

Unlocking Opportunities for Youth in the Orange Economy: Music in Africa

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This Note is part of the Solutions for Youth Employment (S4YE) Knowledge series focusing on the Orange Economy or the creative sectors.¹ The previous Note in the series, 'Orange Economy: As a Driver of Jobs for Youth' addressed interventions and strategies that can help support growth and job creation for youth in the orange economy.

This Note does a deep dive into the music industry and provides a situational analysis of the music landscape in Africa. It highlights how the music industry could provide economic opportunities for youth and discusses some enabling strategies for translating music into economic and social benefits.

Some strategies for promoting youth-led music enterprises in Africa include 1) Access to finance to support music enterprises, 2) Targeted music-friendly policies, 3) Support for networks and enabling infrastructure, 4) Enhanced participation of women and artists from marginalized communities, and 5) Human capital development through skills, training, and innovation.

1. The Music Industry in Africa-Overall Trends

Africa has a rich and vibrant music tradition. It ranges from traditional to contemporary music and comprises music creators, music arrangers, and singers. Musicians in the continent incorporate traditional music and culture with modern musical forms.

Access to technology has helped create new opportunities for African musicians to reach a wider audience, mainly through digital streaming services. Local online music platforms are carving a niche for themselves by allowing artists from all over Africa to upload songs and generate revenues from streaming. Smartphone and tablet ownership is rising, creating a foundation for digital content development and dissemination.

The music streaming and digital music landscape in Africa is poised to take off in the coming years. Revenue in the music streaming segment is projected to reach US\$271 million in 2021 with an expected annual growth rate (CAGR 2021-2025) of 16.11%, resulting in a projected market volume of US\$ 493 million by 2025. (Figure 1).²

¹ This Note follows the definition of orange economy used in the UNESCO Framework for Cultural Statistics (FCS) and outlined in the S4YE note 'Orange Economy: As a Driver of Jobs for Youth.' 'Orange economy' refers to a range of economic activities in cultural and creative industries where the main objective is "the production or reproduction, promotion, distribution or commercialization of goods, services, and activities of content derived from cultural, artistic or heritage origins." The orange economy covers various cultural domains: art, crafts, films, cultural heritage, video games, fashion, and music.

² Music Streaming - Africa. Accessed: September 17, 2021. <https://www.statista.com/outlook/dmo/digital-media/digital-music/music-streaming/africa>

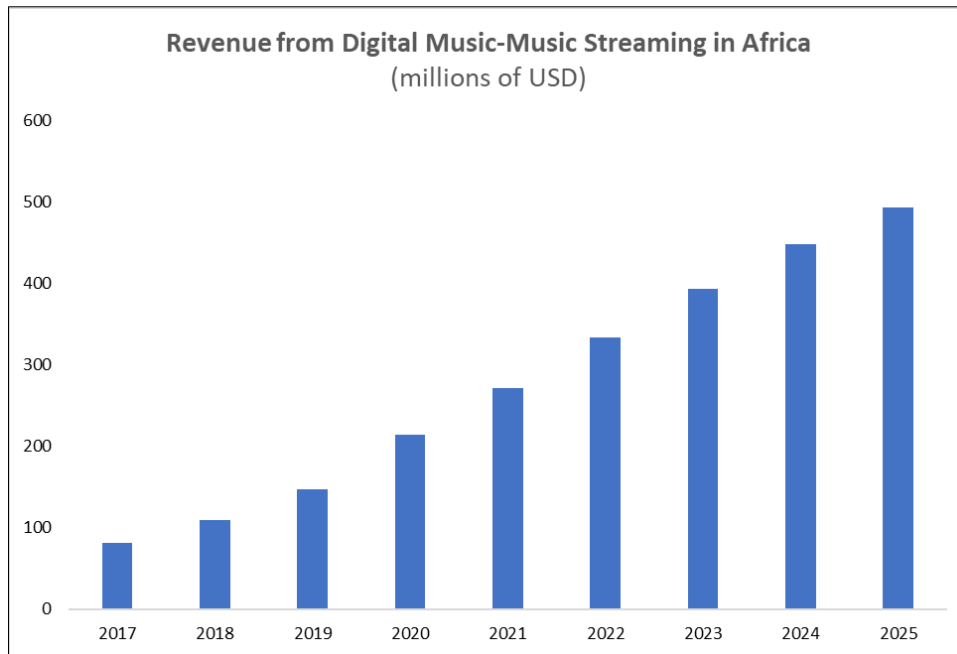


Figure 1: Revenues in Music Streaming segment in Africa is predicted to be five times more in 2025 than it was in 2017.
Source: [Statista Music Streaming - Africa](https://www.statista.com/outlook/dmo/digital-media/digital-music/music-streaming/africa). Accessed: September 17, 2021.

A cross-country comparison of the music streaming industry shows Nigeria leading the pack with 90 million USD in revenues (2020) from music streaming. A large part of the high revenues can be attributed to the rise in popularity of niche song genres like “afrobeats”, whose origins can be traced back to the Nigerian music industry.³ In Kenya, the mobile music industry saw a \$10m growth in industry revenue between 2015 and 2020.⁴ Music-streaming revenue is estimated to increase at about 20% in South Africa, 30% in Kenya, and 40% in Nigeria, resulting in revenues of about \$40M, \$5.2M, and \$17.5M respectively between 2019 – 2023.⁵ On average, the digital music streaming industry is predicted to generate a revenue of almost 9 USD per user in the African market.⁶

³ <https://www.bbc.com/news/world-africa-45033642>

⁴ Hruby, A. 2020

⁵ PricewaterhouseCoopers, 2016

⁶ Music Streaming - Africa. Accessed: September 17, 2021. <https://www.statista.com/outlook/dmo/digital-media/digital-music/music-streaming/africa>

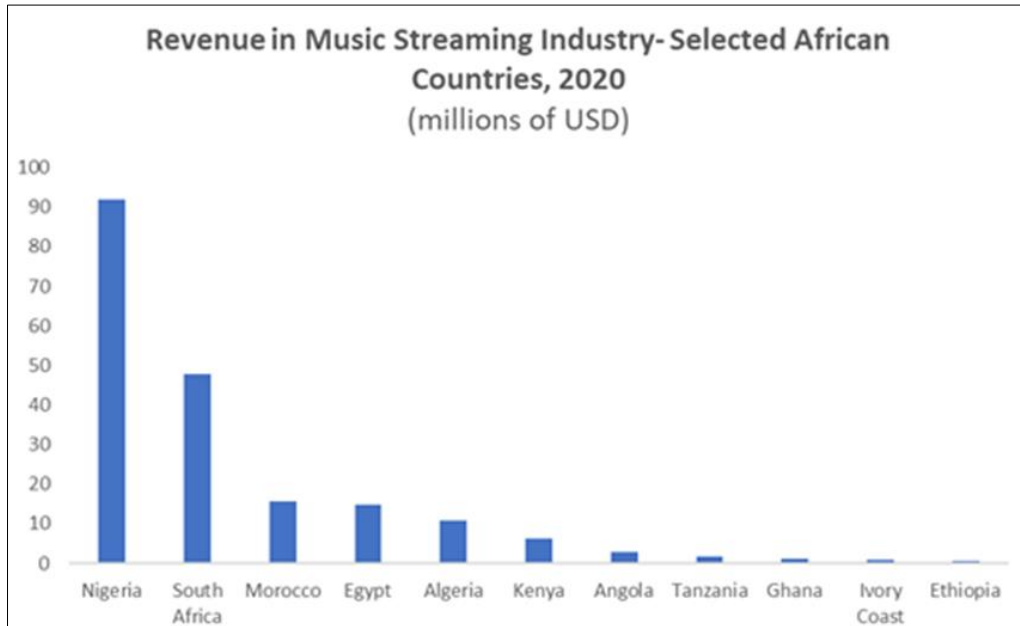


Figure 2: Nigeria is leading the pack with respect to revenues from the music streaming industry.⁷

Source: [Statista Music Streaming - Africa](#). Accessed: September 17, 2021.

The streaming segment is also expected to have close to 52.8 million users by 2025 with a user penetration of 2.6% in 2021 and expected user penetration of 4% by 2025 (Figure 3).⁸ It is estimated that more than 25 streaming platforms are operating in Africa.⁹ The increase in the uptake of music streaming platforms and user penetration signals an abundance of opportunities to be unlocked by youth in the digital music space. Box 1 lists one such example of a music streaming service in Africa.

An interesting trend emerges when we compare user penetration and revenues - higher revenues may not signal higher user penetration. For instance, in the case of Nigeria, while revenues from the industry is highest, user penetration falls short by a long margin (Figure 4). This indicates that a lack of equitable access to internet services across the country is keeping user penetration low. While the Nigerian market for music streaming shows tremendous revenue potential, it is important to allow for facilities to enable access to streaming platforms by investing heavily in ICT infrastructure. This has positive spillover effects, not only on the demand side of the industry but also the supply side. Music artists cannot produce what they cannot sell- if demand and better access is bolstered by solid infrastructure, artists are more incentivized to produce music, thereby increasing the supply.

⁷ Methodology: The Music Streaming market builds on Statista’s primary research (the Statista Global Consumer Survey), bottom-up modeling, market data from independent databases and third-party sources, the analysis of various key market and macroeconomic indicators, historical developments, current trends, and the reported performance indicators of the key market players. In particular, they consider average prices as well as annual subscription and download frequencies. All monetary figures refer to consumer spending on digital goods or subscriptions in the respective segment. This spending factors in discounts, margins, as well as taxes. The user metrics show the number of customers who have made at least one online purchase within the last 12 months.

⁸ Statista Music Streaming - Africa. Accessed: September 17, 2021. <https://www.statista.com/outlook/dmo/digital-media/digital-music/music-streaming/africa>

⁹ Ibid.

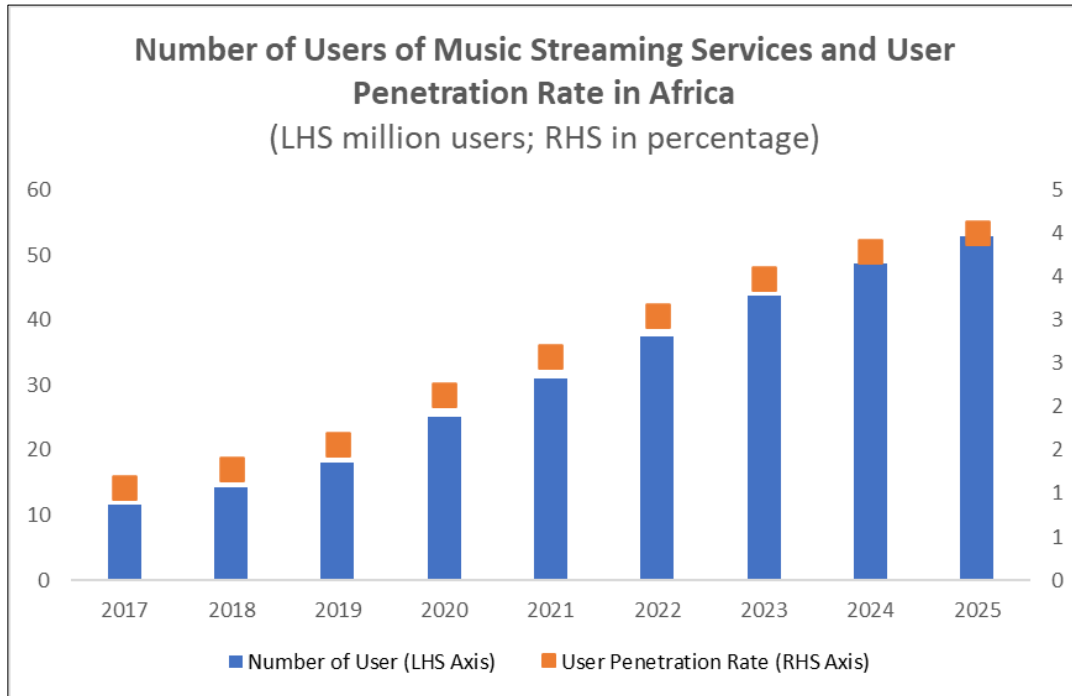


Figure 3: Number of Users and User Penetration Rate in Music Streaming segment in Africa

Note: User penetration is defined as the percentage of the population of a region/country that uses music streaming services/platforms.

Source: [Statista Music Streaming - Africa. Accessed: September 17, 2021.](#)

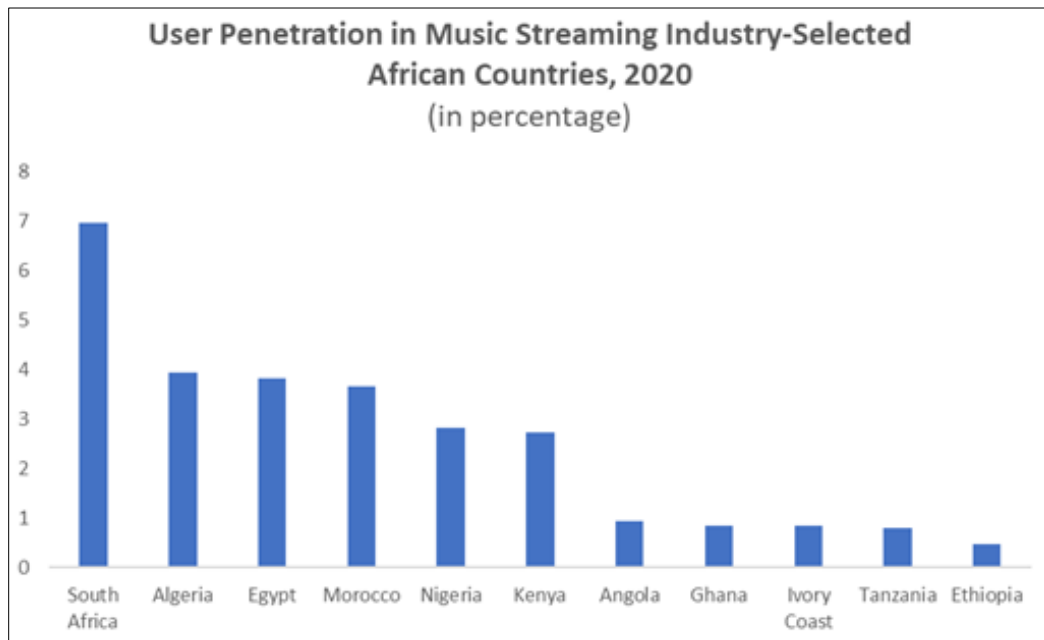


Figure 4: User Penetration Rate by Country

Note: User penetration is defined as the percentage of the population of a region/country that uses music streaming services/platforms

Source: [Statista Music Streaming - Africa. Accessed: September 17, 2021.](#)

Box 1: The “Spotify” of Africa:

Kenya-based music platform, [Mdundo](#) is one of the largest online music streaming platforms in Africa and is also called the Spotify of Africa. It allows users to legally download and stream audio content uploaded by various regional artists, Mdundo has over 5 million active users through their website and Android app, more than 90,000 registered artists, and over 20 million downloads and streams per month.¹⁰ The company disperses half of its income to artists.

Investments in Fintech are supporting growth in online payments for the music industry. In Sub-Saharan Africa, the rapid expansion of mobile payments has helped increase financial inclusion, with 43% of adults in 2017 reporting they had an account at a bank or with a mobile money service provider.¹¹ This has enabled online payments for music by offering access to cashless financial systems through digital technology. These new financial tools have supported growth of music entrepreneurs by allowing them to run more global, at-scale enterprises. Fintech has enabled synergies between digital technology, new tech-enabled business models, and social entrepreneurship (Box 2).

Box 2: PopRev – A digital investment platform for the public to invest in musicians

[PopRev](#), an investment platform launched in collaboration between African music service [Udax](#) and [PiggyVest](#), is an online savings and investment platform that allows fans to invest in the music catalog of artists. With real-time monitoring and insights, fans can track the performance of the music in which they have invested. The profits of an artist are linked to digital streaming, and this has created a viable business model which allows musicians artistic freedom without funding pressures. PopRev has opened the market for data-driven investment in the music industry while protecting the interests of musicians by allowing them to keep their music rights.

A new generation of music entrepreneurs in Africa has been working towards building successful music enterprises. Music entrepreneurs in Africa are developing new services targeted specifically to address the needs of African musicians. Nigerian musician Oluwatosin Ajibade, also known by his stage name Mr. Eazi, has supported upcoming young musicians in Africa through his [emPawa Africa](#) program, for which he has partnered with YouTube. [Africa Music Fund](#), a \$20 million initiative launched by him, provides funding to African artists based on projected streaming revenues. Similarly, [Africulturban](#) is a youth-led, nonprofit organization founded in Dakar, Senegal, by rapper Babacar Niang, also known as Matador. The organization aims to support Senegalese urban culture and music creation. Africulturban organizes Hip Hop Academy, through which young professionals take free courses related to the media and entertainment industry such as graphic design, music production and editing, marketing, and communication.

African music industry is getting increased attention from international players. With the world's three largest record labels, Universal Music Group, Sony Music, and Warner Music Group, all having entered the African market, there is greater space for African artists to expand their markets. Nigeria, for example, has a strong domestic digital music business, and international players are taking a considerable interest. U.S. and European record labels are signing Nigerian artists as they gain visibility through collaborations with Western artists. Increasingly there is also support for African music enterprises. Universal Music Group, for example, licensed their music catalog to [Boomplay](#), Africa's largest local streaming platform.

¹⁰ Stassen, 2020

¹¹ World Bank, 2019

2. Opportunities for youth in the music industry

Music production is entrepreneurial and creates youth employment opportunities through its linkages with other activities.¹² The center of the music industry is the musician, but several supporting activities also expand in the process. The music industry is associated with various production and distribution phases, including recording, musical composition, video editing, marketing and promotion. These related activities support additional jobs in other sectors such as education and media, that are essential to the music ecosystem. Figure 5 shows the music industry ecosystem and how jobs in one segment affect one another.

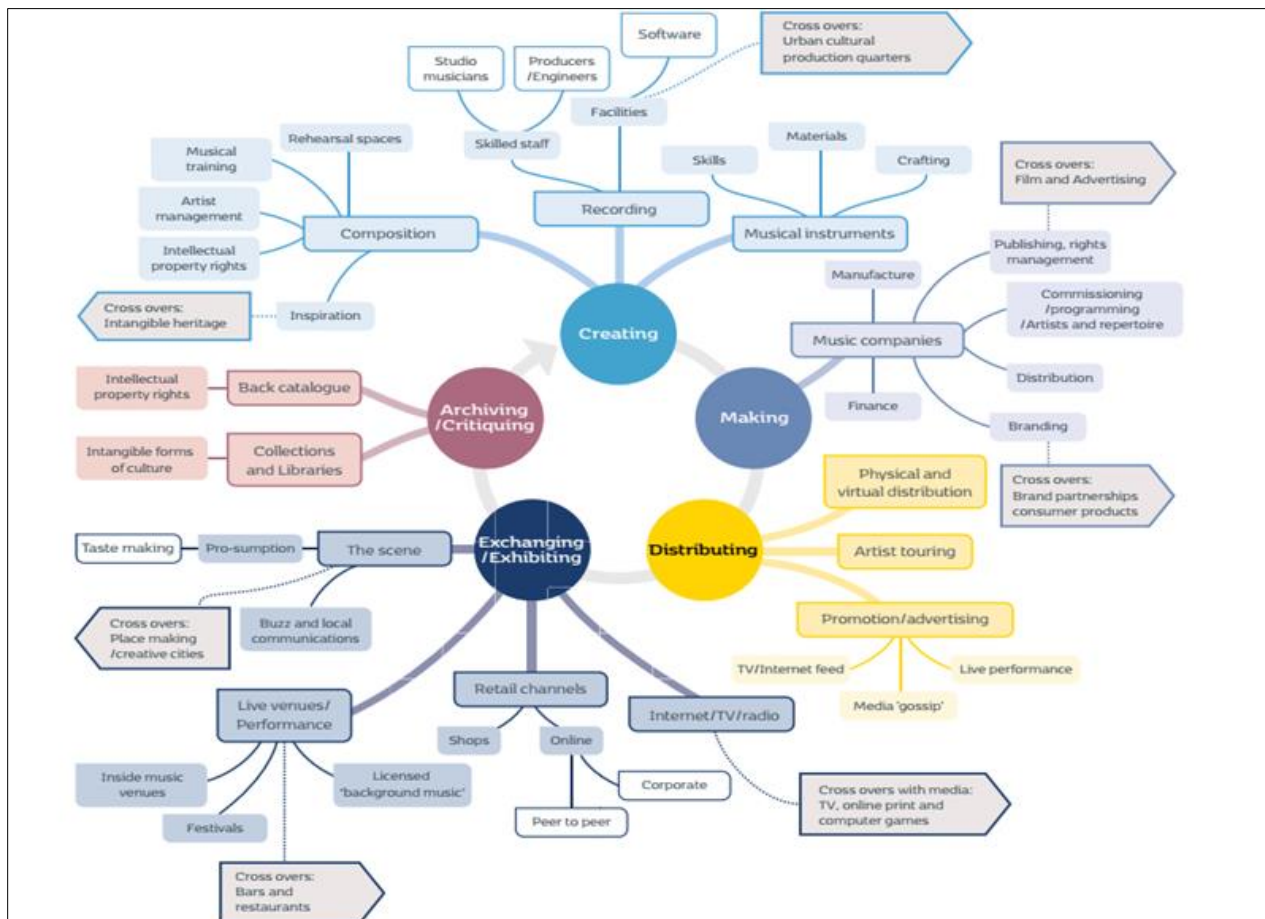


Figure 5: Music Industry Ecosystem

Source: *Cities, Culture, Creativity: Leveraging culture and creativity for sustainable urban development and inclusive growth*, World Bank, 2021

Some examples of youth-led music enterprises in Africa are mentioned in the table below.

¹² Ernst and Young, 2015

Table 1: Some Youth-led music enterprises in Africa

Digital platform for streaming local African music	Mkito : Mkito is an online music streaming website located in Tanzania, launched in 2014. The website was developed by Nadeem Juma, who was also responsible for developing Tanzania’s first mobile banking platform. Consumers can download free music, which is supported through advertising revenues, or purchase music through online payment platforms. Mkito provides artists with 60% of all revenue generated through downloads on their website.
Establishment of local record labels	Cashtime Life : Thabiso Khati is a music entrepreneur who has been working towards the development of South African urban culture. In 2013 Thabiso co-founded Cashtime Life, a hip hop record label and entertainment agency that helped launch numerous independent South African hip-hop artists in a genre primarily dominated by western record labels.
Enabling training and support for youth in the music industry	Africulturban : Africulturban is a youth-led, nonprofit organization founded in Dakar, Senegal, by rapper Babacar Niang, also known as Matador. The organization aims to support Senegalese urban culture and music creation. Africulturban organizes Hip Hop Academy, through which young professionals take free courses related to the media and entertainment industry such as graphic design, music and video production and editing, marketing, and communication.
Digital music distribution	Africori : Africori was founded in 2009 by Yoel Kenan to provide opportunities in digital space to African musicians. As the largest digital music distribution company in Africa, the company distributes to over 200 international and music platforms and provides services such as marketing, music publishing, artist development support, and video distribution. This additionally supports the African music industry by providing job opportunities in the sector.

However, some constraints need to be addressed for supporting youth participation in the music industry in Africa. These include but are not limited to access to finance for music entrepreneurs, lack of promotion of local artists, low revenues for musicians, lack of coordinated strategy and national policy on music industry, high piracy levels, etc.

3. Five Strategies to support youth-led music enterprises

1) Access to finance to support music enterprises

Funding difficulties and limited access to capital have hindered the development of the music industry in the continent. This is particularly true for women and youth in the sector due to their low-income levels and limited access to networks.¹³ Additionally, music enterprises find it difficult to access bank loans as it is viewed as a high-risk sector by lenders. . In 2019, \$22 million or only 1.1% of African startup investment capital was for entertainment companies.¹⁴ As there is significant underinvestment in the sector, in January 2020, [Afreximbank](#), a pan-African multilateral trade finance institution launched by the African Development Bank, launched a \$500m Creative Industry Support Fund to support cultural and creative products. The initiative by Afrximbank is trying to make it easier for creative enterprises to access funds.

¹³ Manyala, K. 2016

¹⁴ Hruby, A. and R. Annan. 2020

2) Targeted music-friendly policies

The lack of cohesive policy for the music industry limits its role in the continent's economic development. Supportive government policies through the development of music venues, access to capital, and targeted training programs can support growth of the music industry.

Africa has a growing demand for live music, particularly in major cities, which offers more opportunities for local musicians. Some local governments are investing in the development of the music industry by supporting artists and the creative process by providing public spaces for music performances, training and education, and providing musical instruments and residencies for musicians (Box 3).

Box 3: Music Cities of Africa

- **Cape Verde**, situated off the coast of West Africa, has been leveraging its music industry for the economy and the preservation of its history and cultural identity. The country has placed the creative economy at the cornerstone of its development strategy through a [micro-credit facility](#) called Culture Bank, which provides seed money to artists. Praia, the capital of the Republic of Cape Verde, has been recognized as a UNESCO City of Music. The city has undertaken measures to reward, support, and train talent in the music industry through residency grants in other countries, community studios, music education programs, and commissioning local music festivals.
- **Brazzaville**, Democratic Republic of Congo, another UNESCO City of Music, monetized on their music heritage by building concert spaces, supporting music festivals, and providing musicians with instruments and residencies to hone their talent. This has enabled public concerts to occur, which is a significant tourist attraction and has placed the city in the wider Pan-African music network. The city began by supporting musicians through residency programs that provide them with recording facilities, musical instruments, and the training. The Ministry of Culture and Arts also established programs to increase investment in the music sector and professionalization and commercialization of the industry.

With the growth of the digital music market, copyright laws that protect the commercial interests of artists are required to support the industry's growth. Enforcement of intellectual property rights ensures copyright owners benefit economically from their work. Kenya has a [National Music Policy](#) that works towards protecting the interests of musicians in the country. The policy also mandates that 60% of airplay is reserved for local musicians in vernacular radio stations to promote traditional music in Kenya. The policy also reinforces the government's support in protecting the interests of artists and combating piracy and copyright infringement through the Kenya Copyright Board (KECOBO) by establishing a digital copyright licensing system.

Policy makers can also use their local music industry as a strategic instrument for growth in tourism, restaurants, and services. A vibrant music industry drives economic activity through music-related spending on goods and services such as restaurants, hotels, and transportation. The growth of tourism globally has provided many cities with the incentive to promote their music industry to draw visitors. For example, Nigeria has leveraged the potential of its film and music industry to promote Nigerian interests and culture worldwide. The country also plans to use its music industry to attract tourists worldwide, with 60% of the tourism demand in Lagos centered around music and entertainment.¹⁵ Governments can proactively leverage their music industry and integrate it in their tourism promotion policies.

¹⁵ Harris, G. 2018

3) Networks and support infrastructure

Social networks and catalyzers are critical for a thriving music industry. There is a limited number of platforms or organizations for policy advocacy and for the music industry to interact with the government and private sector. Creating networking opportunities, mentoring, and support through music industry engagement platforms and music industry associations can help bring various stakeholders together to leverage information, resources and initiatives (Box 4).

Box 4: Networks and support infrastructure

- [Music in Africa](#) is an online platform for providing African musicians with the opportunity to interact, connect, and promote their music. It is a project initiated by [Siemens Stiftung](#) and the [Goethe-Institut](#) in collaboration with several local partners. The platform aims to promote the music industry in Africa by providing access to relevant information, resources, and initiatives. It leverages the potential of all African nations by promoting and connecting music initiatives across the continent.
- [African Music Export Office \(BEMA\)](#) is a regional network of music professionals based in Africa. Established in 2007, BEMA promotes the production and distribution of African music in the continent and across the world. Through events like the International Forum of African Music, BEMA aims to empower artists in Africa while also strengthening the African music market by responding to the needs of artists.

4) Enhanced participation of women and artists from marginalized communities

Access to professional networks, training programs, and funding is often limited for women and musicians from marginalized communities. These inequalities can be addressed through access to funding, technical skills support, and other targeted policies to increase inclusion (Box 5).

Box 5: Inclusion and Diversity in Music

- [Gender@Work](#) program launched by Music in Africa in 2019 works towards increasing women's participation in the African music industry by developing their skills and technical expertise. It provides them with classroom and practical hands-on training in stage management, electronic music production and recording, and music business management.
- [Southern African Disabled Musicians Association \(SADMA\)](#) has over 40 musicians across the country, and the organization acts as a record label and concert organizer for artists with disabilities. SADMA participates in policy advocacy of disabled musicians and provides training in copyright, royalties, publishing, and recording contracts. They have established an accessible music recording studio that serves the needs of blind and physically disabled musicians. This enables disabled musicians in Africa to record their music in settings similar to those in a commercial music recording studio without facing accessibility constraints.

5) Human capital development through skills, training, and innovation

The growth of the music industry requires investment in human capital through formal and informal learning opportunities. Running a music enterprise requires business skills. Successful music enterprises require agents, event managers, publicists, and financial management experts to ensure growth. Skills

development courses and vocational training programs are needed in higher education institutions to provide the music industry with the right kind of talent. Figure 6 illustrates the top 10 skills listed on LinkedIn profiles globally in 2019, as essential to working in the music industry. Digital Literacy is listed as a specific skill that shows the highest skill penetration in the music industry, followed by social media, event planning, digital marketing and graphic designing (Figure 7).

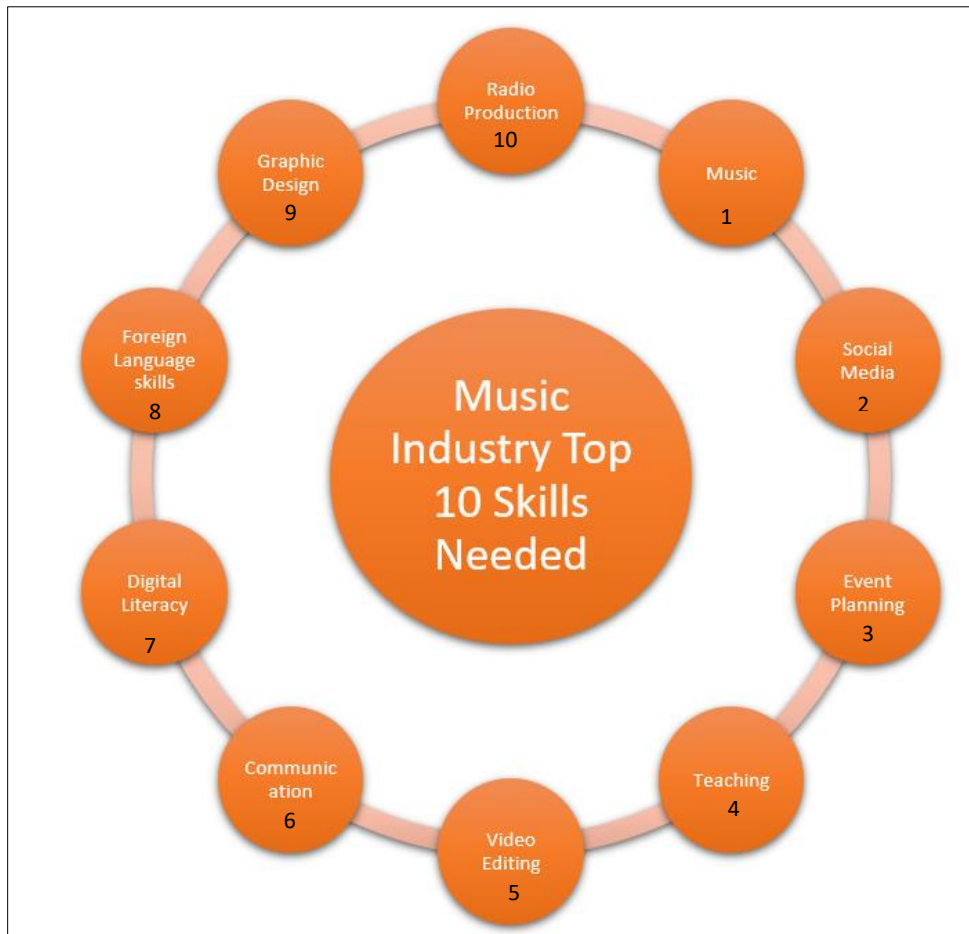


Figure 6: Top 10 Skills Needed in the Music Industry (2019, Worldwide)

Source: LinkedIn Data for Development Industry Skills Needs Dataset

Note: The Industry Skills Needs metric captures which skills are most likely to be added to a member's profile in one industry compared to other industries. It's calculated using an adapted version of a text mining technique called Term Frequency - Inverse Document Frequency (TF-IDF). This method gives more weight to a skill for an industry if more members in the industry list the skill on their profiles and the skill is more unique to the industry. The skills included are those added while a member holds a particular occupation (i.e. the skill flow approach). While the skill flow approach creates a trade-off whereby long-held basic skills, such as Microsoft Office being given a lesser weight, the approach is shown to be stronger at identifying the latest emerging skills in a specific industry than including all historical skills that are added during prior occupations. On balance, since the objective of this metric is to detect the latest skills needs, a skill flow approach is adopted. Please see Annex II for detailed methodology

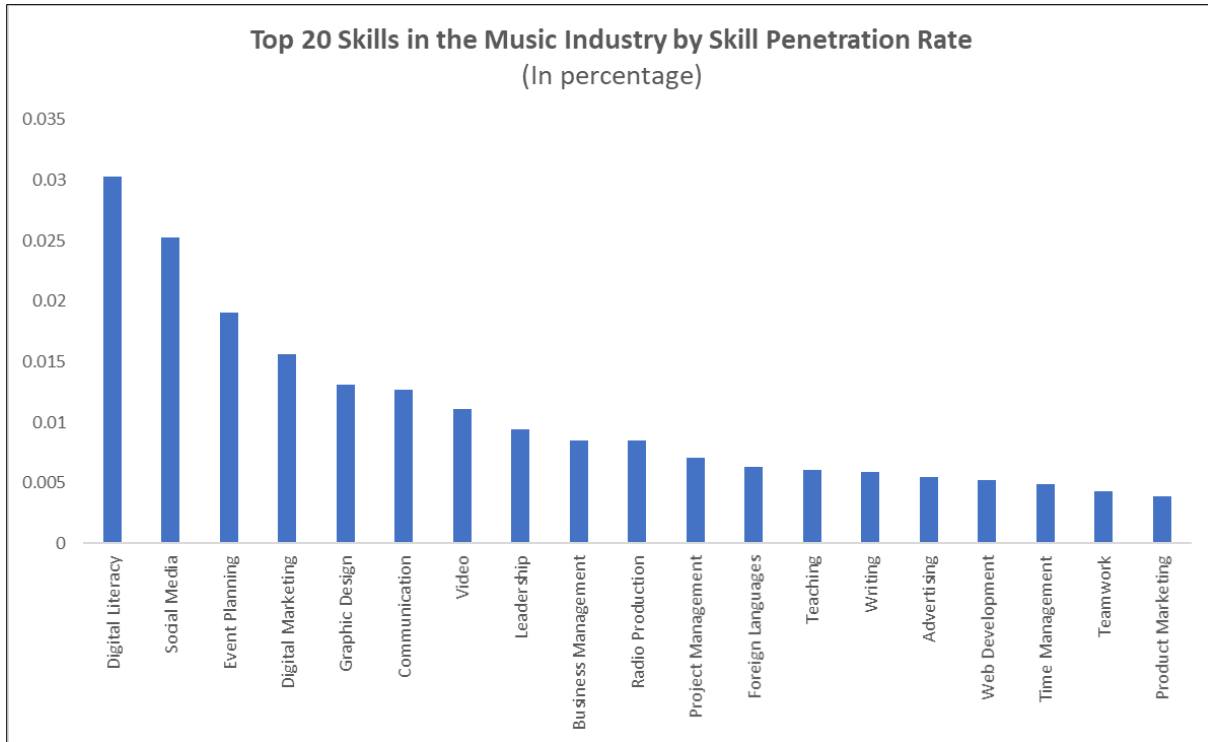


Figure 7: Skills in the Music Industry By Skill Penetration Rate (2019, Worldwide)

Source: LinkedIn Data for Development Skill Penetration by Global Industry Dataset

Note: The Skill Penetration metric looks at how many skills from each of LinkedIn's skill groups appear among the top 30 skills for each occupation in an industry. For example, if 3 of 30 skills for Data Scientists in the Information Services industry fall into the Artificial Intelligence skill group, Artificial Intelligence has a 10% penetration for Data Scientists in Information Services. These penetration rates are averaged across occupations to derive the industry averages reported. It is likely this metric is best at capturing skill penetration across tradable and knowledge-intensive sectors. For example, it may under-estimate the adoption of AI in Manufacturing, since LinkedIn members are less likely to be in this sector compared to others. Please see Annex II for detailed methodology.

Music education through specialized courses makes it possible for a new generation of music enthusiasts and artists to hone their skills. Apart from formal music training, the industry needs specialized training necessary for people in the management or support roles of the music industry. This includes entrepreneurial and business service skills, support for artistic development, music production, strengthening distribution networks, and branding. [Music Business Academy for Africa](#) provides training courses for those looking to acquire skills relevant to the music industry, such as talent management, media, content development, event organization, and production. Programs that support the professional development of musicians are essential for honing their skills as entrepreneurs and business owners. Sony Music has also partnered with [Women of Music Business \(WOMB\)](#) to launch a new training program to support women music entrepreneurs in Africa.

Music education needs to be an integral part of the basic education and human development goals. Creative arts help youth with enhanced language skills, improved test scores, and learning abilities. In Rwanda, music education has played an integral role in helping people deal with the trauma of genocide. [Music Road Rwanda](#) organizes classical and traditional Rwandan music concerts across the country to give

hope and peace to people. They also train students at the Kigali Music School, where music lessons are offered to youth for free. Scholarships under their ‘adopt a student program’ support youth for future careers as musicians and music therapists.

Music industry has untapped potential to deliver economic, cultural and social benefits for youth and their communities. In addition to creating new jobs, it has the power to preserve generations of cultural value. It can also spark interest and motivation in the minds of youth and lead to social change. Digital economy has changed the nature of work by overcoming geographic limitations. Prevalence of online studios, especially during the COVID-19 pandemic allowed for artists to collaborate across geographies. Policymakers have a critical role to play in harnessing the transformative potential of the music industry through policies and enabling environments.

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S4YE is a multi-stakeholder coalition that aims to provide leadership and resources for catalytic action to increase young people engaged in productive work. S4YE's partners include the World Bank Group, Accenture, Mastercard Foundation, Microsoft, International Youth Foundation (IYF), Youth Business International (YBI), RAND Corporation, the International Labour Organization (ILO), the Government of Germany, and the UN Office of the Secretary-General's Envoy on Youth. The S4YE Secretariat is housed in the Jobs Group within the Social Protection and Jobs Global Practice at the World Bank Group.

This knowledge brief does not necessarily reflect the views of the World Bank or each S4YE partner. For additional resources for youth employment, please visit <https://www.s4ye.org/s4ye-publications>

ANNEX - I

Industry Skills Needs¹⁶ - Captures the most distinctive, most represented skills of LinkedIn members working in a particular industry. Based on the skills section of the LinkedIn profile, it's calculated using an adopted version of text mining technique called Term Frequency-Inverse Document Frequency (TF-IDF).

For each country, the weight ($W_{i,s}$) denotes how distinctive and representative each skill s is in an industry i as:

$$w_{i,s} = m_{i,s} * \ln\left(\frac{N}{n_s}\right)$$

With $m_{i,s}$ indicating the number of members in industry i , N the total number of industries, and n_s the total number of industries having skills s . The first term gives greater weight to skills that have high membership penetration, the second term gives less weight to common skills that appear in all industries (e.g. MS Office). In this sense the most important skills for each industry are those that have high member penetration but are also unique.

Skills Group Definition

Skill Group	Detailed Skill- Top 10 (by member count)
Music	Music, Music Production, Singing, Music Industry, Audio Recording, Music Composition, Sound, Music Education, Audio Editing, Audio Engineering
Radio Production	Radio, Radio Broadcasting, Audio Mixing, Audio Post Production, Radio Production, Radio Host, Podcasting, Radio Advertising, Emcee, Radio Promotions
Social Media	Social Media, Facebook, Blogging, Instagram, Twitter, YouTube, Social Media Optimization (SMO), Social Media Advertising, Blogger, Social Media Blogging
Event Planning	Event Planning, Event Management, Corporate Events, Live Events, Event Production, Meeting Planning, Special Events, Festivals, Weddings, Marketing Event Planning
Teaching	Teaching, Tutoring, Lecturing, Language Teaching, English Teaching, Teaching English as a Second Language, Teaching English as a Foreign Language, Sales Trainings, Teaching Writing, Interdisciplinary Collaboration
Video	Video Editing, Video Production, Adobe Premiere Pro, Video, Film, Film Production, Final Cut Pro, Video Post-Production, Videography, Documentaries

¹⁶ Source: LinkedIn Data for Development

Communication	Public Speaking, Communication, Presentation Skills, Interpersonal Communication, Presentations, Oral Communication, Client-focused, Professional Communication, Professional Phone Skills, Presenter
Digital Literacy	Microsoft Office, Microsoft Excel, Microsoft Word, Microsoft PowerPoint, Microsoft Outlook, Microsoft Access, Computer Literacy, Office 365, Mac, Spreadsheets
Foreign Languages	English, Spanish, French, Dutch, German, Portuguese, Foreign Languages, English as a Second Language (ESL), Italian, Business English
Graphic Design	Adobe Photoshop, Adobe Illustrator, Graphic Design, Adobe InDesign, Adobe Creative Suite, Web Design, Art Direction, Logo Design, Illustration, Design

ANNEX – II

Skill Penetration¹⁷ – Measures the time trend of a skill across all occupations within an industry. Based on skill addition rates, and the number of times a particular skill appears in the top 30 skills added across all of the occupations within an industry. For example, if 3 of 30 skills for Data Scientists in the Information Services industry fall into the Artificial Intelligence skill group, Artificial Intelligence has a 10% penetration for Data Scientists in Information Services. These penetration rates are averaged across occupations to derive the industry averages reported.

There are four steps to computing skill penetration:

1. Use the industry skills needs framework above to calculate the weight for each skill s for each occupation o in industry i :

$$w_{i,o,s} = m_{i,o,s} * \ln\left(\frac{N}{n_s}\right)$$

2. Construct a list of the 30 top represented skills for each occupation o in industry i , based on the values of $w_{i,o,s}$:

$$[(s_1, w_1), (s_2, w_2) \dots, (s_{30}, w_{30})]$$

- 3 Calculate the skill group penetration rate at the occupation industry level $P_{i,o,S}$ by counting the number of skills s belonging to each skill group S and dividing by 30.

$$P_{i,o,S} = \frac{\sum_{s=1}^{30} s \in S}{30}$$

4. Get the average skill group S penetration rate $\bar{p}_{i,S}$ across all occupations o for the industry i :

$$\bar{p}_{i,S} = \frac{\sum_{o=1}^n P_{i,o,S}}{n_i}$$

¹⁷ Source: LinkedIn Data for Development

