# The Impact of COVID-19 on Music Innovation and the Way We Experience Music

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## Abstract

Innovation in music has led to the development of new musical genres, instruments, media, and creation tools. In recent decades, the internet and mobile devices have been game changers that have shifted music consumption to digital media and made music available everywhere. Now, technological advances are enabling applications to be taken to the next level through generating music or playlists and personalizing musical experiences. Innovative business and monetization models are being developed to change the distribution of funds in the music industry for the benefit of the artists, and researchers are exploring additional benefits of music in fields like sports, health, and well-being. Nevertheless, the structure of the music industry and the ways in which we consume and teach music have barely changed for decades and even centuries. The media have changed, but the experience of listening to a song remains the same, and the prevalent method of learning music is still a face-to-face lesson.

COVID-19 has dramatically shaken up the music scene: while music consumption increased, live concerts were canceled, music lessons moved online, and ensembles became unfeasible. In this chapter we discuss how the pandemic broke existing barriers by compelling people to create and experience music in new ways. That opened an opportunity for music startups to harness technology, develop innovative musical experiences, and disrupt the music industry. In this chapter, our particular focus is on the Israeli music startup ecosystem and how it was affected by the pandemic.

Keywords: startups, music startups, startup ecosystem, music innovation, music industry, music education, online education, streaming, concerts, COVID-19

## Key Elements in Music Innovation

Music innovation applies to various fields and applications associated with musicians, music fans, teachers, and the music industry. Those applications include tools for music consumption and creation, musical instruments, controllers, synthesizers, media, hardware for audio and sound design, and applications for live shows, performance, sports, health, therapy, education, music distribution, and monetization.

The evolution of the music industry has been heavily shaped by media technologies, as in most other creative industries (Jeffcutt, 2004; Wikström and DeFillippi, 2016). In fact, many of the disruptions and successful innovations in the music industry are attributed to external innovators (Tschmuck, 2012; Uli, 2018). For example, the Walkman was developed by Sony in 1979, when the company was not yet a participant in the record business. Another example is MTV, which was brought into being in 1981 by two subsidiaries of Warner Communications, in cooperation with the RCA and IT&T. Although the U.S. music industry was initially doubtful about the new music video channel because of the high costs associated with video productions and the assumption that there was no market for music videos, it was quickly proven to be wrong, as the audience skyrocketed to 17 million within two years. The marketing strategy of music companies was changed forever thanks to MTV and other music video channels, to the extent that today one cannot imagine marketing a record production without a video clip (Tschmuck, 2012). The same was true of the compact disc: co-developed by Philips and Sony in 1979, its successful introduction in the music market and the following rapid transition from vinyl records resulted in two decades of continuous growth for the global music industry, with recorded music sales more than doubling by the end of the 1990s (Tschmuck 2012; Wikström and DeFillippi, 2016).

More than any other technology, the internet has radically altered the production, distribution, and consumption of music (Molteni and Ordanini, 2003). At the beginning of the 1990s, a method for compressing audio files to a size that was easily transferable through the internet and could be stored on a computer hard drive appeared under the name MP3 (El Gamal, 2012; Tschmuck, 2012). The effect of this innovation was not fully realized until the introduction of portable devices such as MP3 players and iPods, enabling consumption of music wherever the listener was located. Early versions of MP3 players had rather limited capacity, only being able to hold a small number of songs. The iPod, launched in 2001, was a huge improvement on other MP3 players since it could store up to 5GB of MP3 files (Hviid et al., 2018). With the advent of peer-to-peer (P2P) file sharing, as popularized by Napster in 1998, things started to look grim not just for the music industry but for the entertainment industry as a whole on a global scale (Vaccaro and Cohn, 2004; Lampel et al., 2008; El Gamal, 2012). Napster ran into legal difficulties over copyright infringement, was quickly sued by the music industry establishment, and was shut down by court order. However, many new services emerged and took its place.

The power and influence of the pre-internet music industry primarily stemmed from its ability to control physical distribution, but the internet has made such models increasingly irrelevant. Internet distribution initially resulted in a sharp decline of music sales, primarily through piracy, which the music industry had tried to fight, to no avail (Alexander, 2002; Wikström, 2014). This failure to contain the new technological challenges of the era, and the massive and incessant pressure caused by the new media resulted in a strategic repositioning on the part of the major music companies. The low ability of the music industry establishment to adapt is explained by a difficulty in anticipating the impact of technological opportunities, a complex and time-consuming process of establishing a new techno-institutional match, technological conservatism, the oligopolistic structure of the sector, and the hierarchical organization of major companies. It is for these reasons that the music sector became prone to uncontrollable change, triggered by exogenous factors, originating from the fringes of the sector and driven by external actors (Dolata, 2008).

The launch of the Apple iTunes Music Store in 2003 was the start of a new model for online music retailing. Apple, which at the time was not a music industry player, managed to get all the important music licensees on board, thereby providing an extensive music catalog and giving consumers a new legal option, using a novel pricing model. While the iTunes Music Store did not stop music piracy, and the level of illegally obtained music exceeded that of purchased music (Waldfogel, 2010), it nonetheless grew to be the number one retailer of digital music: it now controls a market share of 85–90% in the U.S. and has become the largest music distributor in the world since 2010 (Tschmuck, 2012; Hviid et al., 2018). This transformation had disruptive consequences beyond music retailing and redefined music companies’ organizational structures, work processes, routines, and professional roles. However, while the iTunes Music Store was a disruptive innovation, it was relatively incremental, since it mimicked traditional music distribution logic, and the major labels’ positions and power structures remained largely untouched (Wikström, 2012; Wikström and DeFillippi, 2016).

Other players subsequently joined the digital music market, becoming key participants in the music scene. Founded in 2005, and acquired by Google in 2006 for $1.65 billion, YouTube quickly rose to prominence as the world’s most important online video portal and second-largest search engine, spearheading the online distribution channels (Hviid et al., 2018). The dying music video industry was consequently resuscitated (Edmond, 2014): every music video is now instantly uploaded to YouTube, and artist popularity is measured by the number of views, as well as by album or single sales. Furthermore, YouTube grants artists exposure to a global audience, bypassing the conventional music distributors (Cayari, 2011; Oh and Lee, 2013). While being an important partner to the music industry, YouTube was accused by major labels for not paying adequate royalties and for hiding behind “safe harbor” legislation to do so.[[2]](#footnote-2) Yet, by the end of 2017, the channel had signed revenue-sharing agreements with rights collecting societies and the three major record labels (Hviid et al., 2018).

The introduction of mobile devices made music available anywhere and ushered in the development of a variety of interactive musical applications and virtual musical instruments that use a touchscreen interface. The growing computational power of these devices has allowed developers to use locally run models, thereby improving applications and making them more sophisticated and responsive (Essl and Rohs, 2009). Yet, there is still a gap between computers and mobile devices—and Android devices in particular—especially where latency or delays are concerned.

In 2015, recorded music revenue returned to growth, after nearly two decades of privacy-driven declines. That happened thanks to the emergence of music streaming services such as Spotify, Apple Music, Amazon Prime, and Deezer. At the core of the subscription-based business model lies access to music, rather than ownership of that music (Wikström, 2012; Sinclair and Tinson, 2017). The music industry unsurprisingly embraced and supported music streaming, but the battle over royalties paid to creators, especially to artists and independent labels, continues (Marshall, 2015; Shapero, 2015). From 2015 to 2019, overall recorded music revenues, driven largely by streaming, posted a compound annual growth rate of 13%, reaching $11.1 billion in annual revenue. In 2019, streaming accounted for 80% of those revenues.[[3]](#footnote-3)

Not only was music distribution completely altered by the digital revolution in the music industry but its value-added network was also fundamentally reshaped, and the industry became more artist-driven (Tschmuck, 2016). Musicians turned from being dependent contractors into artistic entrepreneurs—“Artrepreneurs,” as defined by Engelmann et al. (2012)—and music making became a process that covers economic and legal aspects in addition to art. Artists have moved center stage and can now collaborate with partners from outside the traditional music business and benefit from different income streams (Thomson, 2013). Social media sites and user-generated content platforms enable musicians to market and promote themselves to a global audience. Moreover, the digital revolution merged the spheres of active music making and passive music consumption. Music fans now participate in the production, distribution, and communication of music, and use and change music for their own purposes (Winter, 2012; Tschmuck, 2016).

## The big players in the music industry and music startups

The music industry is characterized by a highly concentrated oligopolistic structure (Lopes, 1992; Alexander, 2002; Watson, 2008; Guichardaz et al., 2019). During the 1970s and 1980s it was controlled by “The Big Six”: PolyGram, CBS, RCA, EMI, Warner, and MCA. These major record companies employed an open system of development and production under oligopolistic conditions that incorporated innovation and diversity in popular music as an effective strategy for maintaining the viability and control of the market (Lopes, 1992). The major label landscape is, however, subject to constant change due to merges, acquisitions, and restructuring. Today, there are only three major labels: Universal Music Group, Sony Music Entertainment, and Warner Music Group. In 2019, their combined market share of the global recorded music market accounted for 68%, with independent labels owning 32%.[[4]](#footnote-4)

The major labels continued to thrive and maintain their oligopoly in the overall music market for decades. They anticipated the move toward an artist-driven industry and established the “360-deal,” which, while requiring much more interaction with external actors, guarantees them a share of the revenues from publishing, merchandising, and touring, in addition to recordings (Marshall, 2013; Tschmuck, 2016). By developing this new strategy, majors have managed to reorganize themselves and their environment in a way that optimizes their business and re-secures their profitability (Stahl and Meier, 2012; Guichardaz et al., 2019). Transactional capability—i.e., the capability which increases market exchange between a firm and its environment—is becoming predominant among music majors and provides a good explanation for their resilience (Guichardaz et al., 2019). In this context, it is worth considering the Korean and Japanese music industries. The former embraced digitization, flourished, and became globally recognized; the latter wrestled with it and declined. Another reason for the success of Korean cultural industries has been that they have been greatly supported by the government, as they were deemed central in an export-focused economy (Kwon and Kim, 2014; Parc and Kawashima, 2018; Parc and Kim, 2020).

Music startups are technology companies that seek to bring innovation to the music industry and change the ways we create, consume, and experience music. That innovation includes: enhancing music experiences and interaction; facilitating music to reach a larger audience; making use of music in various activities in our daily life; and developing new monetization and business models that will fairly distribute royalties and revenues between artists, labels, and middlemen. Incumbent music firms may face barriers when conducting business model experiments, especially service-based models, because of their size, established corporate culture, and organizational structures. For this reason, startups have become the leading force in this area (Waldner, 2012). As of April 2021, there were 4,378 music startups from all over the world. Out of those, 1,086 were funded—to a total of $12.8 billion—and 643 (14.6%) were inactive. To date, the sector has seen 172 acquisitions, 17 initial public offerings (IPOs), and 9 companies that have become unicorns (valued at more than $1 billion): Spotify, Shazam, Deezer, Epidemic Sound, SoundHound, Beats Music, Ximalaya, Netease Music, and JoyTunes.[[5]](#footnote-5)

In recent years, the three major labels have been embracing innovation and cooperating with startups in various ways. Warner Music Group and Sony Music have both partnered with the Techstars Music accelerator, and have made some high-profile investments in music startups through their investment funds. Universal Music Group has the Abbey Road Red in-house incubator; the Capitol Innovation Center, which is a Los Angeles-based “collaborative workspace” for artists and tech-heads; and the Universal Accelerator Network—a growing series of partnerships with tech accelerators around the globe. In spite of such efforts, some startups are unhappy about the flaws in these collaborations. They criticize the internal structure and decision-making process of the major labels as being slow and old-fashioned; they describe difficulties working with different label departments and reaching a licensing contract; and they claim that major labels are unwilling to take the risks involved in working with startups, accusing them of doing nothing more than creating “Innovation Theater.” On the other side, the major labels criticize startups for inexperience, lack of understanding of the music market, being naïve about navigating the music industry, and having unrealistic expectations of the cost of doing business with that industry.[[6]](#footnote-6)

## Innovation and entrepreneurship in Israel

Israel is a powerhouse of entrepreneurship and cutting-edge innovation and technology. The phenomenal success of the Israeli high-tech ecosystem and the fact that Israel was able to reach such economic growth that it had the highest concentration of startups in the world has been examined by many works, the most notable of which was *Startup Nation* (Senor and Singer, 2011). The authors of that book claim that the factors that led to the success of Israel as a startup ecosystem include: the mandatory military service; the culture of questioning and argument; assertiveness and informality; geopolitical disadvantages that encourage constant innovation and improvement; and immigration waves, including many academics. Another factor noted by other scholars is government support (Isenberg, 2010; Kon et al., 2014).

The role of the military as one of the most prominent drivers of the Israeli high-tech industry is widely known, and it feeds the startup ecosystem with human resources who have the motivation for entrepreneurship (Senor and Singer, 2011; Kon et al., 2014). During their military service, young people receive technical training and acquire both a high sense of responsibility and an orientation toward success. Thus, the army brings with it professional training, social ties, and social codes that influence the composition of the high-tech workforce and the high-tech industry’s organizational and functional culture (Chorev and Anderson, 2006; Swed and Butler 2015). This creative, skilled, and multicultural workforce is one of the most prominent reasons why executives and multinational corporations (among them Microsoft, Google, Amazon, Apple, Facebook, IBM, etc.) have chosen Israel as a base for research.[[7]](#footnote-7)

In addition to the factors which are unique to Israel, institutional mechanisms exist there that foster entrepreneurship. These are mostly attributed to venture capital funds, incubators, and accelerators, all of which provide education, mentoring, and a relatively safe environment for entrepreneurs to develop their startups (Rothschild and Darr, 2005). Also worth mentioning are the Israeli higher education institutions and the multinational corporate research centers that have made a significant contribution to the startup ecosystem (Kon et al., 2014).

In 2020, Israeli startups raised a record $10.178 billion; in Q1/2021 alone, $5.374 billion was invested in Israeli startups. The total value of M&As in 2020 was $7.97 billion, compared to $21.67 billion in 2019, but the difference can be explained by the pandemic, as the world economy closed down. M&A activity in Q1/2021 returned to pre-pandemic levels and its value has already surpassed $2 billion. Moreover, 128 Israeli high-tech companies raised $6.96 billion through IPOs in 2020.[[8]](#footnote-8)

Israel’s tradition of military service and its history as a country struggling to survive have led entrepreneurs to found startups in domains like security, cyber, fintech, and medical devices. The local startup ecosystem is maturing and scaling up, and now hosts many successful unicorns. In a growing community of talented people who are enthusiasts both for music and for science and technology, more and more Israeli entrepreneurs are choosing to combine their love of music with technological innovation. In 2015 a community activity named TMT (Tel-Aviv Music Technology) was founded by Revital Hollander.[[9]](#footnote-9) It now numbers about 3,500 music technologists (musicians, sound engineers, designers, developers, entrepreneurs, psychologists, neuroscientists, investors, and educators) and has held more than 40 meetups, conferences, and a music-tech hackathon: the Austria–Israel hackathon “HackATune” (in collaboration with the Austrian embassy, Austrian innovation authorities, the Karajan Institute, and the Vienna State Opera).[[10]](#footnote-10) This activity, as well as other music and tech events—like the first music-tech hackathon, “DiscoTech”, and the TechnoArt conference—has resulted in increased exposure to and awareness of music-tech in Israel, and has generated local and international connections that have led to new collaborations and new ventures.

## The Israeli Music Startup Ecosystem 2021

In this section we explore the Israeli music-related startup ecosystem. We collected data from Crunchbase, Tracxn, IVC, and Start-up Nation Finder, the last two of which cover the Israeli startup ecosystem and provide information on most of the startups. We analyzed the data of 192 music related startups featured on those sites, and we prepared a comprehensive questionnaire, which we sent to the founders of those startups. Of the founders approached, 38 responded to the questionnaire, and 10 were interviewed. The research was conducted from September 2020 to June 2021.

Out of the 192 startups, 122 are active and 64 are inactive. The remaining six have been acquired by international companies: Yokee (acquired by Stingray), Sound Better (Spotify), Mugo (Deezer), IMGN (Warner Music), ICast (Storytel), and Foxytunes (Yahoo). At least 47 of the startups were funded, raising a total of more than $751 million. One company (Dalet SA) went for an IPO, one (JoyTunes) became a unicorn (in 2020), one (Artlist) is labeled as a “soonicorn” (in 2021), and one (Waves Audio) is a private audio-tech company with an estimated annual revenue range of $100–$500 million.



**Fig. 1** Number of Israeli music startups founded in each year

Most Israeli music startups were founded in 2010 or later (see Fig. 1). In 2012, 18 companies were founded, twice as many as in 2011; thereafter the number of newly founded companies per year remained similar, reaching its peak in 2016 with 26 new companies. Over the next four years the number dwindled, having recorded a significant drop in 2018, to a level that has stayed fairly constant. This trend is in accord with the wider gradual decline of newly founded startups in Israel: according to the Israel Innovation Authority, from approximately 1,400 new startups founded in 2014, the number shrank to 850 in 2019, and to 520 in 2020.[[11]](#footnote-11) However, this data is probably not accurate (especially for 2020 and 2021), since reports concerning founding and closing of companies may be published several years after the event.

We investigated Israeli music startups and other Israeli startups that have some relation to music. We labeled the startups according to five main categories: music creation and consumption; audio and hardware; streaming; education and digital health; and business, ecommerce, fintech, and advertising. Since music and media technologies are deeply intertwined, some startups may fall into any of these categories, even those with a minor connection to music. One such example is startups that develop video tools and platforms (such as YouTube when it was founded), since video has become an integral part of music consumption and other music-related activities. The largest sector, including more than half of the startups, is that of music creation and consumption. Other relatively big sectors in Israel are education and digital health, and streaming; the remaining two categories are less well represented.



**Fig. 2** Distribution of Israeli music startups by sector

We compared the amount of funds raised by companies in each of these sectors in both Israel and globally, as shown in Table 1. The sector that has raised the most funds in Israel is music creation and consumption, with just under $491.5 million. That corresponds well both to the number of Israeli startups operating within this sector and to the almost $3.7 billion raised globally. Surprisingly, Israeli streaming startups only raised about $2 million, making these the lowest-funded Israeli sector, despite it being both the most funded worldwide (with $8.4 billion) and the second largest sector in Israel. The global funding figures were taken from the Tracxn music-tech report;[[12]](#footnote-12) the Israeli funding figures for each company are available on IVC, Start-up Nation Finder, and Tracxn. As a result of the different definition of music startup used by each source, some companies included in this research may not appear in the Tracxn report and vice versa. In addition, not all the funding data is available online and some companies choose not to disclose it. This table is therefore only indicative, providing general insight as to the trends and the relative numbers.

|  |  |  |  |
| --- | --- | --- | --- |
| Sector | Global | Israel | Funding of Israeli startups as a proportion of global funding |
| Audio & Hardware | 1,249 | 65.52 | 5.25% |
| Business, Ecommerce, Fintech, Advertising | 324.1 | 87.612 | 27.03% |
| Education & Digital Health | 132 | 105.01 | 79.55% |
| Music Creation and Consumption | 3,684.2 | 491.48 | 13.34% |
| Streaming | 8,400 | 2.043 | 0.02% |
| Total | 13,789.3 | 741.665 | 5.45% |

**Table 1** Comparison of total funding raised by music startups globally and in Israel in each sector (USD million)

For many years, Israeli music startups struggled to raise funds locally. Some moved to the U.S., some remained small private companies (with the exception of Wave Audio, which became a leader in its domain and is still private), and some vanished. Music innovation remained on the fringes of the Israeli ecosystem, way behind other sectors. However, since the middle of the 2010s local investors have shown more interest in investing in music-related startups. This may in part be due to the rehabilitation of the music industry and the maturity of the Israeli ecosystem, allowing it to open up to new, small sectors.

According to the available data, the best years in terms of funding were 2015, 2018, 2019, and 2021, with total investments ranging from just under $99.5 million in 2018 to almost $176 million in 2019. Relatively minor investments were recorded in 2017, raised by ten companies in total; although funding for Israeli startups greatly increased in 2020, the big drop in that year in the music sector may have been a result of the COVID-19 pandemic. It seems that 2021 has been a good year for the music sector, with recorded investments of more than $120 million raised by five companies by July alone. Of the startups we investigated, 80% reported a growing interest in their ventures on the part of investors in 2020–2021, and related this to the pandemic.



**Fig. 3** Total funds raised by Israeli music startups per year



**Fig. 4** Number of funded Israeli music startups per year

## The impact of COVID-19 on the music industry

In December 2019 an outbreak of a newly discovered coronavirus was identified in Wuhan, China. This virus causes a respiratory disease (COVID-19), it is highly contagious, and it is primarily spread during close interaction between people. Within a short time, the number of cases had increased exponentially and the virus had spread across the globe. The world that we knew has changed, as social distancing and self-isolation have become common practice. The music industry was unsurprisingly tremendously affected by the social gathering restrictions and the lockdowns, which led to the cancellation of tours, concerts, and album releases, and caused many other disruptions (Agarwal and Sunitha, 2020; Pitlik et al., 2020; Seetharaman, 2020). Nevertheless, the global recorded music market grew by 7.4% in 2020, and total revenues accounted for $21.6 billion. It was the sixth consecutive year of growth, and the industry’s best year since 2002.

Growth was driven by streaming, which accounted for 62.1% of total global recorded music revenues, and compensated for the decline in other formats’ revenues. Paid subscription streaming revenues increased by 18.5%, with 443 million premium accounts; total streaming (both free and premium) grew by 19.9%, reaching $13.4 billion.[[13]](#footnote-13) While total music streaming revenues increased, Sim et al. (2020) found that streaming consumption actually *decreased* during this time as a result of movement restrictions, particularly in countries where the restrictions were more severe. Many people stream music on the road and prefer video-based music at home. This argument is supported by the simultaneously increased consumption of music on video platforms, such as YouTube and Twitch (Sim et al., 2020; Onderdijk et al., 2021).[[14]](#footnote-14)

Aside from live shows and music streaming, however, overall music consumption has greatly increased during the pandemic. Studies conducted in the U.S., Spain, Italy, Israel, and India report that people have turned to music during lockdowns and have devoted more time to musical activities such as listening, singing, composing, or playing an instrument. Lockdown measures have had a negative impact on people’s mental health (Rossi et al., 2020; Wang et al., 2020), but music has provided a coping mechanism to reduce stress, anxiety, and loneliness, and to improve general well-being (Cabedo-Mas et al., 2020; Gazmer et al., 2020; Giordano et al., 2020; Ferreri et al., 2021; Ziv and Hollander-Shabtai, 2021). Even the general emotional reaction to music was found to be more intense during this time than under normal circumstances (Ziv and Hollander-Shabtai, 2021). Listening habits seem to have changed: demand for nostalgic music has soared (Yeung, 2020; Gazmer et al., 2020; Gibbs and Egermann, 2021), at the same time as more and more consumers are listening to new music and discovering new artists (Cabedo-Mas et al., 2020).[[15]](#footnote-15) Research suggests that this change of habits was a reaction to the lockdown rather than to the pandemic itself (Yeung, 2020).

The prohibition on live concerts forced artists to adjust and integrate new forms of media to keep their audiences engaged. Many moved to online alternatives, such as livestreaming, and the number of users surged. Some of the most notable livestreamed concerts include those of Dua Lipa,[[16]](#footnote-16) the Rolling Stones,[[17]](#footnote-17) Blackpink,[[18]](#footnote-18) the Glastonbury Festival,[[19]](#footnote-19) and the One World: Together at Home concert, which raised $127 million for coronavirus relief.[[20]](#footnote-20) Livestreamed concerts generate a sense of belonging and togetherness for viewers (Vandenberg et al., 2021; Swarbrick et al., 2021). However, choice of streaming platform and social features for a virtual concert are highly important, as they affect the connectedness among the audience, as well as the connectedness between the artist and the audience members (Onderdijk et al., 2021).

Ziv and Hollander-Shabtai (2021) investigated four types of “Corona Clips” that were created by individuals or in collaboration during the first lockdown in March–April 2020 and were distributed through sharing on social media. These were: *satirical songs* with lyrics referring to lockdown restrictions; *cooperating artists*, where musicians performed together at a distance, usually doing cover versions of uplifting songs, with each artist providing a single part; *concerts in empty halls* without an audience; and *home concerts* in which musicians recorded intimate performances at home. A few days after the first lockdown restrictions ended in May 2020, 200 people completed a survey. Most participants were exposed to at least a few “Corona Clips” clips and enjoyed them. They enjoyed watching musicians they love in intimate concerts and videos. Nonetheless, when asked whether they thought they would attend live shows in the future, most participants expressed their wish for live shows and concerts to return, and they strongly preferred live experiences to streamed concerts. These findings are corroborated by Vandenberg et al. (2021), who found that livestreamed concert participants missed the experience of a real physical concert: that is, the collective energy, the physical engagement, and the environment. More recent evidence suggests that that is indeed the case, as people flocked to physical concerts when restrictions on gatherings were lifted.

Additionally, collaborations between the music and gaming industries received increased attention, as virtual concerts took place in video games. Although such collaborations had existed for a while, the rise in popularity of video games, and multiplayer games in particular, since the beginning of the pandemic (Barr and Copeland-Stewart, 2021) has highlighted more than ever before their potential as a medium for concerts.[[21]](#footnote-21) For instance, the hit multiplayer game *Fortnite* introduced interactive in-game concerts by Travis Scott and Ariana Grande, accompanied by special in-game cosmetics and merchandise.[[22]](#footnote-23)

Another domain entirely disrupted by the pandemic was music education, and online education (or e-Learning) in general. Face-to-face teaching activities were suspended, with higher education institutes, schools, and conservatories worldwide required to quickly shift to remote learning, challenging traditional music education methods (Dhawan, 2020; Habe et al., 2021). There were a number of critical concerns and challenges. Music teachers were inadequately prepared for the move and insufficiently supported in online teaching. There was a lack of student engagement with online learning, and much teaching of music online was ineffective. There was a general lack of resources, and significant disparities between schools and students of different socio-economic backgrounds. Finally, technical limitations led to low sound quality, latency, and video delay. Despite the difficulties, music teachers still found this transition to be an opportunity to adapt and innovate in the music learning process, and they acquired skills and technological tools that could be integrated in face-to-face teaching (Daubney and Fautley, 2020; Ozer and Ustun, 2020; Biasutti et al., 2021; Shaw and Mayo, 2021; Hash, 2021; Cheng and Lam, 2021; Joseph and Lennox, 2021; Calderón-Garrido and Gustems-Carnicer, 2021; de Bruin, 2021).

Several new teaching approaches and strategies have been developed during the pandemic. For example, Johnson and Merrick (2020) set up weekly Zoom meetings to support students’ well-being, and to improve communication and connection among teachers and students. Emotional support provided by the teacher, and interaction between teacher and student, have a positive influence on students’ motivation and engagement (de Bruin, 2021; Waters, 2021). Johnson (2020) built a framework for online music teaching, and suggests having an informal discussion forum for students to develop a peer community and foster enthusiasm. These two methods revolve around student motivation, which is vital for overcoming technical challenges and student success. Lemay and Peters (2020) suggest settings in which bands could rehearse together at school while respecting hygiene standards and physical distance: rehearsals should preferably be held outdoors, and special masks should be worn for playing wind instruments.

Over the years, many startups have developed digital tools for music education, intended for music teachers, self-learning, social learning platforms, and more. It seems that the main obstacle was the market being unready to adopt new methods after centuries of traditional music learning. But the pandemic and the associated lockdowns seem to have brought about a change, as usage of self-learning music applications has surged. These applications often involve the learner’s family in the learning process, making the experience more powerful and unique. Moreover, a survey conducted in Austria found that two-thirds of the participating music teachers were willing to integrate digital tools to some extent into their music lessons after the pandemic, especially putting learning materials online and using videos (Aigner et al., 2020). While there are some advantages to online music education, we believe that it should only be complementary to face-to-face learning, since synchronized music making is still a challenge and the social aspect could be lost (Lemay and Peters, 2020; Palau et al., 2020; Goetz, 2020; Aigner et al., 2020; Encarnação et al., 2021; Spieker and Koren, 2021).

Israeli music startups that participated in the research emphasized the opportunities presented by the pandemic to every musical sector, in the form of more exposure and revenues, an easier “go-to-market,” and higher demand, especially in the amateur market, but also among those professional artists and producers who moved their activities online. When it comes to music education, investors, teachers, and parents now better understand the need for new digital learning and creative tools, making it easier for startups in this field. Israeli startups that develop B2C music applications (plugins, educational applications, and creative mobile applications) showed sales growth in 2020. More than half of survey respondents reported that their sales volume had increased to some extent as a result of the pandemic, with almost a third of participants noting a significant increase. Beyond our survey, JoyTunes reported growth of more than 150% in sales since the first lockdown, followed by a successful fundraise of $50 million in 2021 from Google and Qualcomm;[[23]](#footnote-24) Artlist enjoyed a successful round in 2020 and acquired its competitor.[[24]](#footnote-25) Our interviews with startup founders affirmed this trend. Of the startups that raise funds at pre-seed or seed stages, 80% reported a growing interest among investors in 2021, much higher than in 2019 and 2020.

While more funding is being poured into the sector, that same money may also represent a threat. Startup founders said in the interviews that the massive amount of funding pouring into the industry made it very hard for small- to medium-sized companies to compete with larger ones, as far as marketing and advertising were concerned. Small startups may therefore be forced to raise more funding in order to keep up with the competition and stay relevant.

## Discussion

Innovation has significantly transformed the music industry time and again, and it will undoubtedly do so in the future. By and large, that innovation was previously driven by external players and factors, and the industry was not able to control the impending change. The most traumatic example was the internet revolution, which led to the collapse of some areas of the music industry, due to their inability to adapt. The same can be said now. Just as in the case of the Korean and Japanese music industries in the wake of digitization, the music industry must choose to embrace innovation and find a responsive strategy, or to stick to the old norms and structures and therefore be uncontrollably disrupted by innovation. In fact, it seems that the music establishment is more willing to collaborate with startups and other innovators today; and there is a potential for more to be done in that perspective.

Innovation has brought a change in media, but the structure of the music industry and some aspects of experiencing music and teaching it remain the same. Listening to a song, music licensing, music education, live concerts—these and many more are still based on decades-old models, structures, and processes. Music startups have long been trying to employ technological advancement to innovate the music business and reshape our musical experience, but to begin with they were not well received by the market, and investors were hesitant to invest in anything to do with the dying music industry. That situation started to change with Spotify and the introduction of streaming and service-based business models, when the industry was brought back to life. Nevertheless, the music scene was still in need of a catalyst for innovation that would break existing barriers.

In this respect, the pandemic has presented a big opportunity for music startups. The use of technology was significantly accelerated in a short time in every aspect: communication, online education, ecommerce, entertainment, health, sports, and more. It has become more natural to stay at home and use online tools to communicate in various ways, and our habits have correspondingly changed. All music-related activities were forced to adapt and to resort to innovative technological solutions, such as online music learning or virtual concerts. Music consumption and the popularity of musical activities rose sharply during this time, as music was found to alleviate the negative effects that lockdown measures had on people’s emotional and mental health, helping individuals to cope with social distancing, isolation, and loneliness.

However, one cannot ignore the challenges incorporated in creating engaging and satisfying virtual shows and educational music content, since people still seem to prefer physical concerts and face-to-face music education. While virtual experiences are now more accepted by the public, it is too early to determine which solutions will remain with us in one way or another, even once the pandemic is over. In the case of live shows, it is unclear whether virtual shows or shows that combine both virtual and physical experiences will be as satisfying as physical shows. It is possible that there will still be demand for such shows, perhaps with further enhancements, even if they are not as satisfying as attending a physical performance.

The Israeli music startup ecosystem is in constant growth. Along with the 192 startups we studied, we are aware of the existence of dozens of other ventures that are currently at an early stage. We assume that the maturity of the Israeli ecosystem in general, the growing community of music technologists in the country, the increasing interest of investors, and the involvement of international music firms and institutions will lead to the exploitation of the huge potential for music innovation. The COVID-19 pandemic has shaken the entire music community. It has emphasized and demonstrated the market needs and has led music consumers, creators, students, and teachers to take the next step toward digital experiences. Finally, it has increased the interest of investors in the Israeli music ecosystem, which has seen significant growth in demand for musical applications. Overall, it seems that the pandemic has prepared the ground for new developments that will meet the challenge of shaping our future musical experiences.

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