on three of them: analytical, descriptive, and generative AI.

2.1.1 Analytical Artificial intelligence

AI analytics can be as efficient and productive as a group of data scientists working together and analyzing data. To begin with, analytical AI can be defined as a technology which analyzes, processes, and learns from big amounts of information in order to be able to engage in decision-

making and problem-solving processes. It can execute analytical tasks which would typically require human intelligence and provide scalable and accurate analysis of data (Flavián et al., 2022).

Machine learning (ML) is typically associated with analytical AI as it discovers specific patterns analyzing large amounts of data. Surden (2019) states that machine learning can be defined as a combination of various computer techniques which are used to find particular useful patterns to implement them in versatile tasks, for instance, detecting fraud.

A particular thing which makes ML systems unique is that they are able to make effective decisions without understanding complex meaning of the analyzed things. In other words, a human could have come to the same results as the machine, using their cognitive skills, while ML system uses identified patterns and predictions based on large amounts of data to generate the solution.

2.1.2 Descriptive Artificial intelligence

Swisher (2021) points out that descriptive AI is the analytics that is used to describe something that happened in the past and it analyzes data to answer the question “What did happen?”. One of the most useful techniques for descriptive analytics is clustering, which means putting similar things into groups in order to see certain patterns.

Moreover, it is quite common to use mathematical and statistical tools in descriptive analytics in order to outline the issues and emphasize areas that require change (Riahi et al., 2021).

2.1.3 Generative Artificial intelligence

One of the most rapidly developing types of artificial intelligence in the last years is generative AI. This type of AI is an innovative technology that produces new content such as video, text, audio, graphics etc. by studying identified patterns, statistics, and existing digital content. Advances in deep learning allow this technology to be only partially supervised or unsupervised at all (Baidoo-Anu & Owusu Ansah, 2023).

According to Baidoo-Anu and Owusu Ansah (2023), there are two major generative AI: Generative Adversarial Network (GAN) and Generative Pre-Trained Transformer (GPT).

While GAN is used for generating synthetic data and deciding whether the content is authentic or not, GPT is trained to read and create human-like text in particular languages based on large amounts of data.

To provide the example of generative AI, we should take a closer look at one of the most famous tools based on GPT language model technology - ChatGPT, developed by OpenAI. It is a chatbot that is capable of generating high-quality human-like text and completing various tasks such as answering questions, generating letters, translating text into different languages, or writing scholarly papers. The chatbot operates by studying and analyzing extensive data stores and using its efficient design to perceive user requests and provide appropriate responses. This means that ChatGPT can perform wide range of text-based requests in a matter of seconds (Lund & Wang, 2023).

2.2 AI in music

There is no doubt that with the rapid AI development, many industries started incorporating it in the businesses for the benefits, that the technology offers. As Ben-Tal et al. (2020) point out, AI is capable of enhancing creativity in music activities of both professional and non-professional musicians. Moreover, musicians are willing to implement AI in their work or production process as they show interest in exploring artificial intelligence capabilities.

2.2.1 Implementation of AI in music

Artificial intelligence is often used as a music tool in various stages of music creation and presentation. The main ways in which AI can be incorporated into music activities are listed and described below.

Music composition

According to Hernandez-Olivan and Beltran (2022), music composition is a creative process which requires making various creative decisions in order to create a piece of music. Essential elements in terms of music generation are considered to be harmony, music structure, melody and texture as well as instrumentation and orchestration. To compose and generate music a few types of most

frequently used neural network architectures are applied, for instance, Generative Adversarial Networks (GANs), Variational AutoEncoders (VAEs), and Transformers.

- GANs were briefly described in the previous chapter, however, I invite the reader to take a closer look at their concept. As Sharma and Bvuma (2023) elaborate, GANs operate based on the training of generator and a discriminator, which allows them to produce diverse music melodies and harmonies for various music styles. The purpose of a generator model is to convert the input data into samples, that are merely unrecognizable from actual melodies, while the role of a discriminator model is to distinguish whether given samples are created by the generator or not (Bitarães et al., 2022). These networks are widely used in music composition: they are capable of creating pieces of music which sound familiar to the listener, as they are produced by examining existing music structures, yet suggesting innovative melodies to step outside of conventional genres (Sharma and Bvuma, 2023).

The following figure gives a reader a better understanding of how music is created using generative adversarial networks.

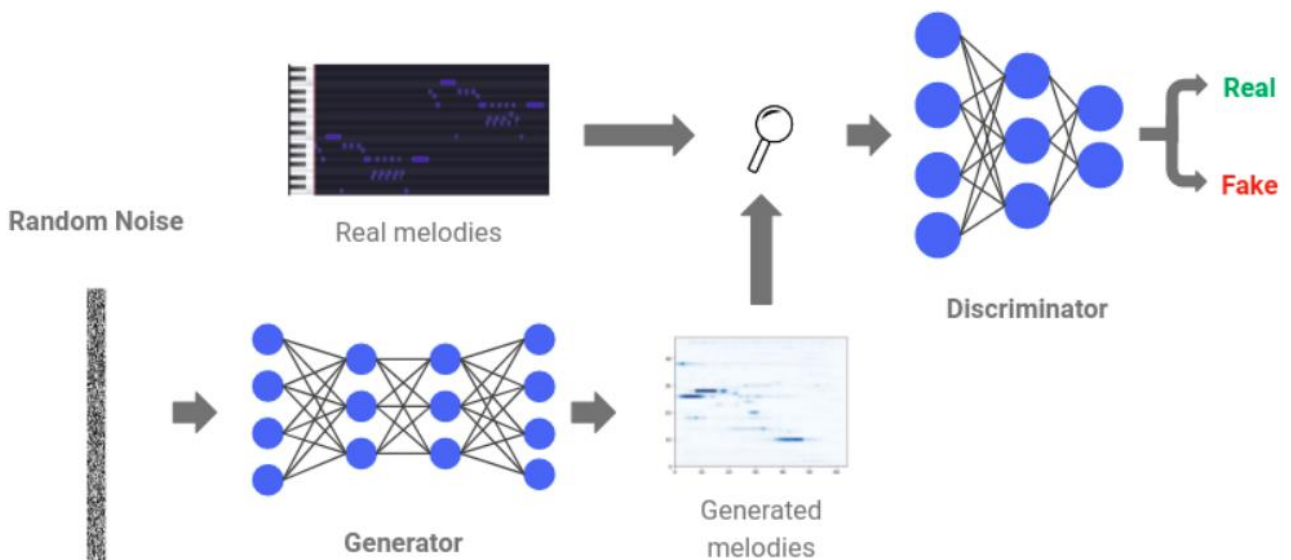


Figure 1. A visual explanation of a GAN model (Bitarães et al., 2022)

- VAE model consists of an encoder and decoder combination, where the encoder's role is to transform input data in a so-called latent space and decoder's mission is to convert it to reconstruction data (Hernandez-Olivan and Beltran, 2022). According to Sabathé et al. (2017), there is a reconstruction loss after the model goes through this training process, however, it allows the network to sample the data and then produce new pieces that are similar to the input data. The initial data can vary from text to images or sound, which makes VAE model more convenient. On the other side, the network is limited by its training and, therefore, it is able to produce a wide range of music pieces but is restricted by the scope of the input data.

- Moving forward, transformer networks are models that are also based on encoder and decoder combination; however, they rely on attention mechanism to produce multi-instrumental music segments (Bitarães et al., 2022). Attention mechanism refers to an idea of allowing the network to focus on a piece of data which is more significant to the problem it is currently working on. The multi-head attention is divided into three parts: encoder self-attention, decoder self-attention, as well as encoder-decoder attention (Naranjo de las Heras, 2020).

As reported by Hernandez-Olivan and Beltran, 2022, it takes quite much data to train transformer models, although they are considered one of the best tools for generating larger chains of music pieces thanks to the attention mechanism.

Lyrics generator

What is more, artificial intelligence is able to not only produce melodies or chord progressions, but generate lyrical texts as well. There are several requirements for the generated lyrics to be considered decent: they should correspond to the chosen music style and the given melody, besides being grammatically correct. In addition, creativeness and constructiveness of the lyrics are evaluated (Ma et al., 2021).

According to Chen and Lerch (2020), such architectures as Recurrent Neural Networks (RNNs) are widely used for text generation thanks to their advantages in modeling language and are based on supervised and unsupervised learning as well as reinforcement learning. Ma et al., (2021)

elaborate that such factors as existing lyrics, syllable structure, keywords, and content are implemented to enhance the quality of the lyrics generated by RNNs.

For instance, LyricJam Sonic is a music tool which consists of two neural network and is designed for producing music pieces as well as streams of lyric text. Additionally, it is able to operate without human intervention as well as with cooperating with real musicians (Vechtomova & Sahu, 2023). Lyrics generation is a more versatile and complicated process compared to basic text generation since such factors as rhythm, pitch value, syllabic base, and others should be taken into account. Such language models as GPTs (Generative Pre-Trained Transformers) and its various versions can also be applied to lyrics generation (Chen and Lerch, 2020).

Live performance

Implementation of generative AI can be beneficial not solely in the music production and recording stages: it allows artists to enhance their live performance. Patrick (2022) discusses a generative AI system, where the neural network is accountable for managing the controller interface, which allows it to continue the live performance by mimicking the actions of the performer. However, the musician in charge can observe the steps of the system and direct the actions of the network.

As it was mentioned earlier by Vechtomova and Sahu (2023), LyricJam Sonic is another system which can be incorporated into the guidance and improvement of live performances: it is trained to generate music flow in real time by studying the melodies played by an artist. The system also makes it easier for the user to find inspiration in the process of live performance by offering unusual sound sequences.

According to Odu et al. (2023), we can determine that AI music tools are aimed at augmenting interactive performance, enhancing music instruments, real-time collaboration, and sound processing during the performance. AI adjusts to the dynamics of the performance and enhances it through interaction with the musicians; moreover, it is capable of complementing traditional sound of music instruments with digital effects as well as engaging in live music creation. Lastly, AI is often incorporated into live performances with the purpose of augmenting the experience for the audience by providing better quality music mixing and sound processing.

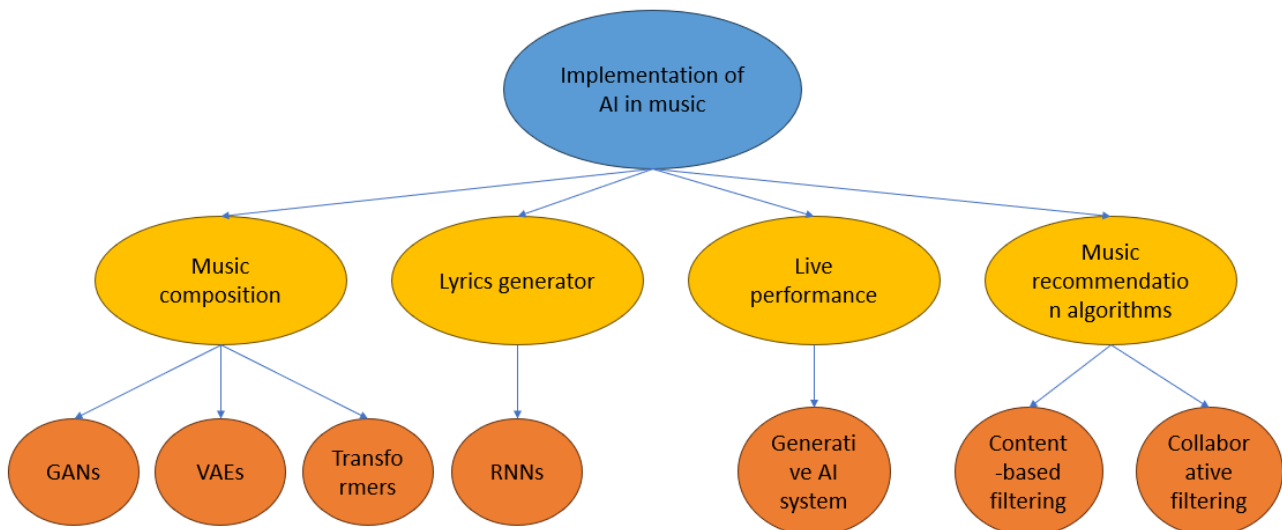
Music recommendation algorithms

Another implementation of AI involves constructing music recommendation algorithms, most commonly used for music streaming platforms. Murindanyi et al. (2023, July) elaborate that streaming platforms nowadays contain lots of music and other types of material which makes it more complicated for users to navigate through the platform's library. Thus, artificial intelligence and machine learning techniques were applied to develop an algorithm that analyzes users' preferences and suggests songs or playlists based on what a user has already listened to. First, an algorithm identifies music features and then categorizes certain music piece into a specific genre of music. This makes the process of exploring new music significantly simpler for the users of these platforms.

In other words, leading music streaming platforms amplify personalization of music recommendations through algorithms based on machine and deep learning. Mahadik et al. (2021) points out that the first well-known method of content personalization is content-based filtering, however, this approach is based on the material enjoyed by the user in the past and, hence, is limited to already existing preferences. The second method is collaborative filtering, which analyzes and suggests music material that other users with similar interests enjoyed. This method provides another point of view on one's interests, however, it leaves out less popular music pieces.

Considering that mentioned approaches have substantial flaws, AI chatbot model based on Natural Language Processing (NLP), which relies on user's emotions instead of relying on solely existing preferences, was suggested to be considered. Since people's music choices depend heavily on their mood, in some cases users do not pick music based on their usual interests and preferences. Hence, the chatbot could acquire the information regarding user's mood and make a recommendation by assigning the mood to a certain genre (Ali Farkash & Tengku Petra, 2024).

We can conclude that generative AI, as well as AI in general, is a quite useful and frequently used tool in the music industry. The figure below demonstrates earlier mentioned AI implementations in a graphic form.



*GANs, VAEs and other neural networks can be applied for various AI implementations

Figure 2. Graphic representation of AI implementation in music

2.3 Music industry

This research is focused on the influence of AI on music industry. According to Massarotto (2021), music industry refers to creative industries, which means it is rooted in talent, skill, and creativity that can create wealth and income using intellectual property. Others refer to it as the copyright industry, meaning that products created and distributed in the music industry are the subjects to copyright.

Elements of music industry

Massarotto (2021) claims that music industry can be divided into three core groups: recording industry, music publishing, and live performance, which are based on interconnecting networks. For better clarification, we will take a closer look at these parts:

1) Recording industry is the most influential part of the definition as for most artists, it is the first step they should do, if they aim to create profit. First, artists are discovered by producers, who are tied to record companies. Then, executives of record companies are responsible for generating sales through distributors and promoters, who for their part, choose the songs with best

commercial potential. This way recorded songs reach digital stores and music streaming platforms, and after all, the audience.

2) Music publishing, however, is a B2B (business-to-business) industry and it refers to the distribution of royalties among rightsholders. Such royalties can be mechanic (collected from recorded music's sales), performance (royalties collected when a piece of music is performed live, for instance, at a restaurant or through the radio station), and synchronization (for instance, when a song is used in a movie).

3) Last but not least, live performance industry acquired the biggest part of market share starting from early 2000s. In this industry most of the attention is dedicated to bigger music stars and their events. Live music focuses on outstanding type of experience and has been on the rise at least before COVID-19 pandemic.

2.4 Music production

Music production refers to "an expression of the creative and artistic development of music both in and out of the studio" (Hepworth-Sawyer & Golding, 2011, p. 17), while there is also a distinction to music production process which refers to the essential creation of the product, for instance, a CD or a vinyl record.

As reported by Zager (2021), music production is a complicated process of creating a piece music, typically guided by music producers. Some of the producers' responsibilities include:

1. Development of a production concept. It refers to shaping the framework of an album that is about to be produced, for instance.
2. Development of an arrangement concept. Arrangements simply symbolize the sound of the band or an artist and they must be agreed upon in order to make the sound coherent.
3. Song selection, which means the process of choosing songs that fit the creative concept of an album or other music work.
4. Providing coaching for musicians and singers, which is equal to guidance.
5. Audio engineering. Engineers are in charge of sonic image of the song; they implement technology to recorded music creation, for instance, through effects.

6. Mixing music, which refers to a process of harmonizing and combining the elements that make up the final sonic image of the song.
7. Mastering is a final step after the mixing stage was completed. It includes ensuring technical quality of the song.

Weng and Chen (2020) point out that music production is a big part of the music industry: while music industry is a broader term, music production focuses on sound recording and editing, recording of music instruments, and other creative and artistic components as well as the performance element. With the digitalization of music industry, the production process became simpler and more convenient: music recording and mixing as well as performing were simplified with the use of digital tools.

The following figure demonstrates the complexity of a music industry and illustrates the music production process.

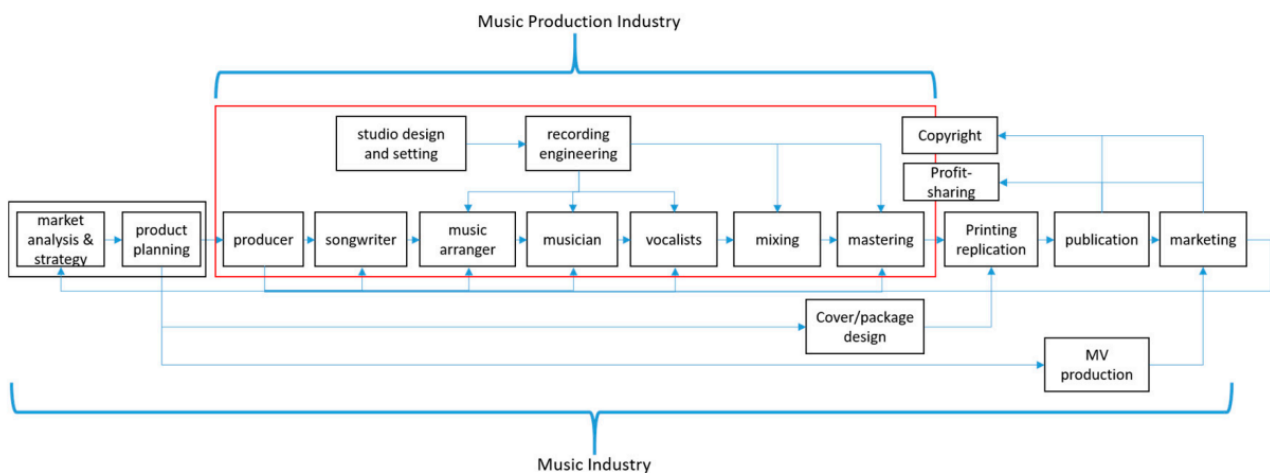


Figure 3. Music production as a part of music industry structure (Weng and Chen, 2020)

Intelligent music production

In the era of digitalization and rising popularity of artificial intelligence, intelligent music production, which will be further referred to as IMP, became a rapidly growing field in music industry.

According to Moffat and Sandler (2019, September), IMP refers to the process of implementation of AI to the production process, especially engineering, mixing and mastering parts. The first component of IMP, which should be taken into consideration, is levels of control: the question here is what are the restrictions placed on IMP by an engineer in terms of processing of audio material. Then, producers pay attention to knowledge representation, that refers to an approach used to give the system the context in which audio material should be mixed and handled. Lastly, audio manipulation is an aspect of the IMP, which is used to describe both direct and indirect approaches to audio transformation – this is the part where an action is performed.

The figure below helps the reader to gain a better understanding of how the IMP tool interacts with an audio material.

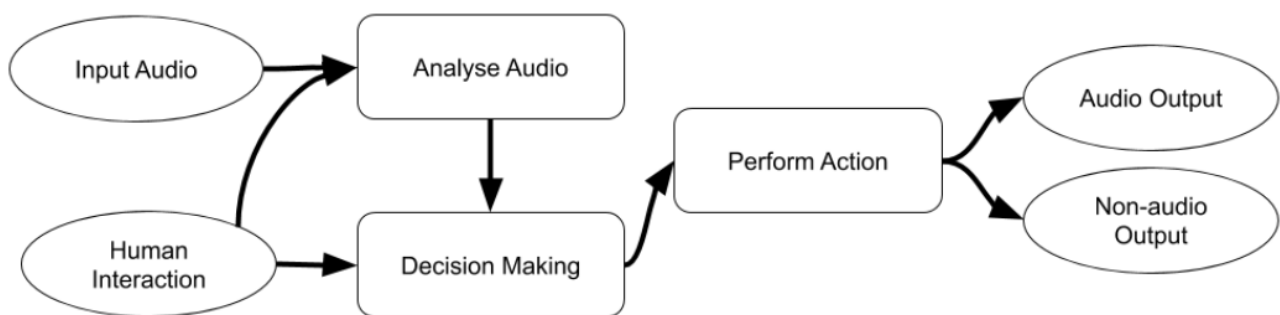


Figure 4. Visualization of how an IMP tool operates (Moffat and Sandler, 2019, September)

Martin and Avila Rojas (2022) provide examples of some AI music production tools:

1. Amper Music. It operates based on an AI generating algorithm and allows users to create and edit music pieces in various genres and styles.
2. AIVA. The tool has a similar, however, more advanced interface compared to Amper. It serves the purpose of generating new music with a strong focus on the classical genre.
3. NSynth. It is a synthesizer based on a neural network which allows it to generate unique sounds that human-adjusted synthesizers would not be able to produce.

4. Loudly. This tool can be compared to a remix studio, where users are able to alter existing pieces of music or produce new ones.

5. LANDR. It is an extremely popular tool, known for mastering, engineering and creating unique music pieces.

6. Flow Machines. This tool focuses on music composition in one's own style as well as providing pre-selected library of music rules, melodies, and other parameters.

2.5 Future of music industry

Due to rapid improvements of digital technologies and acceleration of AI implementation, music industry is constantly developing, in attempt to adapt to the new reality. The future of the industry can be examined more thoroughly through observing current and future music industry trends, which will be described more detailly in this chapter.

Music streaming services

As reported by Khvorostyanaya and Tevanyan (2021), digitalization remains to be one of the leading trends in the music industry. In the past, users had an opportunity to download songs and albums by paying a fee, however, nowadays we can observe a trend on using music streaming services.

Hracs and Webster (2020) state that music streaming platforms had become a prevailing way of distributing music in the last decade thanks to operating on subscription-based business model instead of a common and well-known idea of selling and buying physical products such as vinyl or CD records.

According to Chatsri (2021), Spotify is dominating on the market with 31% market share, then it is followed by Apple Music (15%) and Amazon Music (13%). In addition, the total number of music streaming platforms users is increasing each year and the global music market is expected to expand significantly by 2030.

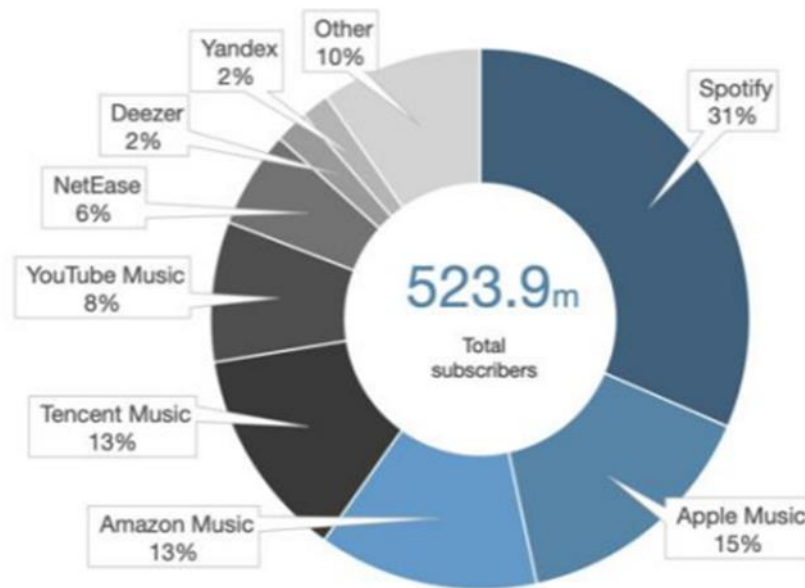


Figure 5. Model of global streaming music subscription market (Chatsri, 2021)

AI algorithms

It is a well-known fact that AI algorithms are implemented into various business areas and, moreover, creative industries are not an exception. Guo (2023) emphasizes that such algorithms can be applied to not only music composition and production, as it was described in previous chapters, but to enhancing user experience as well. For instance, various music playlists and recommendations are developed based on user's preferences with the help of AI: this makes it easier for a user to explore new songs and genres and, additionally, gives artists more opportunities to get discovered.

AI algorithms aimed at personalization are widely integrated across numerous industries. In music industry it became a trend especially after being implemented into music streaming services, since personalized recommendations simplify the decision-making process for users and make the services more convenient (Sun, 2022).

Blockchain technology

Another trend in music industry is incorporation of blockchain technology into monitoring allocation of royalties, also known as artists' compensation for the accomplished work (Guo, 2023). Li et

al. (2021) suggests that one of the main issues in music industry of 21st century is copyright violation in terms of online music, which can be solved by implementing blockchain technology as a copyright protection measure. This technology plays a role of a ledger which cannot be affected by any type of mediators and is not centralized.

As explained by Guo (2023), this type of decentralized system ensures transparency of transactions and protection from piracy accidents. Transactions made via blockchain can be tracked which makes it simpler to control the distribution of music material.

Future trends: virtual reality and augmented reality

Virtual reality (VR) and augmented reality (AR) are currently implemented in various creative business sectors; however, they are predicted to be exploited in more innovative ways. In research provided by Summers et al. (2021), one of the experts shared their intention to design an AR concert in order to introduce the audience to electroacoustic music, where one can observe how music sounds move in space. Moreover, it has been mentioned in the same research that VR has already been used for audio restoration and reconstruction of lost visuals, which can be developed to a new level in future. Some participants of the given research stated that AI-based tools and their rapid development are expected to create new, undiscovered opportunities for professionals of music industry.

In addition, VR and AR can play an important role in enhancing interactive performances and engagement of listeners and fans. This type of technology is likely to significantly improve experience of live performances (Guo, 2023).

The following figure sums up current and future trends that were discussed in this chapter.

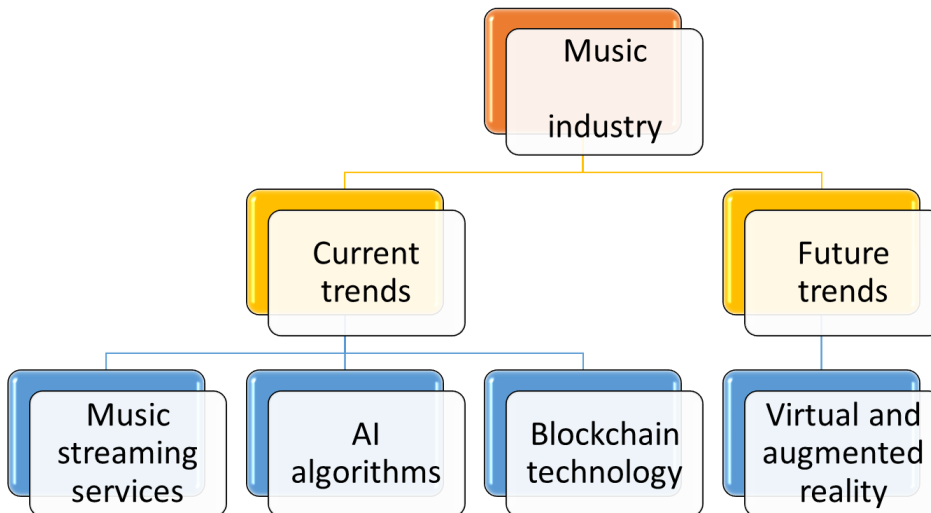


Figure 6. Current and future trends of music industry

In conclusion, it is essential to mention that constant development of AI-based tools and technologies provides lots of opportunities as well as creates certain challenges for those who are involved in the music industry. Moreover, predictions regarding AI and its implementation in the industry are quite hard to make due to continuous innovations.

3 Implementation of the study

3.1 Research method

There are different research methods used for various types of studies: qualitative, quantitative, mixed methods research and others. In this study, a qualitative research method was chosen to gain better understanding and new insights regarding the contribution of artificial intelligence to the music industry. According to Saldana (2011), qualitative research method focuses on non-numerical type of data, which includes textual materials such as notes, interview transcripts, Internet websites but also photo and video data, which reflects experiences related to the research topic.

Additionally, there are various genres of qualitative research such as ethnography, grounded theory, phenomenology, case study, content analysis, narrative and poetic inquiry, art-based research, and action research. Some of the above-mentioned genres can be combined and used in

the same study since qualitative research is often cross-disciplinary and is conducted within many related fields (Saldana, 2011).

A selected research method impacts the nature and the results of the whole study and, therefore, after studying different approaches, I have decided to use qualitative methods for this research since they can be more useful for providing in-depth analysis. In this study the aim is to find out the reasons of music industry's fluctuations and how generative AI is involved in these changes. Quantitative research may be able to answer the "how many" question but qualitative research is focused on "what", "why" and "how" (Ritchie et al., 2013), hence, it will be more beneficial for looking into the root of the changes in the music industry caused by AI.

Moving forward, the descriptive research is conducted when the goal of the study is to provide a general review of the situation and to describe a particular phenomenon (Kamper, 2020). Considering that this study focuses on describing the connection of generative AI and music industry, we can conclude that the descriptive approach will be appropriate.

Moreover, there are deductive and inductive research methods. Soiferman (2010) points out that deduction is used for forming a theory, testing a hypothesis, and then adjusting the mentioned theory; while induction implies that the theory is formed based on previously made observations. In this study, inductive method is used as the concepts and conclusions are drawn based on the collected data from secondary sources.

3.2 Data collection

This subchapter discusses the sources where the data was extracted from and the data collection techniques that were used in the process.

To begin with, there are primary data, that refers to data that has been originally collected by the researcher and has never been published before, and secondary data, that has been produced or gathered by other people. In other words, secondary data, such as books, articles, websites, represents the interpretation of the primary data, such as questionnaires, surveys, interviews (Ajayi, 2017).

In addition, Saldana (2011) states that there are several main data collection methods for qualitative research: interviewing participants, observing participants, analyzing documents, analyzing media materials, and others.

The discussion forums were selected as the most applicable means of collecting secondary data for this research. This method was chosen because the forums contain visions, opinions, and experiences of a number of people, which makes it easier to collect data without conducting an interview with all the participants. Thus, only secondary data is used in this research.

To find the data required for the research, I specifically searched for online discussion forums, using such key words as "generative", "artificial intelligence", "future of AI", "advantages and disadvantages of AI", "music industry", "music production" in order to find those forums, which contain the data closest to the topic of the study. I used Google Scholar and Google as search engines as I realized that I could obtain the maximum amount of data from these search systems, since these are the most popular ones among other users, who are willing to share their opinion.

I am convinced that discussion forums are the most reasonable sources for this study as they replicate the concept of interviews: if one is able to find the forums where the required question has already been asked, users play the role of interviewees who share their opinion freely and are able to add more comments over time.

3.3 Data description and analysis

Since the research material consists of data that already exists, this chapter provides detailed information on what kind of data had been selected and what methods had been applied to analyze it.

When doing my research, I decided to extract data from a few online discussion forums, that are listed in the appendices in the end of this paper, as they had plenty users commenting on how generative artificial intelligence impacts music and music production. Hence, the data consists of users' comments as well as replies to each other that are shared on the forum and are aimed to address a certain question.

Moreover, I selected these forums because respondents there have provided their independent opinion supplied with numerous arguments and reasonings. Typically, respondents feel more liberated to discuss a certain topic online where they can be anonymous, thus, they are more likely to share their honest opinion. In addition, participants discuss the topic solely for simply sharing their opinion and do not adjust their views for specific research, which makes it less biased.

Moving forward to data analysis, Saldana (2011) points out that data analysis plays the crucial role in qualitative research and its main goal is to detect new insights from the gathered data and show the results to the reader. There is a number of tasks data analysis aims to achieve, for instance, identifying new patterns and categories and then, discovering how they are interconnected. This can be reached with different types of coding and themeing the data in order to design concepts and develop a theory as a result.

For this study, I chose content analysis as a main method of data analysis. Kleinheksel et al. (2020) state that “content analysis is a method designed to identify and interpret meaning in recorded forms of communication by isolating small pieces of the data that represent salient concepts and then applying or creating a framework to organize the pieces in a way that can be used to describe or explain the phenomenon” (p.127, para. 1). Content analysis can be widely used for research of media materials such as online websites, tweets, text messages, blogs, and other digital sources (Saldana, 2011). In this case, I consider the content analysis of media materials to be the most relevant data collection method, since the data required for answering the research questions, has already been gathered in online resources.

Thus, to conduct this analysis all the comments and replies from two of the selected discussion forums were saved in a MS Word document, which consisted of 43 pages. After all the data was gathered in one place, the author started analyzing it to search for the units of data it could be divided into. Then, I color coded the data into three units of analysis: comments regarding advantages of using generative AI in music industry and production, comments regarding drawbacks of using AI in music industry and production, and, finally, comments regarding how respondents saw the future of AI in music industry. Afterwards, to narrow down the data, the color-coded material was saved in a separate MS Word document into three units mentioned earlier. I analyzed

units to define categories within each unit at a time by color coding the text. Lastly, I analyzed the results and came up with conclusions in the end.

3.4 Ethical considerations

Nowadays, when we live in a digital era, ethical issues are especially crucial to be taken into consideration. Ciuk and Latusek (2018) suggest that the identity of research participants must be protected and no harm should be caused by the process or outcomes of the study. Anonymity of research participants is typically the best way to avoid any damage to research subjects, which can be reached by excluding particular information about participants' identity. However, Saldana (2011) argues that the topic of anonymity in research that uses data from digital sources is debatable: the controversy of public posting lies in the question whether free access gives researchers a permission to use the data.

In this study, the researcher did not collect any personal information about the respondents except personal nick names which they used for a particular online platform and which do not reflect any legal names. In some cases, users provided their location as well as the platform provided the date when a user shared their opinion. This way, respondents were guaranteed that they can disclose as much personal information as they would like to or keep it confidential and remain completely anonymous. Moreover, since the users of these platforms shared their views freely online, without dependence on the conducted research, we can conclude that their participation in the discussion was purely voluntary. Using the same logic, we can say that the researcher did not interfere in the discussion and, therefore, participants' replies were not affected and less biased.

3.5 Credibility and trustworthiness of the research

Credibility (sometimes referred to as reliability) can be explained as how persuasive the conducted research is to the reader (Saldana, 2011). Stahl and King (2020) point out that the research is considered credible if the findings seem to be relevant, consistent, and applicable to reality. We can say that credibility is quite subjective but it can be improved through, for instance, using multiple sources of information, ensuring that researchers have spent a prolonged period of time studying and analyzing the data, or clearly stating what methods of data analysis had been used.

Furthermore, trustworthiness can be explained as reporting how the research was conducted and explaining how the process was held, thus, it requires researcher's honesty and directness as well as transparency of their work (Saldana, 2011). In addition, Stahl and King (2020) argue that some of the main elements for trustworthiness are transferability – to what extent conclusions from one research can be transferred to the other one with different context; and dependability – to what extent other researchers would reach the same findings.

In this research, respondents were not selected by any type of characteristic which makes participants' backgrounds more diverse and randomized. The researcher did not ask any leading or guiding questions so users' responses and conclusions were less biased. It is also crucial to point out that this study was reviewed and carried out with the help of academic advisor which makes it more credible. Moreover, I described the research process, approach, and methods as well as what and how data was collected to make this study clearer and more transparent to the reader.

3.6 Limitations of the method

Every research method has certain limitations and qualitative content analysis is not an exception. To begin with, respondents may change their opinion before sharing it publicly because they can see what other users have already posted on the forum, therefore, the outcomes of the research may be biased to some extent. What is more, the number of users whose opinions are taken into consideration is limited. Additionally, the researcher is not able to collect respondents' personal information, such as age, origin, occupation, or social status which may affect the evaluation of their answers.

4 Research results

In this chapter, the results of the study will be revealed and described in detail. The participants were asked quite open-ended questions about the future of artificial intelligence in music, specifically music production, but their answers were allocated into three units: benefits of implementing AI into music production, demerits of using AI, and their predictions regarding what will happen with AI and music industry in the nearest future. As it was mentioned before, respondents' identities will be kept anonymous for privacy and ethical reasons.

4.1 Benefits of implementing AI

The majority of users highlighted that artificial intelligence is being and will be implemented in the music production whether we like it or not. However, more than a half of respondents claim that use of generative AI has many advantages, most important of them are described below.

1. A tool for creativity

To begin with, more than a half of users claimed that either they tried AI tools in terms of music production and found them useful or that AI has a great potential for creativity and music industry in general.

The majority of participants of the discussion stated that generative AI can be an excellent tool for music production as it accelerates the process and leaves more room for human creativity. Instead of doing repetitive tasks, one can focus on creative decisions, since that is what AI was developed for in the first place. While trying to prove their point, one of the respondents argued: “I want AI to do my job so I can have time to express myself creatively and do the things I actually want to do”, which summed up the opinion of many other users.

Moreover, a few respondents stated that generative AI can serve as a replacement of some skills that a certain person might not possess. These users claimed that musicians and artists can use AI to pretend that they acquired some skills which they do not always need. For instance, it is impressive when an artist is able to play numerous musical instruments but there is no need to master every one of them: instead, you can use AI.

Only a small percentage of users pointed out that AI does not threaten artists' creativity, but on the contrary, allows people to be more creative when combining AI-generated parts with human-made ones.

2. Increasing one's efficiency

A smaller part of respondents provided some insights regarding how AI tools increase efficiency of producers and music artists: most of them stated that productivity is most likely to improve with the implementation of generative AI.

In addition, a few participants expressed their opinion about having AI tools as their personal assistants. They stated that wide availability of AI tools allows them to work at a studio with an AI assistant any time of the day when the inspiration strikes them. What is more, this “assistant” is able to suggest new ideas or propositions regarding the music one is working on, which might make the process more efficient.

One of the respondents provided a highly insightful comment on the usage of generative AI tools among professionals: “But, there is a huge segment of music makers in the world who produce music for money. Think, movie and television soundtracks, soundtracks for commercials, game soundtracks, etc. Even if these music makers produce music for fun on their own time, when they’re on the clock they likely want to make the most effective use of time. They’re doing a job, and very likely doing it under time constraints. I see AI having important use for them in increasing efficiency and, probably, quality”. A few other users agreed with the fact that AI tools can help music producers with time-efficiency, specifically when there is a time limit for production of music material.

Some users paid special attention to the usefulness of AI to amateur and non-professional music makers. As it was said in the part about previous advantage of generative AI, with the use of specific tools producers are not required to acquire certain skills and can rely on AI performance. Hence, many amateur producers are able to reach a new level of music production as well as record material at their own pace or efficiently fix some mistakes, if needed. A user commented this idea: “For me AI in music seems like a blessing. It will make production all the most accessible for an amateur musician such as myself”.

3. Rapid improvement of AI tools

The majority of respondents confirmed that even if certain AI software does not provide highest quality tools at the current moment, we can see that the enhancement of such software is moving quite fast.

A few of the participants pointed out that considering the speed of generative AI development in the recent years, drastic changes in the quality of the tools are expected to happen in the nearest future. Users noted that some material generated by AI is not ideal but it is significantly better than the material AI produced a short period of time ago, for instance, a year ago. The comments regarding this topic were: "I have no doubt that AI will soon be able to produce very good music" or "It's maybe 6-12 months away from being completely indistinguishable from the real thing". AI's ability to adapt to new human needs and evolve at a substantial rate was considered as an advantage by the respondents.

4.2 Demerits of using AI

Most of respondents provided some type of negative arguments against implementation of generative AI in music industry. Their reasonings can be divided into three main categories (disadvantages of using AI): big part of users agreed that even though AI tools can be beneficial, music materials created by humans are more preferable; then participants of the discussion claimed that they would not want AI to ruin the creative process of music production, and, last but not least, some raised concerns about authenticity of AI-generated material and talked about copyright issues.

1. Preference for human-made music

A quite large part of users left negative comments about AI tools: most of them agreed that in comparison to art made by humans, music created with the help of AI will not be their first choice. Such words as "soulless", "dull" or "digital noise" were used to describe AI-generated music by some of the respondents.

Some participants specifically mentioned that artificial intelligence is not able to create art, emotion or provide connectedness. In their opinion, the algorithm exclusively uses the input data it had been programmed with and, therefore, has nothing to do with art.

One respondent shared a meaningful insight on how AI-generated material can be disturbing: “The songs can actually sound nifty, at first, until the seams start showing. Then things get a bit creepy. For instance, the system loves adding vocals, but not in any known human language.”

A few other users claimed that AI is still limited by the human intelligence, hence, it cannot outperform real artists and will not reach the same quality of material as real humans do. Using this logic, they concluded that there is no reason to give preference to lower-quality music which lacks emotion, passion, and expression of art.

2. Music production process becomes joyless

A solid part of the respondents argued that the process of creating music is the most enjoyable part for them, and they do not wish to shorten it. Majority of them stated that in their opinion making mistakes, brainstorming ideas with other artists, and playing live instruments when the inspiration strikes are some of the most pleasant and joyful moments of music production. The mutual conclusion among respondents was that making music is about the journey, not the end result, and, hence, the music material is valuable solely when it includes human experience and allows further interaction with an artist.

One of the participants shared a comment: “I am very much in the camp that nothing beats being in the room with other musicians to get in the flow of making live music”, meaning that mastering and implementing AI tools might be helpful but it is assuredly not enough to fully replace live and interactive process of music production.

3. Concerns regarding authenticity and copyrights

Finally, as many other people around the world nowadays, participants of the discussion shared their concerns about ethical issues and issues regarding authenticity of AI-produced materials.

A smaller share of the respondents pointed out that with the use of generative AI in music industry, it is quite complicated to prove the ownership of one’s work since it may be partially or fully generated by artificial intelligence. A few of the respondents paid attention to a subtle topic: if a

piece of music is generated by AI, the question of authorship should be addressed. If a person, who used an AI tool for music production, claims to be the author, we cannot fully agree with this statement. On the other side, the person who created the AI tool in question is not eligible to claim themselves an author, and, thus, the question of authorship remains to be unsolved.

One of the discussion participants argued that: “If students can’t turn in a piece of AI written essay, then creative professionals should not be able to claim AI generated stuff as their work”. Other participants were not able to provide arguments against this statement, and the question was left open.

Another part of users suggested that professional musicians are the ones who get affected by the implementation of AI the most. First of all, copyright issues impact bigger artists who cooperate with major music labels since it affects availability of their music. However, smaller artists can be negatively affected as well: thousands of AI-generated songs are added to music streaming platforms every day, which makes it significantly more complicated to stand out and gain larger audience. The issue is that listeners do not memorize the name of the artist or simply do not recognize who is the real person.

The figure below provides an overview on the previously discussed results.

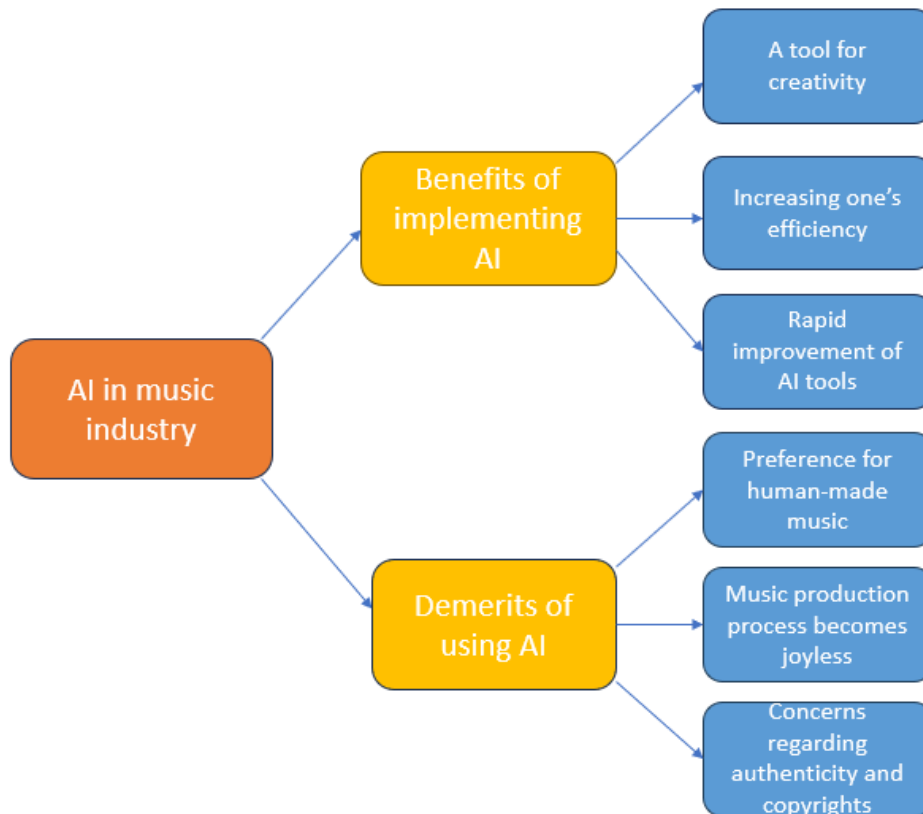


Figure 7. Summary on advantages and disadvantages of using AI in music industry

Future of AI in music industry

First, the biggest part of users left their comments regarding future of generative AI in music production and shared some of the predictions related to the ways in which AI tools may be improved. In order to organize their responses, I created three categories: optimistic opinions, negative predictions, and comments with neutral attitude.

1. Optimistic opinions

To begin with, a smaller group of discussion participants expressed their opinions and feelings regarding integration of AI tools in music industry in a positive way, meaning that users felt optimistic about influence of artificial intelligence. Some of them simply stated that they feel optimistic, however, others had different reasonings to justify their views and predictions.

A number of respondents suggested that having a constant assistance in the form of AI has a potential of taking production process to a new level. They stated that with the use of AI every musician can become their own engineer or producer, without depending on various people in the industry and without acquiring minor mechanical skills. Users found liberating the fact that generative AI opens the door to artists who struggle financially and, hence, have quite limited studio time for producing music material.

In addition, a few of the participants proposed that in future AI tools could be developed to the level of using human creativity by decrypting neural links and networks in the brain. In other words, these users predict that musicians will be able to imagine the sound in their head and AI will reproduce it in real life. Using the same technique, AI can be applied to identify what music genres or elements one prefers more, by recording the brain's response to certain music and then, adapting the suggestions to specific preferences.

Finally, a few other interesting opinions were shared, for instance, the fact that AI will be able to enhance existing audio materials or that AI tools will be tailored to various musicians' needs, and, therefore, artists without much talent will also have a chance of producing successful music.

2. Negative predictions

Moving forward to negative predictions, a larger group of respondents were worried about the impact generative AI will have on the music industry. Users' opinions fluctuated from strong concerns about AI ruining music market and the process of production to a slight mistrust of how this type of technology will change the industry.

Several of the participants expressed their concerns regarding validity and credibility of music in future. According to them, every piece of music might have an element created by AI but there will be no way to recognize and acknowledge it, since AI will become more human-like. Users mentioned that although some musicians do not wish to be a part of AI-dominated music industry, there will be no choice left for them. Additionally, legal issues with major labels and their lawyers may arise in this regard, since it is likely that labels will claim copyrights on as much music as they are entitled to, including AI-generated material.

Moreover, only a few discussion participants argued that AI is changing the meaning of art and humanity and will continue influencing music industry into producing commercialized and “fake” art. In their opinion, without experiencing real emotions, developing hard skills, and fulfilling the creative needs, the concept of being an artist or a musician will no longer be the same. Meaning that musicians and other creators will face greater larger challenges with creating a unique sound.

Lastly, there was another group of respondents, who raised concerns regarding the fact that AI is predicted to take over some of the creative jobs leading to music professionals suffer financially or being forced to seek employment in other industries. According to the gathered responses, it is unclear if enough jobs will be created in comparison to the number of jobs being overtaken by AI in the creative industries.

3. Comments with neutral attitude

A group of respondents provided some insights on the subject of what modifications await music production but their comments did not have positive or a negative context, hence, I allocated such statements into neutral attitude group, which was approximately the same size as negative predictions group.

The most common provided opinion was that AI tools, to whatever extent they are developed, will never fully replace human creativity and connection. Respondents were quite clear about the fact that some aspects such as live performances or music made solely for the purpose of enjoying music production process, will remain in the lives of the artists. Some pointed out that musicians will not abandon mastering music instruments simply because artificial intelligence can replace these skills for them.

What is more, most of the participants agreed that in 50 years the world, including, music industry, will be drastically modified due to the impacts of generative AI: AI tools will not simply produce music by imitating artists but will be closely tied with neuroscience industry in order to be unrecognizable from a human being.

Other opinions were shared among respondents as well, for instance, that half of the people in the industry are going to like using AI and will continue implementing it for their own benefit; other half, on the other hand, will not be pleased with the usage of AI tools. Regardless of these opinions, well-trained AI will be able to exceed the talent of poorly trained artists.

In conclusion, the diagram below provides the summary of the respondents' views regarding future influence of AI on music production.

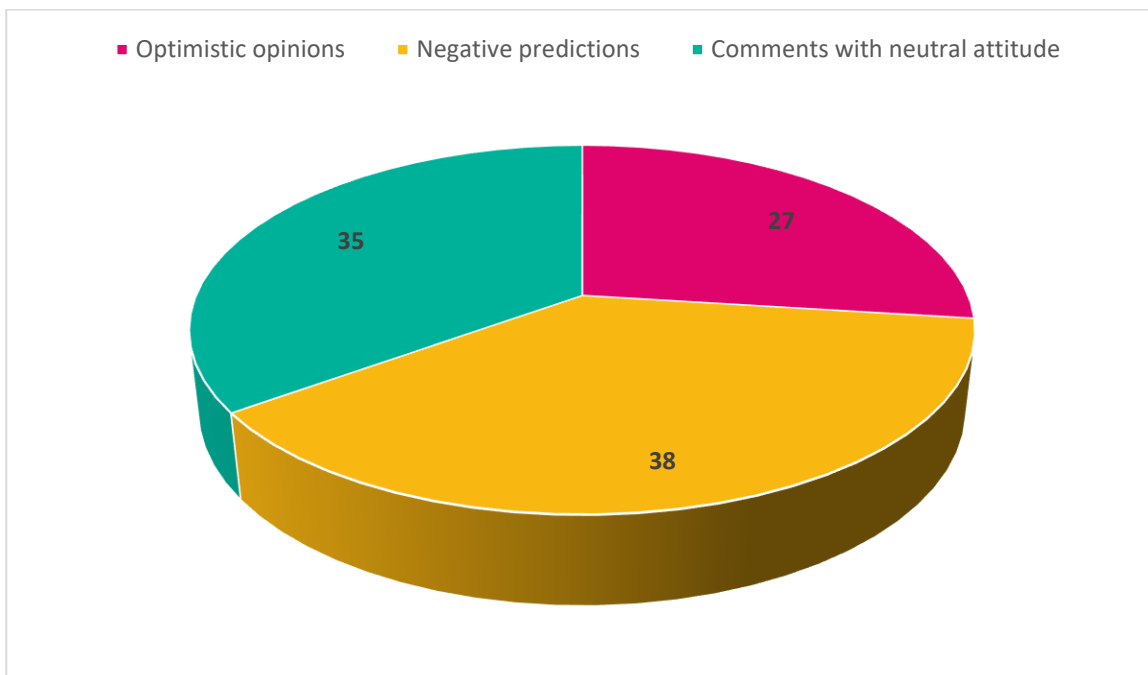


Figure 8. Respondents' views on the future of AI in music industry in percentage terms

To sum up, most of the discussion participants expressed their concerns regarding negative influence of AI on music industry, however, many others provided insightful opinions on how AI tools may be inspiring and efficient for many artists and creators. A third group of respondents solely suggested some predictions on the future of the industry without commenting on their preferences or emotional factors.

5 Discussion

This study was aimed to define and analyze the contribution that generative AI has made to the music industry; in addition, music production process and how it is connected to generative AI was

analyzed in a more detailed way. In order to examine the contribution of generative AI, two research questions were formulated. To answer the research questions, I conducted qualitative research using descriptive content analysis method. Secondary data was collected from online discussion forums to acquire a better understanding of what are advantages and disadvantages of implementing generative AI in music production as well as to gain knowledge regarding predictions about influence of generative AI on music industry in future.

Following sub-chapters answer the research questions, describe main findings, practical implications, evaluation of the results that were achieved through researching, as well as limitations of the research and proposals and recommendations for future research.

5.1 Main findings of the research

The purpose of the study was to examine the connection of generative AI to music industry by focusing on merits and demerits of implementing AI in music production and the future of AI in music industry. Formulated research objectives were met and research questions are answered and discussed below.

RQ1. What are advantages and disadvantages of using generative AI for music production process?

Nowadays, artificial intelligence is being widely used across various business sectors and industries, including music industry. According to the results of the research, producers and musicians find it both beneficial and harmful depending on how it is being used and implemented. Some discussion participants claimed that generative AI as a tool can create more space for one's creativity, taking responsibility for repetitive and mechanical tasks and leaving creative decisions to the creator. Moreover, it allows amateur and non-professional musicians to make higher quality music without spending loads of time on gaining certain musical skills. It means that such generative AI tools make music production more available and accessible to the broader number of people.

Other group of respondents pointed out that using generative AI tools significantly increases efficiency of music production process. It is a well-known fact that one cannot "activate" their inspiration at any given moment and when professional musicians work with a time restriction, it may be an issue. Using AI tools can resolve the problem by suggesting possible combinations of notes,

beats, or asking the creator leading questions depending on what they wish to achieve. Participants mentioned that they view generative AI as an assistant who is available at their home or studio 24 hours and does not require rest, sleep, or inspiration to work on music.

What is more, generative AI's enhancement is considered quite rapid. Many of the imperfections and bugs are being removed in the newer versions of the software. Hence, although some of the AI-generated material is not ideal at the current moment, we can conclude that the constant improvement of AI tools and consideration of users' feedback allow developers to take artificial intelligence to the next level within a short period of time. Some of the respondents shared their opinions that AI will be able to produce music material unrecognizable from human-made one in the nearest future, based on the AI improvement we can observe nowadays.

As it was reported by Moffat and Sandler (2019, September), and discussed by the author of this study in the 2.4 subchapter of the Literature review, such AI implementations in music as intelligent music production are capable of working with human producers in a collaborative and supportive way, modifying their interaction with music and supporting creativity flow. Moreover, IMP has shown the signs of production process optimization. In addition, as it was mentioned in the Literature review (2.5 subchapter), Summers et al. (2021) suggested that music professionals are only about to explore the possibilities AI-based technologies and their development can bring. Thus, obtained findings support the information found in existing sources.

However, a part of discussion participants shared their views on how generative AI can be a disadvantage in the hands of music artists and producers. For some artists or simply music lovers, a concept of art refers to something that involves creativity, emotion, and connection with the audience, which artificial intelligence considerably lacks in at the moment. Some people expressed their opinion that they do not perceive AI-generated music as a form of art and do not consider AI creators relevant artists. This phenomenon is also related to the fact that music materials produced with the help of generative AI can make listeners feel uncomfortable, for instance, when the lyrics of the song sound quite appropriate until one realizes that they are not written in any known human language.

Additionally, the process of music production may be long and complicated, however, some music creators do not wish to reduce it to a shorter one, since the process itself is valued the same way as the result. It is essential to point out that some musicians view generative AI tools as a facilitation of music production, and others, on the other hand, prefer to complete even small tasks on their own in order to extend the creative process and ensure the originality of the produced material.

Lastly, implementation of AI raises issues regarding authenticity and copyrights in the music industry. In some cases, it is not clear who can be authorized as a creator of a piece of music: artificial intelligence or a human musician. So far, it has not been decided how much credit generative AI should receive and, what is more, what are the ways to detect which part of a material was generated. Respondents stated that the debate regarding copyright issues has not been solved due to constant development and fluctuation of AI, which makes it more complicated in terms of legislation.

These findings can be supported with the issues discussed by Guo (2023) in the Literature review chapter, who stated that problems regarding music piracy, copyrights and intellectual property started with digital revolution more 20 years ago and are amplified by implementations of AI.

In conclusion, generative AI continues to be present and useful for professionals in music industry as it provides various benefits, however, creative professionals must accept and adapt to its disadvantages.

RQ2. What is the future of generative AI in the music industry?

To answer the second research question, I should state that the wider group of respondents provided negative opinions in terms of generative AI's future in music industry, although positive and neutral predictions combine into a larger share of the chart.

Less than one third of discussion participants felt optimistic about AI tools, however, they provided decent arguments. For instance, not every musician has an unlimited access to recording studios, and such tools as generative AI will be able to reduce this process, leaving more space to

creative studio time or fixing one's mistakes. Similarly, respondents mentioned the probability of AI cooperating with neuroscientists in order to reproduce certain sounds by "reading" humans' minds. Moreover, the wider share of non-professional creators will be able to produce higher quality music with AI doing the job where various skills are required to be gained in advance.

Moving forward, technological advancements of generative AI may cause some harm to the job market of the music industry. As it occurred prior to the creation of artificial intelligence we know today, technological progress makes certain jobs disappear from the market, and the same situation is predicted to happen due to development of AI. What is more, the speed of AI generating endless combinations of notes and vocals makes it more obstructive for musicians to create an original sound. Analogically, respondents fear that generative AI development will change the concept of being an artist and will lead to complete commercialization of the music industry and, therefore, "soulless" music. Unfortunately, legal issues are also predicted to worsen the copyrights debate.

To justify such findings, in 2.4 subchapter Li et al. (2021) described the main issues in music industry of 21st century as copyright violation in terms of online music. Therefore, certain measures are essential to be undertaken, for instance, implementation of a transparent payment system based on the blockchain technology.

Finally, more than a third of participants shared their predictions about changes of music industry caused by generative AI, however, the author was unable to define whether these opinions were optimistic or pessimistic, based on the provided comments. For instance, AI tools can be mastered to an extensive level and it does not mean that musicians, whether amateur or professional, will stop receiving music education or acquiring skills related to music production, recording, or live performance; hence, generative AI is not predicted to fully replace human creators. Although not everyone in the music industry wishes to implement AI tools in the art for their own reasons, the respondents suggested that the industry itself will be dominated by generative AI, which will change the concept of music irrevocably.

To sum up, I should state that such predictions as the ones provided above, cannot be entirely credible due to rapid improvements of AI and fluctuations of music industry. Whether

respondents feel optimistic or pessimistic regarding future adjustments of generative AI and the changes it will cause, majority of them promote one mutual idea: the changes in the music industry will be drastic due to AI advancements.

5.2 Practical implications

This paper focuses on analyzing merits and demerits of implementing generative AI in music production, as well as future of AI in music industry. The results of the study have demonstrated that the majority of respondents feel quite pessimistic regarding implementation of any type of AI in music production. However, almost one third of discussion participants had their reasonings to share optimistic predictions regarding the same topic.

Some practical implications can be formulated based on this study. For instance, users' concerns and negative predictions can be taken into consideration when developing and implementing generative AI to avoid fulfilling some of these predictions. The results of the study can be beneficial to companies, developing AI software as well as music producers and artists – exploring future predictions, whether negative, neutral, or positive, can be the first step to adaption to the nearest future of AI-dominated music industry.

Moreover, those people in the music industry, who view generative AI as their “enemy” should consider opinions of those respondents, who suggested various arguments on why they find implementation of AI useful and share optimistic predictions regarding its future in the industry. This way they will be able to master AI and use all the benefits it provides for music production process.

5.3 Assessment of the research results and research process

As Stahl and King (2020) mentioned earlier, methods of data analysis should be stated, research should be based on multiple sources of information, and enough time should be spent on analyzing the data to achieve credible results. All the points were complied with; hence, we can consider research results quite reliable.

The research process itself was quite prolonged: the supervisors and the topic of thesis were changed a few times which made it more time consuming. The most complicated part of conducting the research was deciding on methodology, finding data sources, and analyzing the collected data.

In addition, research and data on artificial intelligence in any industry often fluctuates: new information adds up constantly, which makes it more challenging to find relevant data sources. Therefore, finding suitable and relevant secondary data sources was more complicated but it saved author the time, that could have been spent on conducting interviews or surveys.

Lastly, this thesis was written according to all the required guidelines: sources were cited when used for writing literature view or implementation of the study chapters; participants of discussion forums were kept completely anonymous; results elaborated from extracted secondary data were used in a responsible manner.

5.4 Limitations of the research

To begin with, every research has its own limitations, and this study is not an exception. The secondary data collected for this research was gathered from online discussion participants and it is not guaranteed that all the respondents were directly related to the music industry, although the majority of them claimed that they were. Additionally, conducting the research that is based on online resources may raise credibility and validity issues. Due to this disadvantage of online study, I paid extra attention to carefully assessing and selecting the discussion forums, which were chosen for the analysis.

I must point out that the respondents may express different opinions on discussed topic after some time, since the concept of AI in music industry is developing quite rapidly, as it was mentioned earlier. Hence, this study will be considered valid for a short period of time. Moreover, I tried to be as objective as possible throughout the process of writing this thesis, however, my views might be altered due to various subjective opinions I have analyzed.

5.5 Recommendations for the future research

This last chapter discusses suggestions and implications regarding what additional research can be conducted to enhance the results of the study. It is essential to state that this research was mostly based on the connection of generative AI to music production sector, hence, future studies may focus on other parts of music industry, for instance, live performance and others. What is more, since this study concentrates on generative artificial intelligence, the author recommends exploring how other types of AI impact elements of music industry.

Moving forward, collecting participants' demographic data would benefit future research. Additional analysis could be carried out based on what country and generation the respondent comes from, their gender, employment status, and other factors.

In addition, conducting mixed methods research may improve the quality of the results. For instance, implementing surveys and questionnaires into research will reveal the statistical side of the findings.

In conclusion, it is important to note that such subject as artificial intelligence should be studied with a high frequency as it is constantly being developed and, moreover, it continues to impact various aspects of our lives. Overall, AI needs to be researched considering its unpredictability and fast enhancement.

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Appendices

Appendix 1. Discussion forums

1. AI and Future of Music Production: <https://www.audiosciencereview.com/forum/index.php?threads/ai-and-future-of-music-production.50933/>

2. Is AI the future of Music production?: <https://forum.audiob.us/discussion/55581/is-ai-the-future-of-music-production>