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**OPTIMIZING SPOTIFY'S BUSINESS THROUGH BIG  
DATA ANALYTICS**



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# TIIVISTELMÄ

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Spotifyn Liiketoiminnan Tehostaminen Big Data Analytiikan Avulla

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Ohjaaja(t): Clements, Kati

Tämän kirjallisuuskatsauksen tavoitteena oli selvittää, kuinka big data -analytiikka voidaan hyödyntää Spotifyn ilmaiskäyttäjien tehokkaampaan muuntamiseen maksaviksi tilaajiksi. Digitaalisten alustojen ja suoratoistopalveluiden myötä musiikkiteollisuus on kokenut merkittävän murroksen. Spotify on vakiinnuttanut asemansa johtavana toimijana freemium-liiketoimintamallinsa ansiosta, joka yhdistää maksuttoman, mainosrahoitteen palvelun ja maksullisen premium-tilauksen. Mallin haasteena ovat kuitenkin taloudelliset paineet, jotka korostavat maksavien asiakkaiden merkitystä.

Big data -analytiikka tarjoaa tehokkaita työkaluja liiketoiminnan kehittämiseen, sillä sen avulla voidaan kerätä, analysoida ja hyödyntää suuria tietomääriä käyttäjäkokemuksen optimointiin ja asiakassuhteiden vahvistamiseen. Tutkimuksessa sovellettiin big data -analytiikan viitekehystä, joka jakaa analytiikan prosessin kolmeen vaiheeseen: datan keräämiseen, analysointiin ja hyödyntämiseen.

Tulokset osoittivat, että big data analytiikka voi paljastaa käyttäjien tarpeita ja käyttäytymismalleja, joiden avulla markkinointitoimia ja muita liiketoimintastrategioita voidaan kohdentaa tarkemmin. Lisäksi big data analytiikan havaittiin parantavan sekä käyttäjähankintaa että asiakaspysyvyyttä hyödyntämällä personoituja suosituksia, kohdennettuja kampanjoita ja strategioita, kuten premium-kokeilujaksoja uusille asiakkaille ja räätälöityjen premium-tasojen kehittämistä asiakaspoistuman vähentämiseksi.

Tutkimus nosti esiin tietosuojan ja eettisiin kysymyksiin liittyviä haasteita, jotka edellyttävät huolellista hallintaa erityisesti käyttäjätietojen turvallisen käsittelyn ja datan eettisen käytön osalta. Jatkotutkimuksia suositellaan big data analytiikkatyökalujen tehokkuuden arvioimiseksi, suoratoistopalveluiden liiketoimintamallien vertailuun ja levy-yhtiöiden kanssa tehtävän yhteistyön kehittämiseksi.

Asiasanat: Big Data Analytics, Spotify, Freemium

## ABSTRACT

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Optimizing Spotify's Business Through Big Data Analytics

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The objective of this literature review was to investigate how big data analytics can be leveraged to enhance the conversion of Spotify's free users into paying subscribers. The emergence of digital platforms and streaming services has significantly transformed the music industry. Spotify has established itself as a market leader through its freemium business model, which combines a free, ad-supported service with a paid premium subscription. However, this model faces financial challenges, highlighting the critical role of paying customers in sustaining profitability.

Big data analytics provides robust tools for business development by facilitating the collection, analysis, and utilization of large datasets to optimize user experiences and strengthen customer relationships. This study applied a big data analytics framework that divides the process into three stages: data collection, analysis, and utilization.

The findings suggest that big data analytics can uncover user needs and behavioral patterns, enabling more precise targeting of marketing efforts and business strategies. Moreover, big data analytics was found to enhance both user acquisition and retention through the implementation of personalized recommendations, targeted campaigns, and strategies such as premium trial periods for new users and the development of customized premium tiers to reduce churn.

The study also identified challenges related to data privacy and ethical considerations, emphasizing the need for rigorous data management practices and ethical application of analytics. Further research is recommended to evaluate the effectiveness of big data analytics tools, compare business models across streaming platforms, and develop sustainable collaboration frameworks with record labels.

Keywords: Big Data Analytics, Spotify, Freemium

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# 1 INTRODUCTION

Over the past two decades, the music industry has transformed significantly, transitioning from physical formats to digital streaming services. In the early 2000s, internet piracy disrupted revenue streams, causing global earnings to plummet from \$22 billion in 1999 to \$13 billion in 2014 (Dörr et al., 2013; IFPI, 2024).

To combat piracy, music streaming emerged as an effective solution. Among the earliest streaming services was Spotify, whose innovative freemium model provided free, ad-supported streaming alongside premium subscription. This approach transformed music consumption and drove the rapid popularity of music streaming (Thomes, 2013).

By 2023, the music industry has experienced a significant revival, with streaming contributing 67.3% of its total revenue, becoming the primary driver of growth (IFPI, 2024). Spotify played a major role in this resurgence. According to its Q4 statistics, the platform had 602 million monthly active users, with 39% premium subscribers and 61% free users. Despite generating €13 billion in revenue in 2023, Spotify reported a net loss of €446 million (Spotify Financial Report, 2023).

A large part of these financial challenges stem from the freemium model itself. Bapna et al. (2018) highlights that platforms operating under the freemium model rely heavily on converting free users into paying subscribers to generate sustainable revenue. As ad revenue from free users is typically insufficient to cover costs, subscription revenue becomes the primary financial foundation.

To address these challenges, big data analytics has emerged as a powerful tool for organizations to increase business goals (Aijah et al., 2019; Al-Okaily et al., 2023). By collecting data from user behavior, preferences, and engagement patterns, businesses can enhance user satisfaction and improve decision-making accuracy (Elgendy et al., 2016; Bumblauskas et al., 2017).

However, while the freemium model is widely adopted by many digital platforms, and challenges related to user conversion are well-documented, there is a notable gap in academic literature focusing on the use of big data analytics to improve user conversion rates. Despite big data being a popular tool

for enhancing user satisfaction, its specific application in addressing conversion challenges remains underexplored. This highlights the need for a study that investigates how big data analytics can be strategically leveraged to address user conversion challenges within freemium-based platforms.

As the largest platform in the music industry (Vonderau P., 2019), Spotify must focus on enhancing aspects related to its freemium model to sustain its leadership position in a highly competitive landscape. This thesis examines how big data analytics can be leveraged to improve challenges of the freemium model, such as gaining new users, turning free users into subscribers and decreasing user retention. Ultimately, the thesis seeks to answer the following research question:

- How can Spotify leverage big data analytics to improve free users converting to premium subscribers?

This thesis was conducted as a literature review, drawing from articles and studies in social sciences, business, and information technology. Literature was selected based on criteria such as peer review status, citation impact, and publication relevance. Key search terms included “big data analytics,” “freemium model,” and “music industry”. Academic sources were retrieved from platforms like Google Scholar, JYKDOK, and Consensus.

To analyze the findings on improving conversion, the thesis employs a simplified Big Data Analytics Framework. This framework, designed by the author and informed by sources such as Elgendy et al. (2016), Tsai et al. (2015), and Osman A. (2019) provides a structured approach to evaluating strategies that Spotify can utilize to further improve their freemium model.

## 2 BIG DATA ANALYTICS

This chapter explores the concept of Big Data Analytics, examining its significance and transformative role in modern organizations. It begins with a clear definition of Big Data Analytics and highlights its potential in improving data-driven decision making. Drawing on insights from Elgendy et al. (2016), Tsai et al. (2015), and Osman A. (2019), the chapter presents a simplified framework for conducting Big Data Analytics. This model, developed by the author, breaks the analytics lifecycle into three core stages: Data Collection, Data Analysis, and Data Utilization, offering a practical and accessible overview for application across various industries.

The chapter is structured to provide a detailed examination of each stage in the Big Data Analytics process. The data collection section delves into the sources of data, emphasizing the distinction between traditional and big data, as well as the role of user-generated data. The data analysis section focuses on how organizations process and analyze data, leveraging machine learning and advanced algorithms to uncover meaningful patterns. Lastly, the data utilization section highlights how analyzed data is converted into actionable insights, emphasizing the role of business intelligence in transforming complex data into clear, practical strategies that drive informed decision-making and improve organizational outcomes.

### 2.1 Definition of Big Data Analytics

Big Data Analytics is defined by Ajah et al. (2019) as the systematic process of examining and interpreting large datasets to uncover meaningful insights that guide decision-making. As highlighted by Bumblauskas et al. (2017), the primary goal of Big Data Analytics is to bridge the gap between raw data and actionable insights, enabling organizations to make informed decisions and achieve improved business outcomes. Big Data Analytics integrates statistical



methods, computer science techniques, and domain-specific expertise to transform raw data into actionable insights (Gandomi & Haider, 2015).

Big Data Analytics has transformed industries by enabling actionable insights from massive datasets. Ajah et al. (2019) showcases how, for example, Wal-Mart processes over a million customer transactions hourly, using analytics to optimize inventory and marketing strategies. Similarly, the Library of Congress manages 60 petabytes of data, enhancing digital archiving and accessibility. In healthcare, analytics unlock \$300 billion in value by predicting patient risks and improving treatment outcomes. Social media platforms like Facebook analyze billions of content uploads to optimize user engagement and advertising.

Osman A. (2019) describes Big Data Analytics as a multi-step process that begins with data collection, where relevant data is gathered using appropriate tools and techniques. This is followed by data analysis, which applies advanced methods, including machine learning algorithms and statistical modeling, to uncover hidden insights and patterns. The process concludes with data utilization, where the derived insights are integrated into decision-making processes to enhance organizational practices and strategies. While the model by Elgendy et al. (2016) and other researchers such as Tsai et al. (2015) provides a detailed description of the fundamental stages, the author has condensed this framework into three core stages: Data Collection, Data Analysis, and Data Utilization. This simplified model aims to offer a clear and concise visualization of the process without compromising its conceptual accuracy.

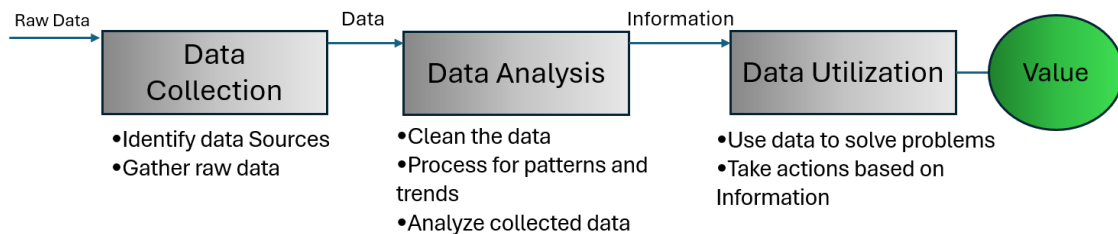


Figure 1, Big Data Analytics Framework, Adopted from Elgendy et al. (2016) & Tsai et al. (2015).

## 2.2 Data Collection

Data, in its most fundamental form, consists of raw and unprocessed symbols, measurements, or facts awaiting interpretation. As Fox et al. (1994) note, data only becomes meaningful once placed within a proper context. In today's digital environment, the scale and complexity of data has expanded significantly, giving rise to the concept of Big Data (Ajah et al., 2019). Unlike traditional datasets, which are often structured and managed through relational databases,

big data is characterized by its volume, velocity and variety (Gandomi & Haider, 2015; Osman A., 2019).

The proliferation of digital technologies—such as smartphones, Internet of Things (IoT) devices, and social media platforms—has accelerated the growth of Big Data (Erevelles et al., 2016). Specialized tools and techniques support the gathering process, including SQL (Structured Query Language) for managing structured data, ETL (Extract, Transform, Load) processes for integrating data from multiple sources, and various data ingestion frameworks suited to high-volume, real-time environments (Elgendy et al., 2016).

A vital subset of big data is user data, which originates from the actions and interactions of individuals engaging with digital platforms (Blasco-Arcas et al., 2023). This user data emerges from sources such as social media posts, e-commerce transactions, and content consumption patterns. Saura et al. (2021) classify user data into two main categories:

- **User-Generated Content (UGC):** Data intentionally created by users, such as written reviews, comments, uploaded images, or shared posts.
- **User-Generated Behavior (UGB):** Data inferred from user actions and usage patterns, such as browsing history, click-through rates, and purchase habits.

These forms of user data are captured as individuals navigate digital environments. Platforms log and store this information in databases, data lakes, or distributed storage systems, enabling it to be aggregated and prepared for subsequent analytical processes (Alaimo et al., 2017). By systematically gathering and organizing data, organizations establish a foundational resource that can later be examined, refined, and leveraged to gain insights once appropriate analytical methods are applied (Alaimo et al., 2017; Saura et al., 2021).

Challenges regarding data collection have emerged, Saura et al. (2021) state that the continuous collection of data has raised widespread concerns, particularly regarding privacy and security. Many users feel that their personal information is being gathered and utilized without adequate transparency or consent. This lack of clarity can erode trust in companies and service providers, especially when the purpose of data collection is not clearly communicated.

## 2.3 Data Analysis

Once data has been gathered, the next stage is to transform these raw inputs into meaningful insights. During the analysis phase advanced statistical methods like, machine learning models, and other algorithmic techniques can be ap-

plied to detect patterns, correlations, and trends that would be difficult or impossible to discern manually (Gandomi & Haider, 2015; Portugal et al., 2018).

For example, Bumblauskas et al. (2017) explains that machine learning methods can uncover natural groupings of users that share similar interests or behaviors, helping organizations segment their audience more effectively. Other models can use historical and real-time data to make predictions about future outcomes, such as anticipating customer preferences and forecasting demand. Meanwhile, recommendation algorithms process vast streams of behavioral information to deliver personalized suggestions that increase user engagement and satisfaction (Portugal et al., 2018).

Early recommender systems, like those on Amazon and CDnow, focused on personalizing product suggestions to drive sales, moving away from generic placements to tailored recommendations such as "people who bought this also bought" (Konstan et al., 2012). Metrics like hit-rate and lift were commonly used to measure how often recommendations led to purchases and boosted overall sales. However, Konstan et al. (2012) showcases challenges like the "Netflix Prize", which was criticized for prioritizing prediction accuracy over practical factors, such as how changes to top recommendations impact user engagement and purchasing behavior.

Portugal et al. (2018) highlights that personalization, enabled by these analytical techniques, can significantly enhance user experiences by aligning offerings with individual preferences. However, it is important to acknowledge that personalization is not universally beneficial. While tailored recommendations or predictive models may lead users to more relevant content or products, Jansen et al. (2020) caution that personalization does not always equate to genuine understanding or deeper satisfaction. In some cases, it may even have unintended negative effects, such as making users feel manipulated or misunderstood.

## 2.4 Data Utilization

Once meaningful insights have been extracted through data analysis, organizations can turn these findings into actionable strategies and informed decision-making. This stage involves leveraging uncovered patterns, trends, and predictions to guide real-world interventions, product innovations, and strategic goals (Elgendy et al., 2016). Successful utilization of data not only addresses immediate challenges but also fosters long-term growth and adaptability.

One critical way insights are operationalized is through the adoption of business intelligence (BI) systems (Niu et al., 2021). BI enables organizations to process vast volumes of structured and unstructured data into practical insights. By presenting analytics results through intuitive visualizations and dashboards, BI ensures decision-makers can interpret and apply findings effectively. As Tsai

et al. (2015) emphasize, this makes Big Data Analytics results accessible and impactful, driving informed decisions and maximizing their strategic value.

Erevelles et al. (2015) illustrate how Big Data drives both incremental and radical innovations. For instance, Google leverages location and search history to assess whether smartphone ads result in store visits, refining digital ad strategies. Amazon's anticipatory shipping uses purchase history, search activity, and shopping cart data to predict customer needs, enabling proactive logistics. Walmart processes massive customer transaction data to optimize inventory and personalize marketing efforts. These examples highlight how Big Data transforms traditional processes into innovative, data-driven strategies that provide a competitive edge.

Further, Erevelles et al. (2016) underscore the importance of transforming ignorance into knowledge as a driver of innovation. Firms that embrace uncertainty and cultivate a culture of inquiry can create unique, inimitable resources that foster competitive advantage. However, achieving this requires overcoming challenges such as the reluctance to admit ignorance and the complexity of building a data-driven organizational culture.

To support such transformative efforts, Ajah et al. (2019) emphasize the need to invest in skilled, motivated teams with a deep understanding of the big data analytics process. Organizations must dedicate resources to building expertise and managing the intricacies of supercomputing platforms, ensuring the full potential of big data analytics is realized. By combining innovative strategies, a strong BI framework, and skilled teams, organizations can unlock the true power of big data for sustained success.

## 3 MUSIC STREAMING BUSINESS

This chapter begins by examining the evolution of the music industry, highlighting its key developments, influential factors, and major competitors. It then introduces the freemium model, a pivotal strategy for Spotify and a widely used approach in the music streaming industry. The chapter explores the advantages of the freemium model, such as attracting a large user base through free, ad-supported access, as well as its challenges, including balancing the value of the free tier with the need to convert users to premium subscriptions. Finally, it delves into Spotify's revenue challenges within the freemium model, focusing on the impact of record label royalties and revenue-sharing agreements, which create significant obstacles to achieving consistent profitability.

### 3.1 Evolution of The Music Industry

In the early 2000s, the music industry faced a significant challenge with the surge of online piracy. Piracy made it possible to share music files freely, bypassing traditional distribution channels and causing substantial revenue losses for record labels and artists (Thomes, 2013). International Federation of the Phonographic Industry's yearly music industry report showcases the decline of industry revenues as between 1999 and 2014, global music revenues dropped dramatically, from \$22 billion to \$13 billion (IFPI, 2024).

To compete against piracy music streaming emerged as a viable solution, providing consumers with legal, convenient, and affordable access to vast music libraries (Dörr et al, 2013). In 2008, Spotify was launched as a groundbreaking solution to the music industry's piracy problem. Offering users access to extensive digital music libraries, Spotify introduced a scalable and legitimate alternative to illegal downloads. Its innovative freemium model, which combined free, ad-supported streaming with premium subscription options featuring ad-free listening and offline playback, revolutionized music consumption

and paved the way for the dominance of streaming platforms in the digital age (Vonderau, 2019).

Since the advent of music streaming, the industry has experienced a remarkable revival. By 2023, streaming services accounted for 67.3% of the industry's total revenue, solidifying their role as the primary driver of the music industry (IFPI, 2024). For example, platforms like Apple Music, Amazon Music, YouTube Music, and Tidal each operate with their own unique business models and strategies. Apple Music, for instance, offers a subscription-only service, positioning itself as a premium alternative to freemium platforms. Both Apple and Amazon benefit from their integrated ecosystems, which can significantly boost user acquisition and retention by leveraging software infrastructures (Barata et al., 2021; Maaso & Haged, 2020).

Spotify's use of the freemium model played a pivotal role in this evolution, blending accessibility and monetization to resonate with millions of users worldwide (Bapna et al., 2018; Aguiar et al., 2021). With 602 million monthly active users reported in Spotify's Q4 2023 statistics, Spotify remains the largest music streaming platform globally, demonstrating the significant impact of its innovative business model on the revival of the music industry.

### **3.2 Freemium Business Model**

The freemium model has emerged as a dominant strategy in the digital economy, balancing accessibility with monetization. While its origins date back to the 1980s, the term was officially introduced by Fred Wilson and gained widespread recognition through Chris Anderson (Bapna et al., 2018). This model offers two service tiers: a free version, often ad-supported with basic features, and a premium version, providing advanced functionalities for a subscription fee (Thomes T., 2013). The core principle of the freemium model is to attract users with an enticing free version while crafting premium features that are so desirable that users feel motivated to upgrade. This strategy not only drives user acquisition but also generates value through advertising revenue from free-tier users, creating a sustainable balance between accessibility and monetization (Holm et al., 2017; Koch et al., 2017).

One of the key advantages of the freemium model is its ability to attract a broad user base at low marketing costs, making it great for digital startups. The free tier appeals to modern consumers' expectations for free access, creating high perceived value, while the premium tier provides a monetization pathway through enhanced offerings (Barata et al., 2021; Thomes T., 2013). This strategy has been widely adopted across industries, including software, mobile apps, and streaming platforms. The success of the freemium model depends on effectively managing the customer lifecycle, which includes acquisition, conversion, and retention (Sinclair et al., 2017). Businesses must focus on attracting free-tier

users, converting them to paying subscribers, and minimizing churn by maintaining high levels of user satisfaction (Hamari et al., 2020). Social engagement also plays a crucial role, as premium features often enable sharing and interaction, fostering retention and incentivizing upgrades (Hamari et al., 2020).

One common issue arises in the freemium model when the free tier is overly generous, leading users to feel satisfied without needing to upgrade. As noted by Holm et al. (2017), offering too many features in the free version can hinder conversion rates, as users may perceive the free tier as meeting their needs.

To address this, Koch (2017) advocates for a "Premiumfirst" trial approach, where users begin with the premium version before transitioning to the free tier. This strategy leverages the concept of loss aversion, as users are likely to perceive the free tier as a downgrade after experiencing the benefits of the premium version, thus increasing their likelihood of upgrading. Conversely, starting with a "Freefirst" strategy positions the free tier as the initial benchmark, which can diminish the perceived value of premium features and reduce conversion rates.

Building on this, Mäntymäki et al. (2023) identify key factors influencing user behavior in freemium models. For basic users, the decision to upgrade is driven primarily by enjoyment and the perceived value of the premium subscription, highlighting the importance of hedonic benefits and cost-benefit analysis. For premium users, however, retention is more closely linked to factors like access to new content and service ubiquity, showcasing the importance of differentiated and exclusive features. This information could be used in creating a new additional premium tier.

### 3.3 Spotify's Profitability Issues

The music industry has undergone a transformative shift, with streaming platforms now dominating global music consumption (Aguiar, 2017). Spotify, the industry leader, was a pioneer in adopting the freemium model, reshaping the way users engage with digital music (Aguiar & Waldfogel, 2021). By Q4 2023, Spotify reported 602 million monthly active users, including 236 million premium subscribers and 366 million free-tier users (Spotify Financial, 2023). While premium subscribers contribute 86% of Spotify's revenue, the ad-supported free tier remains a challenge, highlighting the company's reliance on converting free users into paying customers for profitability.

Spotify's freemium model is designed to balance accessibility and premium incentives. The free tier offers limited features such as advertisements, lower audio quality, no offline listening, and restricted app functionality, whereas the premium tier provides unrestricted access to Spotify's library, ad-free listening, high-quality audio, and offline playback (Wlömert & Papies, 2016). How-

ever, Koch et al. (2017) emphasize that industries like music streaming operate under unique business models due to the need for music rights agreements. A significant portion of Spotify's revenue is allocated to royalties for record labels and rights holders, adding financial strain (Towse et al., 2020).

To illustrate this, the author has developed a simplified representation of Spotify's freemium model, inspired by Towse et al. (2020). This visualization highlights the revenue streams within the freemium structure, providing a clear framework to understand the dynamics and challenges discussed in this study.

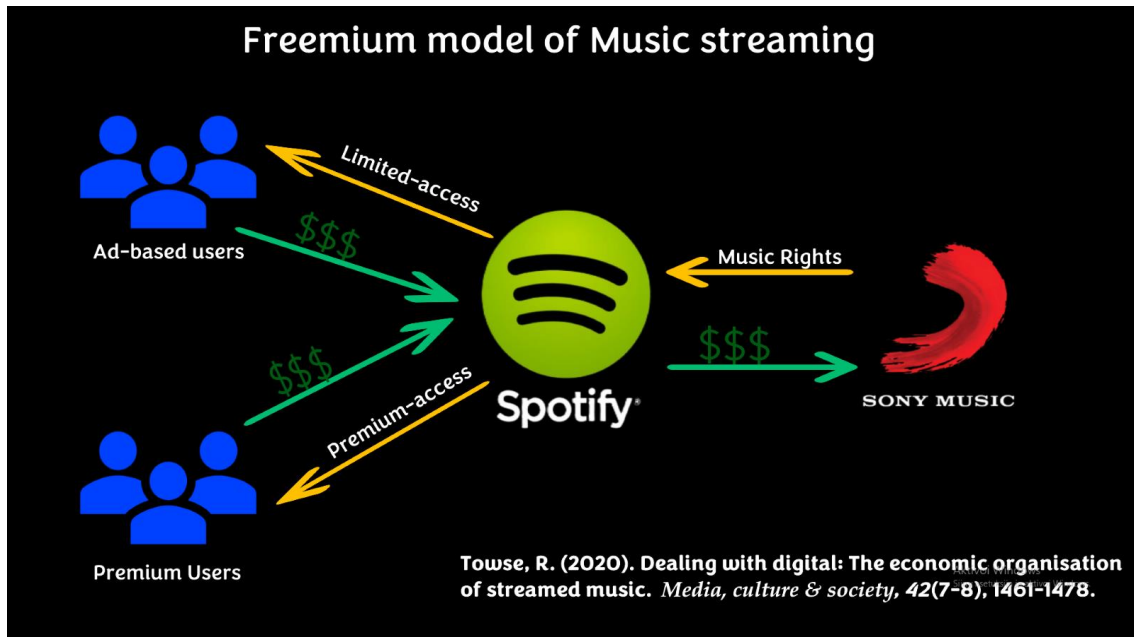


Figure 2, Freemium Model of Music Streaming, Adopted from Towse, R. (2020)

Unlike other industries where free users generate negligible marginal costs, music platforms face high expenses for every stream because of these royalty payments (Towse R., 2020). Advertising revenue from free-tier users often falls short of covering these costs, creating a disparity that makes premium subscriptions essential for Spotify's profitability (Koch, 2018). Moreover, Spotify must maintain competitive royalty agreements to preserve partnerships with record labels, which could otherwise shift their focus to competitors like Apple Music or Amazon Music (Towse R., 2020).

To sustain growth and address these challenges, freemium adopters must focus on engaging free-tier users while increasing premium conversions. Continuous engagement with the free tier is critical as it forms the foundation for upgrading free users to premium subscribers (Hamari et al., 2020).



## **4 Leveraging Big Data Analytics to Optimize Spotify's Freemium Business**

This section examines how Spotify can optimize its freemium business model through Big Data Analytics, focusing on user acquisition, retention, and conversion. By leveraging a comprehensive Big Data Analytics framework, which encompasses the stages of data collection, analysis, and utilization, Spotify can address key challenges and implement effective strategies. The framework highlights methodologies, challenges, and solutions that utilize advanced tools such as user-generated data (UGD), algorithms, and Business Intelligence (BI) to enhance Spotify's freemium strategy.

The study integrates insights from the music industry and Big Data Analytics to identify actionable approaches for improving user conversion in Spotify. Findings reveal that Spotify can significantly enhance its freemium model by adopting data-driven strategies, including leveraging user data to collect valuable information on past free user, refining algorithms to find patterns, and utilizing BI tools for informed decision-making.

By applying advanced analytical techniques, Spotify can evaluate the effectiveness of these strategies, refining its approach to both user acquisition and retention. These data-driven methods underscore the transformative potential of Big Data Analytics in optimizing Spotify's freemium model, offering actionable insights for sustainable growth, enhanced user satisfaction, and a stronger competitive advantage.

### **4.1 Enhancing User Conversion Through Big Data Analytics**

To enhance Spotify's user conversion within the freemium model, the author has developed a comprehensive table outlining key methodologies, challenges, and potential solutions. The table follows a structured process comprising data collection, analysis, and utilization, showcasing how Spotify can leverage advanced techniques to convert free-tier users into premium subscribers. It high-

lights methods such as User-Generated Data (UGD), algorithms and machine learning, and Business Intelligence (BI) tools to address this challenge. Each stage is supported with relevant sources, practical examples, and actionable steps, while also identifying specific challenges and proposing solutions to overcome them effectively.

	Method	Challenge
<b>Data Collection</b>	<p>Collect User-Generated Content (UGC) and User-Generated Behavior (UGB) (Saura et al., 2021).</p> <p><b>Example:</b> In Spotify's case, this data can identify user preferences and trends, such as most-played songs or regions with high conversion potential.</p>	<p>Many users distrust how their data is collected and used (Saura et al., 2021).</p> <p><b>Solution:</b> Implement clear data privacy policies and communicate how data enhances user experience.</p>
<b>Data Analysis</b>	<p>Apply machine learning and statistical tools to analyze user behavior and uncover patterns like disengagement triggers or factors that influence upgrades (Ajah et al., 2019; Portugal et al., 2018).</p> <p><b>Example:</b> Spotify can identify users who stream content frequently but avoid ads, signaling strong upgrade potential.</p>	<p>Over-personalization may cause user dissatisfaction if recommendations are irrelevant or overly repetitive (Jansen et al., 2020).</p> <p><b>Solution:</b> Balance personalization with content variety and continuously fine-tune algorithms based on feedback.</p>
<b>Data Utilization</b>	<p>Use insights to develop personalized strategies, such as tailored promotions or trial offers for specific user segments (Koch et al., 2017).</p> <p>Use BI insights to gain overall understanding on what leads to a subscription (Niu et al., 2021).</p> <p><b>Example:</b> Spotify can offer exclusive deals for casual listeners or create curated</p>	<p>Aligning actionable insights with execution requires skilled teams and robust infrastructure (Ajah et al., 2019).</p> <p><b>Solution:</b> Invest in skilled personnel and technology to ensure efficient implementation and measure success consistently.</p>

	playlists to increase premium conversions.	
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Table 1, Utilizing The Big Data Analytics Framework, Adopted from Elgendy et al. (2016) & Tsai et al. (2015).

## 4.2 Optimizing User Acquisition & User Retention

While the primary challenge of the freemium model lies in converting free users into paying subscribers, user acquisition and user retention are equally vital for driving sustainable growth and profitability. User acquisition involves bringing new users onto the platform, while user retention focuses on keeping them engaged and reducing churn to enhance their long-term value. This section examines strategies for effectively attracting new users and maintaining their engagement, which are both crucial for building a steady stream of potential premium subscribers (Bapna et al., 2018; Holm et al., 2017).

## 4.3 User Acquisition

User acquisition refers to strategies aimed at attracting new users to a platform or service. In the freemium model, this is primarily achieved by offering an appealing free version that encourages users to explore the platform's benefits (Holm et al., 2017).

To enhance user acquisition, data-driven marketing can be employed to target specific demographics and locations, focusing on features that increase the likelihood of conversion (Saura et al., 2021). Leveraging Big Data Analytics enables Spotify to understand user behaviors, preferences, and engagement patterns that drive acquisition success.

Koch et al. (2017) advocate for a "Premium-first" strategy within the freemium model, where new users are given temporary access to premium benefits before transitioning to the free tier. This approach leverages loss aversion, as users may perceive the free tier as a downgrade after experiencing premium features, increasing their likelihood of upgrading. Spotify could implement this strategy as a targeted trial campaign. By analyzing User-Generated Content (UGC) and User-Generated Behavior (UGB) (e.g., listening habits, skips, and

repeats), Spotify can assess the effectiveness of the premium-first approach and identify whether it leads to higher conversion rates compared to standard acquisition methods.

### 4.3.1 User Retention

User retention focuses on maintaining user activity and engagement to prevent churn. In the freemium model, retaining free-tier users is critical, as continuous engagement increases the likelihood of converting them into paying subscribers (Holm et al., 2017).

Spotify is heavily reliant on this conversion process, as reflected in its Q4 2023 data: 602 million active users, with only 39% as premium subscribers (Spotify Financial Report, 2023). To improve retention, Spotify can leverage Big Data Analytics to monitor and analyze user behaviors, such as listening frequency, session duration, and skip rates (Portugal et al., 2018).

By employing machine learning algorithms, Spotify can detect early signs of reduced engagement and intervene with personalized strategies (Jansen et al., 2020). For instance, users who show declining activity could receive targeted playlists, notifications, or premium trials to re-engage them and incentivize upgrades.

Mäntymäki et al. (2023) propose introducing new premium tiers to cater to different user behaviors and value perceptions, particularly targeting segments with varying needs and willingness to pay. To implement this, Spotify could leverage Business Intelligence (BI) tools to analyze user-generated behavior (UGB), such as listening frequency, playlist engagement, and session duration, to identify patterns and potential gaps in their offerings. For instance, Spotify could introduce a low-cost, feature-limited premium tier for users who engage less frequently or primarily listen to podcasts. This data-driven strategy would allow Spotify to align premium plans more closely with user needs, enhance satisfaction, and drive conversions, while ensuring that the value of existing premium offerings remains intact (Niu et al., 2021; Mäntymäki et al., 2023).

However, Spotify must carefully manage the "value gap" – the disparity between the perceived value of premium subscriptions and the free tier (Koch et al., 2017). Ensuring premium features provide sufficient value without undermining the free tier is crucial to maintaining user satisfaction and trust. Data insights can help Spotify strike this balance by focusing on features users value most.

## 5 CONCLUSION

This thesis examined how Spotify can effectively utilize Big Data Analytics to address challenges within its freemium business model, particularly the conversion of free-tier users into premium subscribers. Using a Big Data Analytics framework centered on data collection, analysis, and utilization, the research aimed to answer the question:

- **How can Spotify leverage Big Data Analytics to increase conversions from free-tier to premium-tier users?**

This framework provided a systematic approach to identifying strategies for improving conversion rates and optimizing Spotify's freemium model.

The analysis began with key components of Big Data Analytics, such as collecting user-generated content (UGC) and user-generated behavior (UGB) to gain insights into user preferences and engagement. Data analysis techniques, including algorithms, identified behavioral patterns and factors influencing user upgrades. Finally, data utilization emphasized using these insights to develop tailored strategies that boost user satisfaction and drive conversions.

The thesis contextualized these findings by discussing the music streaming industry and Spotify's freemium model. It highlighted how Spotify pioneered the freemium approach, offering free, ad-supported access alongside premium subscriptions, while addressing challenges like balancing the value of the free tier and managing high royalty costs.

Findings reveal strategies to enhance Spotify's freemium model through improved data collection, analysis, and utilization. UGC and UGB can help identify user trends, while transparent data policies can address privacy concerns. Data analysis can uncover conversion opportunities, such as targeting users who avoid ads, while balancing personalized recommendations with diverse content. Data utilization focuses on creating personalized campaigns and promotions, requiring investment in skilled teams and robust infrastructure for effective implementation.

The study also explored ways to enhance user acquisition and retention, including optimizing the "Premium-first" approach and introducing a new premium tier to meet the needs of diverse user segments. Findings demonstrate that refining these strategies and leveraging Big Data Analytics can further strengthen Spotify's freemium model and improve overall user satisfaction.

A critical challenge within the music streaming industry lies in its financial structure, where a substantial portion of revenue is directed to music rights holders. This dynamic significantly limits the impact of increased user conversions, as higher engagement often fails to offset the considerable costs of royalties. To navigate these challenges, Spotify must go beyond refining its user conversion strategies and instead explore alternative revenue streams and innovative approaches that ensure long-term sustainability and profitability in an intensely competitive market.

This study opens the door to numerous opportunities for further research. Future studies could explore the development of cost-effective solutions that address the financial challenges faced by music streaming platforms and rights holders, particularly the burden of high royalty fees. Investigating alternative revenue-sharing models or innovative strategies to achieve a more equitable balance between costs and profits could provide significant value. Moreover, leveraging Big Data Analytics could play a pivotal role in identifying new revenue streams, enhancing operational efficiency, and fostering collaborative approaches that benefit both streaming services and rights holders. Such advancements could pave the way for a more sustainable and mutually beneficial music streaming ecosystem.

## REFERENCES

Alaimo, C., & Kallinikos, J. (2017). Computing the everyday: Social media as data platforms. *The Information Society*, 33(4), 175-191.

Ajah, I. A., & Nweke, H. F. (2019). Big data and business analytics: Trends, platforms, success factors and applications. *Big Data and Cognitive Computing*, 3(2), 32.

Bapna, R., Ramaprasad, J., & Umyarov, A. (2018). Monetizing Freemium Communities: Does Paying for Premium Increase Social Engagement? *MIS Quarterly*, 42(3), 719-A4.

Barata, M. L., & Coelho, P. S. (2021). Music streaming services: Understanding the drivers of customer purchase and intention to recommend. *Heliyon*, 7(8), e07783.

Blasco-Arcas, L., Kastanakis, M. N., Alcañiz, M., & Reyes-Menendez, A. (2023). Leveraging user behavior and data science technologies for management: An overview. *Journal of Business Research*, 154, 113325.

Bumblauskas, D., Nold, H., Bumblauskas, P., & Igou, A. (2017). Big data analytics: Transforming data to action. *Business Process Management Journal*, 23(3), 703-720.

Dörr, J., Wagner, T., Benlian, A., & Hess, T. (2013). Music as a Service as an Alternative to Music Piracy? An Empirical Investigation of the Intention to Use Music Streaming Services. *Business & Information Systems Engineering*, 5(6), 383-396.

Elgendy, N., & Elragal, A. (2016). Big Data Analytics in Support of the Decision Making Process. *Procedia Computer Science*, 100, 1071-1084.

Erevelles, S., Fukawa, N., & Swayne, L. (2015). Big Data consumer analytics and the transformation of marketing. *Journal of Business Research*, 69(2), 897-904.

Erevelles, S., Fukawa, N., & Swayne, L. (2016). Big Data consumer analytics and the transformation of marketing. *Journal of Business Research*, 69(2), 897-904.

Fox, C., Levitin, A., & Redman, T. (1994). The notion of data and its quality dimensions. *Information Processing & Management*, 30(1), 9-19.

Gandomi, A., & Haider, M. (2015). Beyond the hype: Big data concepts, methods, and analytics. *International Journal of Information Management*, 35(2), 137-144.

Hamari, J., Hanner, N., & Koivisto, J. (2020). Why pay premium in free-mium services? A study on perceived value, continued use, and purchase intentions in free-to-play games. *International Journal of Information Management*, 51, 102040.

Holm, A. B., & Günzel-Jensen, F. (2017). Succeeding with freemium: Strategies for implementation. *The Journal of Business Strategy*, 38(2), 16-24.

International Federation of the Phonographic Industry (IFPI). (2024). *Global music report 2024*.

Jansen, B. J., Salminen, J. O., & Jung, S. (2020). Data-Driven Personas for Enhanced User Understanding: Combining Empathy with Rationality for Better Insights to Analytics. *Data and Information Management*, 4(1), 1-17.

Koch, O. F., & Benlian, A. (2017). The effect of free sampling strategies on freemium conversion rates. *Electronic Markets*, 27(1), 67-76.

Konstan, J. A., & Riedl, J. (2012). Recommender systems: From algorithms to user experience. *User Modeling and User-Adapted Interaction*, 22(1-2), 101-123.

Maasø, A., & Hagen, A. N. (2020). Metrics and decision-making in music streaming. *Popular Communication*, 18, 18-31.

Mäntymäki, M., Islam, A. N., & Benbasat, I. (2023). What drives subscribing to premium in freemium services? A consumer value-based view of differences between upgrading to and staying with premium. *Information Systems Journal*, 30(2), 295-333.

Niu, Y., Ying, L., Yang, J., Bao, M., & Sivaparthipan, C. (2021). Organizational business intelligence and decision-making using big data analytics. *Information Processing & Management*, 58(6), 102725.

Osman, A. M. S. (2019). A novel big data analytics framework for smart cities. *Future Generation Computer Systems*, 91, 620-633.

Portugal, I., Alencar, P., & Cowan, D. (2018). The use of machine learning algorithms in recommender systems: A systematic review. *Expert Systems with Applications*, 97, 205-227.

Saura, J. R., Ribeiro-Soriano, D., & Palacios-Marqués, D. (2021). From user-generated data to data-driven innovation: A research agenda to understand user privacy in digital markets. *International Journal of Information Management*, 60, 102331.



Sinclair, G., & Tinson, J. (2017). Psychological ownership and music streaming consumption. *Journal of Business Research*, 71, 1-9.

Spotify Financial Report. (2023). *Q4 2023 Spotify Financial Report*.

Thomes, T. P. (2013). An economic analysis of online streaming music services. *Information Economics and Policy*, 25, 81-91.

Tsai, C., Lai, C., Chao, H., & Vasilakos, A. V. (2015). Big data analytics: A survey. *Journal of Big Data*, 2(1), 1-32.

Vonderau, P. (2019). The Spotify Effect: Digital Distribution and Financial Growth. *Television & New Media*, 20(1), 3-19.

Wlömert, N., & Papies, D. (2016). On-demand streaming services and music industry revenues – Insights from Spotify's market entry. *International Journal of Research in Marketing*, 33(2), 314-327.