NFT's Sustainable Future: The Online Art Market's and its Environmental Concerns

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Abstract:

In the early 2010s, no one could have imagined cryptocurrency growing the way it did. As cryptocurrency continues to increase in popularity and the stock market, there's an unforeseeable, urgent issue: the environmental carnage that cryptocurrencies cause. Particularly in the art market, digital non-fungible tokens (NFTs) have exploded in popularity, causing an inhumane amount of pollution due to computer usage. This paper seeks to explain the rise of bitcoin, the rise of NFTs and their effects on the environment, and how people may be able to rectify the current issues with the digital art market.

Introduction:

As the Covid pandemic started in 2019, the economy was sent into a catastrophic state. In particular, art galleries and museums faced shutdown while artists lost their livelihood. However, a transition to online resources has shown to be effective in recuperating both individuals and organizations. NFTs have especially profoundly impacted how artists could make a livelihood online. This shift to online transactions during Covid has benefitted some artists but caused many environmental issues regarding NFTs. For this reason, reliable solutions must be implemented as soon as possible to reduce the ecological impact of NFTs and other cryptocurrencies.

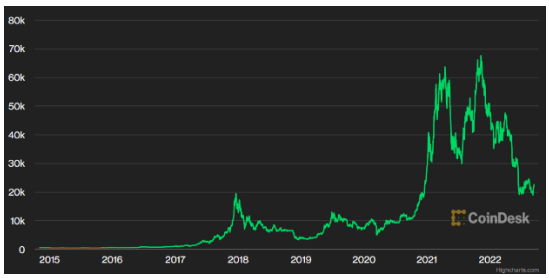
Section 1: Cryptocurrencies

Bitcoin was first conceptualized in 2008 when a pseudonymous group under the name of Satoshi Nakamoto published a paper on its functionality. Bitcoin solved an issue with cryptocurrencies that made anonymous transactions feasible. This was a feat that no other planned cryptocurrency had been able to do before. Bitcoin was established, and the first bitcoins were mined. Soon after, the foremost transactions occurred; Laszlo Hanyecz infamously bought two pizzas

with 10000 bitcoin - which would now be hundreds of millions of dollars.

For years, Bitcoin remained an underground currency, supported only by technology enthusiasts. It slowly rose in price. On April 20th, 2011 - Forbes published an article dedicated to bitcoin. One bitcoin cost $1.16; June 1st, 2011 - 2 months later, it cost $9.22; June 9th, 2011 - Bitcoin reached a peak price of $ 29.57; July 29th, 2011 - bitcoin dropped to $13.48; by the end of October, under $5. What happened? Between July and October, people reported having their bitcoin stolen. A Tokyo bitcoin exchange third party that accounted for 90% of all bitcoin transactions was hacked, causing 2000 bitcoins to be stolen. Bitcoin's reputation was damaged, and prices plummeted. After its slow gaining of attraction, it had seemingly failed. In 2011, WIRED titled an article "The Rise and Fall of Bitcoin" and asserted that "as the tone of media coverage shifted from gee-whiz to skeptical, attention that had once been thrilling became a source of resentment."

Bitcoin continued to fluctuate in its price for much longer. That was until 2017, when Bitcoin rose to a looming price of $1000. Bitcoin proceeded to increase rapidly in price, reaching a peak price of $19000 on December 22nd, 2017. Bitcoin's price would then recede, making many to question the cryptocurrency's reliability. However, as the Covid-19 pandemic struck, bitcoin would quickly creep up to new peaks in prices as the cryptocurrency became mainstream, bringing us to its still fluctuating but high prices today.



Bitcoin price chart from CoinDesk - last updated 9/13/2022 (https://www.coindesk.com/price/bitcoin/)

Within this craze, Bitcoin was not the only cryptocurrency that developed. Huge names in the cryptocurrency market are called altcoins (a name given to any cryptocurrency that is not bitcoin), such as Ethereum, Tether, Binance Coin, and a few more notable names also held a stake. Ethereum, the second biggest cryptocurrency, started development in 2013 and took a different approach to make payments secure. It had the same issues as Bitcoin in its volatility and security flaws but had one main difference: money was not the only thing that could be traded with Ethereum. For example, Ethereum can be used to power non-fungible tokens, which allow for items to be sold to buyers with a smart contract that "automatically executes when the contract's conditions are met."

There are also thousands of smaller cryptocurrencies that usually go unheard of by the public. These altcoins have even more volatile prices than Bitcoin or Ethereum, fluctuating in price by up to 40 times. As a result, people who invest in these currencies are usually

looking to "get rich for free," according to David Gerard, a critic of cryptocurrency. The majority of such cryptocurrencies are scams and disappear after gaining investments. A cryptocurrency investor who goes by the alias of Crypto Spider has made millions from such altcoins yet claims to have "been scammed over 100 times" and recalls losing $250,000 by fraud in 2020. Since so many of these cryptocurrencies simply rely on hype, many investors fail to take a close look at cryptocurrencies that may be a scam. For example, OneCoin stole 4 billion USD from investors before the founder disappeared.

Section 2: The Effects of Covid on the Art Market

Covid-19 has a notorious reputation for ravaging the economy by forcing shutdowns and limitations on physical markets. Galleries and museums suffered heavily as a result of such shutdowns and constraints. In 2020, the UN conducted two different studies, which revealed that 90% of museums worldwide were forced to "close their doors" due to the pandemic. It is expected that 13% of these museums to shut down indefinitely. Some museums could mitigate the damage by hosting online resources, but in museums in Africa, only 5% were able to offer online content due to limited availability to the internet. This is significant because it means that museums in countries with no easy access to the internet will be at high risk of shutting down entirely. Another source, The Art Newspaper, says that galleries will lose 72% of their annual revenue, with 33.9% of galleries shutting down permanently. When considering all of these statistics, it seems probable that museums and galleries that do not have access to the internet will be most damaged by the pandemic.

While physical galleries and museums suffered, online venues faced much more success. For example, Google's Arts & Culture initiative grew by 4106% in streaming viewership and a 150% increase in Youtube video views. Many online art services like Google's Arts & Culture Initiative that were not garnering much attention before the pandemic suddenly received an explosion of attention. In this sense, pre-established online venues were able to find success due to the pandemic. Art museums that went online as Covid-19 struck were also able to find some success. For example, digitalmuseums.at is a virtual museum hosting website that gives museums and audiences a chance to connect through virtual tours, educational content, and streaming content. They opened right after the pandemic struck, offering museums an opportunity to showcase their exhibitions. The website works by displaying an online map that has checkpoints marked for every online museum hosted on the website. However, the map shows that most of the museums were only from Western Europe and the US. This further indicates that countries with less access to the internet may be more susceptible to not hosting online venues, which could be damaging.

Map of online digital projects from museums from digitalmuseums.at (https://digitalmuseums.at)

Other online methods of sharing and buying art also became popular. In December 2021, NFTs that were being sold as art became viral, causing Ethereum's price to skyrocket. This spike in popularity brought many people to the NFT market, giving individual artists a new way of monetizing their work. For example, Tyler Hobbs was initially studying computer science at the University of Texas when he decided that he wanted to become an artist. NFT platforms such as Art Blocks helped him to monetize his work, making him one of the most successful digital artists today. However, NFTs seemed to benefit art museums barely. Dr. Sean Stein Smith and Brian Mittendorf, who are both business professors have a plausible explanation: NFTs are too risky and may not align with the museum's purpose of displaying art to the public. NFTs are no exception to the price volatility of cryptocurrency and may have less value if minted by a museum than by an individual artist. Essentially, there's no guarantee of profit for the museum. Furthermore, if a museum successfully profits by selling NFTs, the art would no longer exist for the sole purpose of showcasing it to the public and existing for the public. Therefore, some museums could find it unethical to seek money from NFTs.

Section 3: Environmental Concerns

NFTs could provide digital artists a new way to monetize their creations during the economic setback caused by Covid. However, the environmental impact is devastating. According to a conference paper by Rehman and et. al, Ethereum has been "estimated to use 44.94 terawatt-hours of electricity per year, which is nearly equivalent to the annual power consumption of countries such as Qatar and Hungary." This large amount of energy consumption is already proving to be dangerous to the environment. Furthermore, as seen by China's emissions, they are also a significant issue caused by NFTs and blockchain-related technologies, exceeding "Czech Republic's and Qatar's total annual greenhouse gas emissions." Some artists have gone as far as not to interact with NFTs due to the environmental damage that they cause.

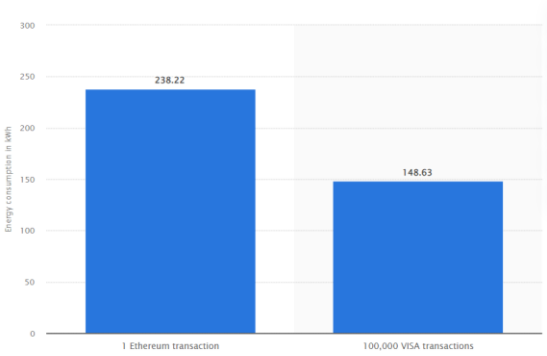


Chart of energy consumption per Ethereum transaction as presented on statista.com (https://www.statista.com/statistics/1265891/ethereum-energy-consumption-transaction-comparison-visa/)

Much of the environmental damage of Ethereum and most other cryptocurrencies has to do with a process called mining. For a new NFT to be minted, a unique entry must be made to confirm the ownership of the NFT. However, this process uses massive computational power, equating to vast amounts of energy. While so many new NFTs are being minted with their explosion in popularity, they are now causing massive environmental damage. The destructive ecological effects of cryptocurrencies and NFTs are undeniable and need to be urgently resolved; what are some potential solutions to reduce their environmental impact?

As stated earlier, minting uses up a lot of energy. If this energy is sourced from environmentally friendly energy sources, there would be significantly less environmental damage. For example, miners could switch to using solar or wind energy. This is a strategy already being implemented by Lake Parime, a startup helping renewable energy companies mine cryptocurrencies. The system works by using excess energy to mine cryptocurrencies, giving renewable energy companies more profit. In turn, this makes renewable energy a more profitable business that will also help to keep the environment cleaner. However, some argue that this solution is not optimal as producing the means to these kinds of energy sources still has "sunk ecological costs in mining, fabrication, and construction." Furthermore, the increased energy use caused by mining may encourage new energy capture projects based on nonrenewable resources, meaning potential indirect harm to the environment. Overall, an increase in renewable energy usage for cryptocurrency mining would still benefit the environment and is feasible, as shown by companies like Lake Parime. Another benefit of this approach is that it helps offset environmental damage from other cryptocurrencies like Bitcoin, not just Ethereum.

Another great solution is more Ethereum specific and is scheduled to be implemented soon. Ethereum soon plans to switch out their environmentally unfriendly system that requires mining with one that does not. This means that ownership of an NFT will be able to be confirmed without the need for massive computational power, leading to less energy. It is predicted that this new "proof-of-work" system will reduce emissions by 99.5%, according to Ethereum's website. When this solution is implemented, most environmental issues surrounding Ethereum and most NFTs will be solved.

Conclusion:

NFTs are still in their infancy stage. It's not surprising that they ran into several issues when they suddenly blew up in popularity. Despite environmental concerns, NFTs are still an excellent way for artists to monetize their work and have positively impacted the livelihoods of artists and art organizations during the setbacks caused by the Covid-19 pandemic. The future seems bright as solutions to NFT's environmental issues continue to be formulated. With the proper precautions, NFTs will soon be able to support artists while remaining environmentally sustainable.

Bibliography:

1. Chohan, U. W. (2022b, February 5). *A History of Bitcoin*. Retrieved September 13, 2022, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3047875
2. *nytimes.com*. (2020b, September 9). Retrieved September 13, 2022, from https://www.nytimes.com/2020/09/09/arts/design/gallery-sales-art-market-virus.html
3. *Covid-19 crisis closes 90 percent of museums globally, UNESCO plans*. (2020, May 21). UN News. Retrieved September 13, 2022, from https://news.un.org/en/story/2020/05/1064362
4. Michalska, J., & Brady, A. (2020, April 27). *Galleries worldwide face 70% income crash due to coronavirus, our survey reveals*. The Art Newspaper - International Art News and Events. Retrieved September 13, 2022, from https://www.theartnewspaper.com/2020/04/27/galleries-worldwide-face-70percent-income-crash-due-to-coronavirus-our-survey-reveals
5. *Just a moment. . .* (n.d.). Retrieved September 13, 2022, from https://www.sciencedirect.com/science/article/pii/S1544612322000496
6. *Why did NFTs Become so Popular in 2021, and Will This Trend Continue Into 2022?* (2022, March 9). Bybit Blog. Retrieved September 13, 2022, from https://blog.bybit.com/en-US/post/why-did-nfts-become-so-popular-in-2021-and-will-this-trend-continue-into-2022--blt8dc432e4466a5f4a/
7. *Just a moment. . .* (n.d.-b). Retrieved September 13, 2022, from https://www.researchgate.net/publication/357900561_NFTs_Applications_and_Challenges
8. *Access Denied*. (n.d.). Retrieved September 13, 2022, from https://www.britishcouncil.org/research-policy-insight/research-series/impact-covid-19-arts
9. Rawlins, A. (2021, December 1). *4 reasons why museums are steering clear of the NFT craze*. Fast Company. Retrieved September 13, 2022, from https://www.fastcompany.com/90699899/4-reasons-why-museums-are-steering-clear-of-the-nft-craze

10. *I went to a physical NFT gallery where digital art was displayed on TV screens. It felt completely pointless.* (2022, June 16). Business Insider. Retrieved September 13, 2022, from https://www.businessinsider.com/what-its-like-in-nft-art-gallery-2022-6?international=true&r=US&IR=T
11. Pipkin, E. (2022, January 1). *"THE ENVIRONMENTAL ISSUES WITH CRYPTOART WILL BE SOLVED SOON, RIGHT?"*. Medium. Retrieved September 13, 2022, from https://everestpipkin.medium.com/but-the-environmental-issues-with-cryptoart-1128ef72e6a3
12. Kemp, B., Samaties, P., Sanaulla, F., Vaughan, C., Vaughan, C., Samaties, P., Kemp, B., & Sanaulla, F. (2022, April 4). *How crypto mining will transform the energy industry*. Roland Berger. Retrieved September 13, 2022, from https://www.rolandberger.com/en/Insights/Publications/How-crypto-mining-will-transform-the-energy-industry.html
13. *Environmental Impact of NFTs*. (2022, April 21). D-Core. Retrieved September 13, 2022, from https://d-core.net/environmental-impact-of-nfts/
14. Pratty, F. (2022, June 16). *Can renewable energy make crypto mining greener?* Sifted. Retrieved September 13, 2022, from https://sifted.eu/articles/renewable-energy-crypto-mining/
15. Ethereum. (n.d.). *The Merge*. ethereum.org. Retrieved September 13, 2022, from https://ethereum.org/en/upgrades/merge/