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ENVIRONMENTAL IMPACT OF CRYPTOCURRENCY **IN DEVELOPING COUNTRIES**

AUTHORED BY-ANJALI AGARWAL

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Abstract

Since the inception of cryptocurrency, a long road has been traveled. Previously dismissed as tools for criminals and speculators, the industry has made significant progress towards establishing itself as a legitimate and (potentially) game-changing space. While bitcoin and Ether have seen tremendous price and user growth, there are still concerns about the long-term implications of widespread use. Numerous skeptics and environmentalists express concern about cryptocurrency mining's high energy consumption, which they believe will result in increased carbon emissions and, consequently, climate change. This paper takes a look at the environmental impact of the well-known cryptocurrency in developing countries.

Introduction

Before coming on the topic of Bitcoin or Cryptocurrency, it is important to know the existence of money and how it is trusted by people as an exchange of value. Money represents value. It is given in exchange of something and it passes on in exchange of things to other person. But to believe in these transactions, there should be a trust in people that it has some value. Like govt told its people that it will be liable for the value paper currency which is basically a Govt promise and people trusted this Fiat money. It is a legal tender as it is given by central authority. It is regulated by the Central Authority and they can print as much say want. In the present scenario digital money came into the picture which makes the use of physical money lesser. Bank keeps the ledger of all the account to solve the double spending problem. There are attempts to make digital currency viable but the double spending problem cannot be solved without central authority as whenever entity gets the right to regulate money, it leads to corruption, mismanagement and control on your own money will be lost. ¹In October 2008, Satoshi Nakamoto created a digital crypto currency called Bitcoin. It is a kind of distributed ledger which can be seen by anyone and it has property that once a data is saved in it then it becomes difficult to change it. In this customer can digitally exchange the value without the interruption of 3rd party which was present earlier. It operates on the premise of solving encryption algorithms to create unique hashes that are finite in number. It is combined with a network of computers and verifies the transactions; users are able to exchange hashes as if exchanging physical currency. There are a fixed number of Bitcoin that is generated and more no. will not be generated to prevent the overabundance and to ensure its uniqueness.² Cryptocurrencies have gone a long way since their inception. While the traditional financial sector first dismissed digital currencies as a tool for scammers and speculators, it has made great strides toward establishing them as a genuine and (possibly) game-changing field.³ While Bitcoin (BTC) and Ether (ETH) have experienced phenomenal price and user growth, there are still concerns about the long-term consequences of broad cryptocurrency use. Numerous skeptics and environmentalists have expressed alarm about cryptocurrency mining's significant energy consumption, which they believe would result in increasing carbon emissions and

¹ James Surowiecki, A brief History of Money(Apr 24, 2020, 4:15) ,<https://spectrum.ieee.org/at-work/innovation/a-brief-history-of-money>.

² Peter D. DeVries, An Analysis of Cryptocurrency, Bitcoin and the Future, Vol1 No.2, Sept 2016.

³ 'Cryptocurrency Mining: What Is the Environmental Impact of Digital Assets', (*Gadgets 360*, 13 August, 2021) <<https://gadgets.ndtv.com/cryptocurrency/features/cryptocurrency-mining-power-consumption-environment-carbon-footprint-bitcoin-ethereum-dogecoin-cardano-hedera-hashgraph-2509771>> accessed 30 May2022.

climate change.⁴ The mainstreaming of cryptocurrencies, as the phenomenon has been dubbed, is without a doubt a watershed moment in the financial world. Additionally, it is a significant event in the world of, well, the world. This is particularly true in the case of Bitcoin, the original cryptocurrency. Similar to Dogecoin, it has seen a sudden increase in value. A coin was valued at approximately \$7,000 in April 2020; it is now worth more than \$55,000.⁵ While Bitcoin mining is a fictitious activity, the ramifications can be just as damaging as the real thing.

Concept Of Bitcoin Mining

However, Bitcoin mining is critical for maintaining and growing the blockchain record, as it is used to create new bitcoins. To mine bitcoins, powerful computers are utilized to tackle computational arithmetic problems that are too difficult to solve manually and that tax even the most powerful computers.⁶

Miners are compensated for their services as auditors. They determine the legitimacy of Bitcoin transactions. They are accountable for this responsibility. Double spending occurs when a bitcoin owner spends the same bitcoin twice. If you give someone a \$20 bill to purchase a bottle of vodka, you lose that \$20 bill, and hence, cannot use it to purchase lottery tickets next door. This is not an issue.⁷ While counterfeit money is a possibility, spending the same dollar twice is not the same thing. When it comes to digital money, the holder can produce an exact copy and transmit it to a merchant or another entity, while keeping the original for themselves.

⁴ Ibid.

⁵ E. Kolbert, 'Why Bitcoin Is Bad for the Environment', (*The New Yorker* 22 April, 2021) <<https://www.newyorker.com/news/daily-comment/why-bitcoin-is-bad-for-the-environment>> accessed 30 May, 2022.

⁶ Alonso et al., 'Cryptocurrency Mining from an Economic and Environmental Perspective. Analysis of the Most and Least Sustainable Countries', (*Energies*, 14 July, 2021) <<https://www.mdpi.com/1996-1073/14/14/4254>> accessed 30 May, 2022.

⁷ Euny Hong, 'How Does Bitcoin Mining Work?', (*Investopedia*, 21 September, 2021) <<https://www.investopedia.com/tech/how-does-bitcoin-mining-work/>> accessed 30 May, 2022.

Cryptocurrency And Environmental Concerns

The competitive nature of blockchains has resulted in high energy expenses. Instead of a single central database, a distributed network of miners' records bitcoin transactions, and they are compensated for their efforts via block rewards. New blocks can be created only after these specialized machines solve complicated cryptographic puzzles. The absence of a trusted middleman or a single point of failure, proponents of bitcoin content, makes it a preferable money system to centralized ones.

Cryptocurrencies, according to a study of emerging countries' economic issues, have the potential to accelerate development across a range of fields. Chudnovsky and Lopez (2006) argue that new technologies and innovations are needed for poor countries to catch up.⁸

Cryptocurrency mining is a time- and energy-intensive process in which powerful computers compete to solve tough mathematical puzzles. Typically, fossil fuels, most notable coal, are used in this process. According to Deutsche Bank, if Bitcoin were a country, it would consume as much electricity as Ukraine in a single year. According to Digiconomist, another cryptocurrency, Ethereum, consumes the same amount of electricity as the entire country of Switzerland in a single year.⁹

While the algorithms that power digital assets such as Bitcoin consume a significant amount of energy to operate, this has a significant environmental impact. Consider the vast number of cryptocurrencies and the expanding demand for Bitcoin mining to understand the issue. At the moment, the energy required to run a blockchain-based currency is comparable to that required to power many small countries, but their use is growing. And when the industry's need for electricity increases, the supply will increase proportionately.¹⁰

Before you can calculate how much electrical energy is necessary to run the bitcoin network, you must first understand how bitcoin is created. To solve the puzzles, you must first determine how many sums are done each second. Following that, determine the amount of electricity required to execute each of the computations. These sums are referred to as "hashes."

⁸ Chudnovsky, Lopez and Pupato, 'Innovation and productivity in developing countries: A study of Argentine manufacturing firms' behavior (1992-2001)', (*ScienceDirect*, MARCH, 2006) <<https://www.sciencedirect.com/science/article/abs/pii/S0048733305002039>> accessed 30 May, 2022.

⁹ 'Cryptocurrency Mining: What Is the Environmental Impact of Digital Assets', (*Gadgets 360*, 13 August, 2021) <<https://gadgets.ndtv.com/cryptocurrency/features/cryptocurrency-mining-power-consumption-environment-carbon-footprint-bitcoin-ethereum-dogecoin-cardano-hedera-hashgraph-2509771>> accessed 30 May, 2022.

¹⁰ 'Which cryptocurrency is the most environmentally friendly?', (*TRG Datacenters*, 17 May, 2021) <<https://www.trgdatacenters.com/most-environment-friendly-cryptocurrencies/>> accessed 30 May, 2022.

Megahashes (sometimes referred to as gigahashes) and megabits are the two most frequently used terms to describe how many there are. In early 2020, the bitcoin network's servers were producing approximately 120 exahashes each second.¹¹ By 2020, if these projections are correct, the bitcoin network will consume 120 GW of electricity each second. The energy equivalent is 63 terawatt-hours (TWh) every year.¹²

Environmentalists fear that when the price of bitcoin increases, mining will become inefficient. Increasing the price of bitcoin entails solving more complicated mathematical problems while maintaining the same transaction throughput. This means that as the network's capacity to process the same number of transactions grows, the network's capacity to process those transactions will expand as well.

Along with the consumption of electricity, bitcoin mining generates a significant amount of obsolete technology. Mining hardware with application-specific integrated circuits (ASICs) is critical in this aspect.

Unlike other types of computer hardware, these circuits cannot be reused and quickly become obsolete. Each year, the bitcoin network generates between 8,000 and 12,000 tonnes of electronic garbage, according to Digiconomist.¹³ If digital currencies are recognized as legal tender, firms may face taxes or penalties based on their energy consumption. Legislators and regulators, on the other hand, disagree on whether digital currencies are legitimate currencies. To further complicate matters, not all cryptocurrencies are created equal, and they do not all consume the same amount of energy. Certain digital currencies, such as SolarCoin, may also profit.

The Role And Law Of WTO

In essence, there are no tariff restrictions in GATT 1994 that bind crypto currency as a commodity. This is due to the fact that the WTO has yet to take action to classify cryptocurrency as a form of goods trading. Although the primary motivation for countries to treat crypto currency as a commodity is to generate revenue from crypto transaction taxes. Crypto money as a payment method falls within the category of trade in services. The General Agreement on Trade in Services (GATS) consists of three parts: the main agreement, which

¹¹ Jamie Redman, 'BTC's Hashrate Touches 120 Exahash, But the Price Has Not Followed', (*Mining Bitcoin News*, 31 October, 2021) <<https://news.bitcoin.com/btcs-hashrate-touches-120-exahash-but-the-price-has-not-followed/>> accessed 30 May, 2022.

¹² Eric Rosenberg, 'The Power It Takes to Create a Bitcoin', (*The Balance*, 16 July, 2021) <<https://www.thebalance.com/how-much-power-does-the-bitcoin-network-use-391280>> accessed 30 May, 2022.

¹³ 'Bitcoin Electronic Waste Monitor', (*Digiconomist*, 13 September, 2021) <<https://digiconomist.net/bitcoin-electronic-waste-monitor/>> accessed 30 May, 2022.

contains obligations and general provisions, attachments (Annexes) relating to rules for specific sectors, and special commitments (Special Commitments) made by each country to provide access to their markets, including indications that countries have not yet applied the MFN principle.¹⁴ The definitions of the various terms is also local and globally standardised which the WTO has to considered to make the development of crypto currency in more lucid manner.

When it comes to international trade, the World Trade Organization oversees the vast majority of it (WTO). Regardless, there are a number of countries that have yet to join the WTO.¹⁵ To reduce tariff obstacles in inter-state commerce, numerous countries formed GATT in 1947, which was later amended as GATT 1994. The World Trade Organization (WTO) was established in 1995, after the Second World War. Previously, the GATT only set tariff barriers on goods trade; however, the WTO covers a wide range of issues, including anti-discrimination, anti-dumping, and intellectual property rights, not just on goods trade but also on services trade.¹⁶ The heterodoxical approach of the crypto in whether in classification as legal tender or 'security' is important aspect because the unification of the same has not been made clear and everyday new self-governed policies are formulated by individuals and entities. These issues are to mainframed into categories so the authorities are clear what tariffs and what regulations are to be imposed. The WTO has to define these aspects to core because the market is very much unregulated and too much volatile. The WTO agreement regulates three (three) categories of trade: goods trade, services trade, and investment trade. The article 1.2 of the GATT agreement draws out four main methods or 'Mode of Supply'. The fourth method has the significant attribute in the current regime for WTO to meet the current demands of its object. The fourth mode requires the natural person to be presented who embark the service of cryptocurrency over the various forums. The crypto exchange company can be ruled in the similar position. However, many experts along with the exchanges may have the branch offices or server within the same state. This might create a conflict but on the practical aspects and the practice might seem different but doesn't affect the nomenclature. The ramifications are such that procedure will complicate rather than simplify the environmentally affected process of mining. The article XX of the GATS gives the sovereign government power to exercise certain exceptions or exemption to the GATT rules. The paragraph 'g' of the article XX provides for conservation of exhaustible natural resources. Now when we see the current trend, the crypto

¹⁴ WTO. *Services: Rules for Growth and Investment*. (2019).

¹⁵ World Trade Organization. *Members And Observers*. (2016).

¹⁶ World Trade Organization. *History*. (2019).

mining is made through the traditional means of energy production i.e., using coal and petroleum-based energy. The heavy intensive use of crypto mining is very much intensive and this will in create extra burden on the state to regulate the limited resources. This is when the WTO has to make a way through amending GATT and GATS while mentioning of importance using the alternative usage of the electricity such as solar energy, tidal energy and so forth. The environmental concerns are the talk of 21st century and the WTO don't want to attend to an added burden. Also, few infamous crypto as mentioned above such as SolarCoin have algorithms of production and distribution in way which use significant less energy in the process. The WTO should consider the aspect and understand the technology in suffice way that it helps the state who are in activity of dealings of crypto as well as legal tender. The municipal boundaries of the transactions are also important as well as the international transactions of the crypto as stated by the authority in USA – Shrimp case. The modern bass of ruling and functioning of WTO is achieving the goal of Sustainable Development. The stressing of usage of renewable resources in such energy intensive commodities is also an important aspect discussed in Doha round.

Crypto money would become an investment item if any regulation on it as a commodity were to be implemented. These countries should issue a warning about the security of crypto currency transactions in this circumstance. In any event, several companies in Indonesia currently provide crypto currency conversion services.¹⁷ These businesses will be in charge of crypto currency transactions. The government has imposed rigorous rules on crypto currency exchange companies to ensure transaction security. Some of the requirements concern the company's terms of establishment, as well as the quantity of the firm's initial capital, with the goal of ensuring that if a transaction error occurs, the company is able to compensate its customers. The concept of Free Trade Agreements is the most potential victim of situations where the international law and the municipal laws don't overlap but are in direct conflict as the states use the defence of sovereignty or national security. In the official complaint by State of Venezuela against USA for banning their local digital currency and this action by USA which is termed as 'less unfavourable' due to the trade restrictions on the single transaction arising from Venezuela but no restrictions from Venezuela state. This on face value is in direct violation and conflict to article II:1 of the GATS. This aspect is of very much paramount importance when such economic super powers like to dominate when the international circuit is operating in grey area. "Venezuelan goods face, as a result of these measures, a greater

¹⁷ Reinm. *List of Exchange Currency in Indonesia*. (2019). [Exchange Cryptocurrency di Indonesia \(digitalis.id\)](https://www.digitalis.id/)

regulatory burden in terms of conditions governing importation, as well as restrictions on who can perform this import function, and unfair market opportunities once importation has taken place. All of this denies Venezuelan goods the equality of opportunities guaranteed by Article I:1 of the GATT.”¹⁸ These states have abundance of renewable and non-renewable energy sources, so the scarcity issue is not much an issue and this dominant position will directly or implicitly have a dominant position over other countries, which is reasonably observed in Venezuela’s complaint to WTO.

Conclusion

Bitcoin’s value is determined by the amount of energy it consumes and the environmental impact it has on the environment. The ability to value a moving target is tough. Due to the continued rise in popularity of Bitcoin, additional processing power is being hired in order to serve a larger number of users. Whether Bitcoin mining is environmentally sustainable in the long run is disputed, especially in light of recent developments. There is no doubting that bitcoin and other proof-of-work blockchains consume a large amount of energy, regardless of your view on cryptocurrencies. While coal and other fossil fuels provide for the vast majority of this energy, proponents of bitcoin argue that renewable energy sources are just as important as conventional sources. Failure to take into account the environmental repercussions of this technology and to regulate digital currency corporations may not only harm the environment but may also deter future digital currencies from reducing their energy consumption and carbon emission levels in the future. As digital currencies gain in popularity, it is important to consider their influence on the environment. As public concern about the environmental impact of blockchain-based currencies has grown, developers are exploring innovative solutions that deliver all of the benefits of digital currency without the high carbon footprint that has been associated with it. Continue to keep your eyes peeled for an emerging generation of environmentally friendly cryptocurrencies that make use of renewable energy sources to reduce the environmental impact of transactional activity

¹⁸ <https://www.twn.my/title2/finance/2019/fi190101.htm>; accessed 16 May, 2022.