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From Coffee To Data: The Influence Of Cardano On Ethiopia's Coffee Trade

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Abstract: Ethiopia's primary export, coffee, has been instrumental in its economic growth. A blockchain multinational company named Cardano advocated for the adoption of their technology in Ethiopia. However, instead of fostering development, the push for blockchain by developed nations perpetuates structural imperialism. This stems from disparities in economic distribution and ICT knowledge. This study examines Cardano's influence on Ethiopia's coffee sector in 2018, revealing a dynamic where developed countries exert influence over developing ones. Cardano's technological prowess positions it at the center, impacting Ethiopia as a peripheral player in blockchain adoption for coffee trade enhancement. Despite Ethiopia's coffee exports tripling in value, the collaboration also benefits Cardano, leading to unequal labor division and economic gains. Furthermore, Cardano's initiatives spawn additional blockchain applications, extending its influence across various sectors.

Keyword: Blockchain, Cardano, Ethiopia, imperialism, coffee.

INTRODUCTION

After the appointment of Ethiopia's new Prime Minister, Abiy Ahmed in April 2018, Input Output (IOHK), a blockchain infrastructure company that provides support for the Cardano platform, established a partnership with the Ethiopian Government. IOHK is a research and development (R&D) corporation responsible for the creation of the Cardano blockchain (Gobena, 2023; Kshetri, 2023). The objective of this partnership was to offer training in the Haskell programming language, to foster the development of blockchain technology. The specific focus of this initiative was to enhance the tracking capabilities of agricultural commodity trading activities, with an emphasis on the coffee sector (Lema & Rabellotti, 2023; O'Connor, 2018).

The Ethiopian Ministry of Science and Technology acts as a student recruiter for the training, which helps Cardano in carrying out its operations in Ethiopia. IOHK is involved in establishing the Cardano ecosystem in Ethiopia by offering Haskell programming language training. Coffee was chosen as the focus of this project because coffee is Ethiopia's primary

export and coffee can grow anywhere in Ethiopia. Blockchain will be used to track coffee from its harvest to its sale to buyers (Castor, 2018).

The partnership between Cardano and Ethiopia in 2018 is one of the catalysts for the creation of the Digital Transformation Ethiopia 2025 plan. The Ethiopian government released an Ethiopian digital strategy plan in December 2018 on the Prime Minister's official website (FDRE, n.d.). The digital transformation of Ethiopia will encompass various sectors, including agriculture, manufacturing, information technology (IT) services, tourism, digital engagement, and others. One of the advancements in technological utilization involves the implementation of the Cardano blockchain to track the value chain.

In addition to the adoption of blockchain in agriculture, the blockchain technology collaboration between Cardano and Ethiopia is in the field of education. On April 29, 2021, IOHK's Director of Africa Operations, John O'Connor, interviewed the Ethiopian Minister for Education, Getahun Mekuria. Before serving as the Minister of Education in 2021, Mekuria was the 2018 Minister of Science and Technology who signed a previous cooperation. Mekuria and IOHK have previously established a partnership through Haskell Programming Language training to use blockchain for Ethiopian agriculture.

According to Mekuria, blockchain technology is needed ‘to improve the quality of education’ in Ethiopia and other countries. Mekuria added that he chose Cardano since it was one of the digital enterprises with the highest cryptocurrency value relative to the US dollar. Mekuria stated the cooperation between Ethiopia and Cardano (through IOHK) in the field of education is in the form of the creation of ‘digital IDs for students, focusing on secondary school. So, [they] started to provide digital ID for all of [their] 12th-grade students.' Furthermore, he said blockchain would be used 'to provide a digital ID for close to 5 million students' in an interview with the IOHK in April 2021 (Input Output, 2021).

One of the contemporary advancements in information and communication technology (ICT) is the current emergence of blockchain and cryptocurrency technology, which is considered for its ability to facilitate data management and aggregation. Blockchain technology is also well recognized for its ability to ensure the security, traceability, and documentation of various transactions, including those involved in supply chain operations (Alamsyah et al., 2023; Guo & Yu, 2022; Tredinnick, 2019). The utilization of big data in the context of blockchain involves the establishment of a network for storage and the integration of databases capable of amalgamating vast amounts of data in order to generate novel data collections. This has the potential to provide novel business models that are highly applicable to prominent sectors of big data, including digital currency and digital identification applications (Muheidat et al., 2021).

Besides supports, there are significant oppositions and critics to the proliferation and adoption of blockchain technology and big data in the developing world. Blockchain technology has also faced criticism for its potential to enable the mapping of resources in an area beyond the control of the state, and leading patterns of asymmetry between the North and South regions, as well as facilitating exploitation. Blockchain management corporations engage in experimental initiatives targeting developing countries to exert control over their resources by leveraging blockchain technology (Jutel, 2021).

There are also other studies that raise questions about the capitalistic nature of data, authority and control over data as well as surveillance issues (Buckley et al., 2020; Corballis & Soar, 2022; Sadowski, 2019; Sadowski & Pasquale, 2015; West, 2019). The emergence of blockchain services signifies the endeavour undertaken by companies to establish a socio-technical framework that enables them to assert their control over novel digital transactions via the blockchain. The current technology advancements encompass endeavours aimed at enhancing productivity, as well as exerting influence and authority (Beaumier & Kalomeni, 2022).

Alamsyah et al. (2023) discuss how blockchain can be used to track coffee from farmers to customers. Bronson and Knezevic (2016) argue that critical analysis of Big Data in the domain of food and agriculture is a novel area of academic inquiry for researchers specializing in critical data theory. This field of study offers an opportunity to explore the connections between big data and the tangible elements of data utilization. Gobena (2023) discussed about Cardano as solution to money laundering in Ethiopia, but has not talked about the power relation between Cardano and Ethiopia.

There has been a lot of research supporting or opposing blockchain. However, there is a research gap in discussing the influence of the Cardano blockchain projects in Ethiopia's coffee trade since 2018. The efforts of IOHK to introduce Cardano's digital blockchain ecosystem to Ethiopia bear resemblance to the imperialist practices which involve exerting influence over the Ethiopian government to get approval and cooperation. As a justification for their cooperation, global north-based developers and multinational corporations argue that their technology is essential to the growth of the global south. In this case, Cardano maps natural resource and personal data in Ethiopia to enhance Ethiopia's coffee trade.

Cardano campaigned that their blockchain project can improve Ethiopia's economic situation, hence influencing opinions on Ethiopia's need for foreign help and blockchain technology. Ethiopia's reliance on the Cardano digital system and the inequity that results from the asymmetrical structure may be affected by the help that Cardano is providing through blockchain technology, rather than improving Ethiopia's condition. This article aims to question how Cardano influenced Ethiopia to adopt their blockchain technology in the coffee trade.

STRUCTURAL THEORY OF IMPERIALISM

This study used a structural theory of imperialism (Galtung, 1971) as its theoretical framework. Galtung's theoretical framework posits that the global landscape can be delineated into two distinct categories: 'Centre nations' and 'Periphery nations,' with each category further comprising internal differentiations of 'centres' and 'peripheries.' According to Galtung, imperialism can be understood as a hierarchical power dynamic between nations. The domination relationship under consideration is a complex association that is established through the establishment of a 'bridgehead' by the central authority of the Centre nation within the central region of the Periphery nation, with the intention of fostering reciprocal advantages. Galtung's rejection pertains to the theoretical perspectives of Marx and Lenin, who exclusively perceived imperialism through the lens of economic interactions within the capitalist system, driven by the objective of market expansion.

According to Galtung, imperialism primarily revolves around the structural dynamics existing between the two parties involved. In addition, Galtung observed that imperialism encompassed not solely economic dimensions, but rather comprised five distinct types: economic, political, military, communication, and cultural. The arrangement is arbitrary and no element holds a greater level of fundamental significance than any other. Imperialism has the potential to manifest in various forms.

Differences in 'living conditions' or LC on income indicators, living standards in the materialistic sense, and quality of life can be used to determine the Centre's 'true interest'. Imperialism refers to the relationship in which there is: 1) a 'harmony of interest' between the Centre and the Periphery; 2) a greater 'disharmony of interest' in the Periphery than in the Centre; and 3) a conflict of interest between the periphery in the Periphery and the periphery at the Centre. Due to the relationships that are formed, the government, which is the centre of Periphery, is expanding more quickly than the periphery of Periphery. Furthermore, the Periphery Centre serves only as a source of raw materials for the Centre. The raw material enters the Centre through the centre, and some of it exits the centre down to its periphery. Compared to the Periphery, there are less conflicts of interest within the Centre. But

according to Galtung, the most crucial issue is the first one, which deals with the 'harmony of interest,' or shared interests, between the centre at the Centre and the centre at the Periphery.

Galtung stated that imperialism uses two combinations of interaction mechanisms: 'vertical interaction relations' and 'feudal interaction structures.' The main point of interaction is that each country and nation have different and complementary values so that exchange can occur. To see whether existing interactions are symmetrical or asymmetrical, equal or unequal, we can examine them through 1) value exchange between actors (inter-actor effects) and 2) effects within actors (intra-actor effects). Inter-actor relations can be seen through the flow of raw materials, capital, and financial goods and services in all directions. Then, the flow from both directions can be compared in various ways.

In this comparison, 'who benefits most' is the most significant factor. Galtung categorizes exploitation into three categories when considering unequal or asymmetric exchange: taking or stealing resources without reciprocity, taking resources with reciprocity, and taking resources that are balanced but have significantly different outcomes on both players. The following structure applies between interactions in the feudal system: 1) Periphery and Centre interactions are vertical; 2) Periphery and other Peripheries interactions do not form; 3) multilateral interactions do not occur; 4) the Centre monopolizes interactions with the outside world, which has an impact on Centre and Periphery interactions. Centre relations with Peripheries from other Centres do not form, nor do Centres with other nations.

The vertical relationship between the Centre and Periphery can be observed through the categorization of imperialism into five distinct types: Economic, Political, Military, Communication, and Culture, as previously discussed. Within the context of economic imperialism, the Centre assumes the role of providing processing and production processes, while the Periphery assumes the role of supplying raw resources and markets. In the realm of political relations, the Centre offers a decision-making framework, whereas the Periphery either emulates or adheres to this framework.

When examining instances of unequal exchanges, Galtung observes that the disparity lies not only in the fact that Party A offers less to Party B than Party B offers in return, but also in the consequential effects known as 'spin-off' and 'spill-over.' As an illustration, in the event that a nation had the requisite resources and infrastructure to engage in tank production, a potential outcome or derivative capability may be the ability to build tanks. The aforementioned phenomenon of the "spin off" effect has the potential to manifest as a subsequent "spill-over" effect, so resulting in a transition from one form of imperialism to another.

METHOD

A qualitative approach was employed in the research process. The fundamental tenet underlying qualitative research methodologies is employing diverse approaches to elucidate social phenomena. This study aims to explain the entry process and impact of the Cardano Multinational Company in Ethiopia. The proposed research methodology will adhere to established social research norms and employ qualitative approaches (Neuman, 2014).

The author collected research data through several methods. First, the author collected data from primary sources through documents, articles and official website uploads published by Cardano (Cardano, IOHK, Emurgo) and the Ethiopian Government. Second, the author used secondary sources from interviews, news, writings, and others from the internet to obtain secondary data. Then, the author codified the data to classify the data according to the research concept. The data that has been classified is then analysed using an illustrative analysis strategy or 'empty box' following the qualitative analysis strategy by Neuman. The empty box will be filled based on the concepts offered by Galtung's structural theory of imperialism.

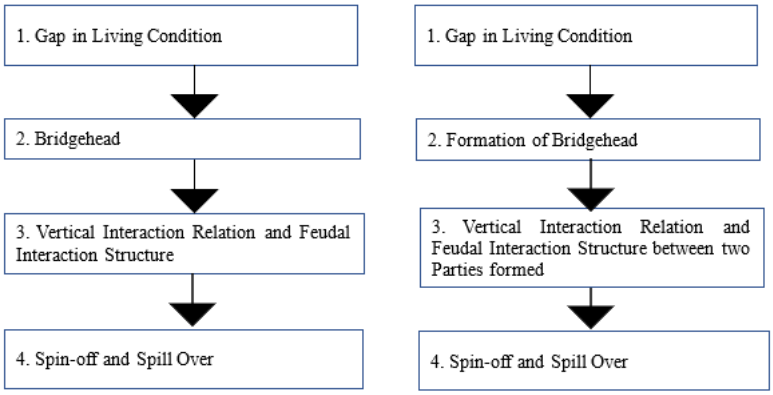


Figure 1. Concepts operationalisation from a structural theory of imperialism and analysis models constructed by author

RESULTS AND DISCUSSION

This article categorized the actors involved based on the classifications outlined by Galtung. The Cardano project consisted of three primary contributors, the Cardano Foundation, IOHK, and Emurgo, each assuming distinct tasks: 1) the Cardano Foundation, headquartered in Switzerland, which endeavours to establish uniformity, safeguard, and advance the Cardano technology and ecosystem; 2) IOHK, a blockchain engineering firm, which takes the responsibility of constructing the Cardano blockchain, and; Emurgo an organization that is tasked with promoting the development of commercial applications inside the Cardano ecosystem (Houben and Snyers 2018). This article will focus on IOHK and its officials as the representation of Cardano as the Centre centre. Ethiopia and its ministerial and Ethiopian Commodity Exchange (ECX) officials will be attributed as the Periphery centre, which provided Cardano with learners and labourers and adopted the blockchain technology to their coffee supply chain policy.

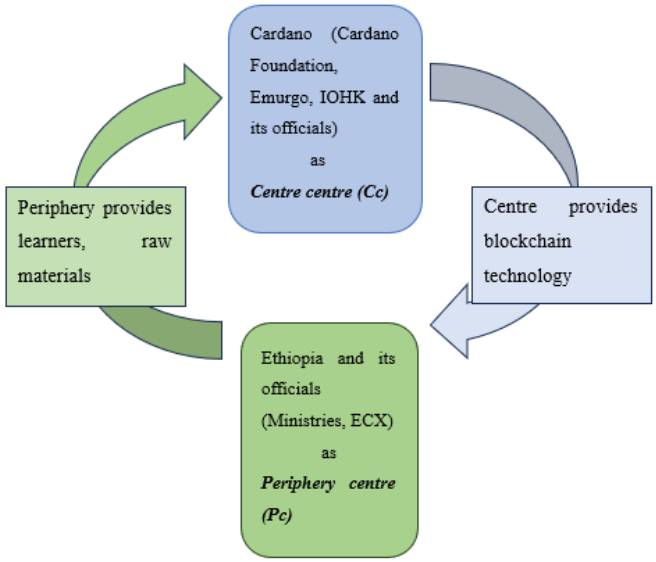


Figure 2. The categorization of Centre and Periphery concepts on Cardano and Ethiopia constructed by author.

A. Gap In Living Conditions

Kacowicz (2007) stated that the assumption that the influence of globalization, including markets, science and technology, can solve the problem of inequality and poverty is not entirely convincing, considering that billions of people still live in absolute poverty. Globalisation encompasses a series of interconnected transformations across several domains,

such as economics, ideology, technology, politics, and culture. Technological transformation pertains to the utilisation of information and communication technology, which has led to a global reduction in distance and facilitated a shift in economic activities from the production of commodities to the provision of services. Cultural transformation encompasses trends that aim to align tastes and standards. Wade (2002) stated ICT campaigns operate under the premise that a significant disparity exists in access to digital resources and technologies. Furthermore, ICT campaigns rely on the underlying concept that information and communication technology possesses inherent traits that make it a viable solution to many problems, as well as the capacity to enhance the capabilities of an organisation.

In February 2018, Charles Hoskinson, the Chief Executive Officer (CEO) of Input Output Hong Kong (IOHK), presented a lecture at the London School of Economics (LSE) focusing on Cardano's objectives pertaining to Africa and the Developing World. According to Hoskinson, the use of Cardano's blockchain technology has the potential to enhance the economies of emerging nations in Africa, such as Ethiopia. This may be achieved through the establishment of a tokenization initiative that encompasses various facets, including the tokenization of natural resources, as well as the human resources and property associated with them. Hoskinson provided an explanation of the ongoing negotiation process between Cardano and Ethiopia with regards to the potential utilisation of the blockchain programme in the country (Wild, 2018).

In pursuit of Cardano's establishment in Ethiopia, negotiations were conducted between representatives of two Parties. The individuals of prominence associated with Cardano encompass Charles Hoskinson, who serves as the Chief Executive Officer (CEO) of Input Output Hong Kong (IOHK) and is also the founder of Cardano. Additionally, John O'Connor holds the position of IOHK Africa Director of Operations. On the Ethiopian front, an influential figure involved in the matter is Getahun Mekuria, the Minister of Science and Technology. As per Proclamation No. 916/2015, which outlines the delineation of powers and responsibilities of the executive organs of FDRE, Mekuria holds a stakeholder position with specific duties and functions in Ethiopia.

An instance illustrating the gap of living conditions used to campaign the technology can be observed in an interview conducted by Bitcoin Magazine with O'Connor, the Director of Operations for Africa IOHK, on May 4, 2018. The interview focused on the collaborative efforts between Cardano and Ethiopia in utilising blockchain technology to enhance agricultural markets, particularly in coffee. This collaboration was showcased at the inaugural blockchain forum event held in Ethiopia. O'Connor stated that the support of the government is essential for the successful implementation of any significant business or technological initiative in Ethiopia (Castor, 2018).

Furthermore, in an article written by O'Connor, it is stated that IOHK engagement with the Ethiopian government, colleges, and local technology developers has been built since before the signing process, which took place during the inaugural blockchain forum in Ethiopia (O'Connor, 2018).

To detect the gap in living conditions, Galtung's idea of living conditions namely living standards, income indicators, and quality of life are used. In this case, the comparison of economic conditions using Gross Domestic Product (GDP) and the Digital Skills Gap Index (DSGI) by Wiley (2021) between the host countries of Cardano (Switzerland), IOHK (Hong Kong), and Emurgo (Singapore) with Ethiopia can serve as indicators. DSGI is a new planning instrument designed for business, academic, and public policy leaders to evaluate their advancements in relation to the determinants that influence a society's digital skills proficiency (Wiley 2021).

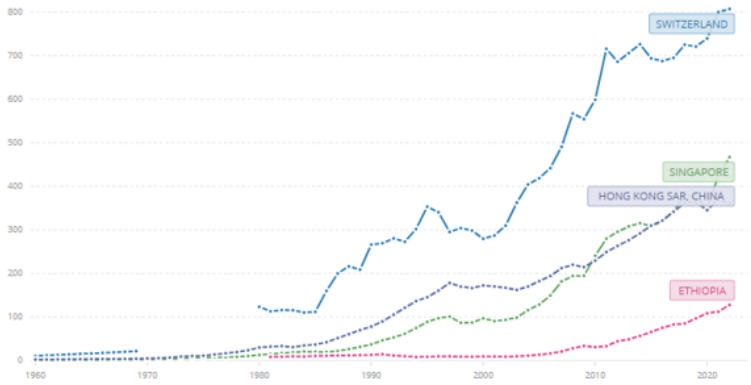
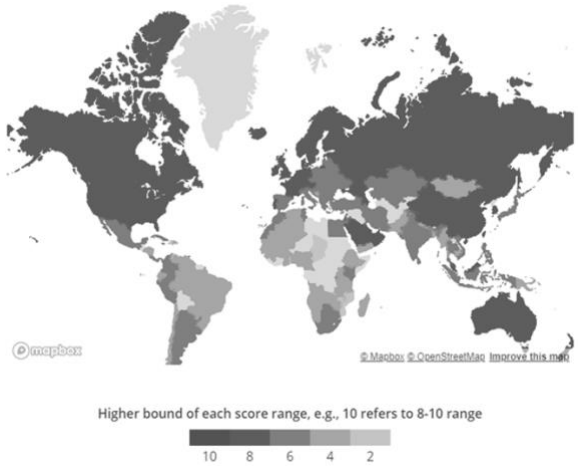


Figure 3 The GDP in US dollar comparison of Switzerland, Hong Kong, Singapore and Ethiopia since 1960-2020. Source: World Bank (n.d.).



No	Country	DSGI Rank	Score
1	Singapore (Emurgo)	1	7.8
2	Switzerland (Cardano Foundation)	11	7.2
3	Hong Kong (IOHK)	19	6.6
4	Ethiopia	119	2.8

Figure 4 and Table 1 The DSGI difference between Cardano and its subsidiaries with Ethiopia (Anon n.d.-b)

Cardano justifies the disparity in distribution between itself as the centre and Ethiopia as the periphery in carrying out its ICT campaigns for Ethiopia. Cardano explained through IOHK that Ethiopia must implement blockchain technology in order to develop its agricultural market. This is similar to what Jutel (2021) states as blockchain imperialism which operates as a novel kind of data mapping that exercises control, fluctuating between the interests of the state, capital, and the solution-oriented exploration conducted by developers. Furthermore, Jutel (2022) stated that the implementation of blockchain and other technologies in developing nations can be seen as a reflection of historical colonial legacies, existing power dynamics, and the penetration of Western capital facilitated by technological abstraction.

B. Formation Of Bridghead

This subsection will explain the formation of bridgehead between Cardano and Ethiopia after Cardano's has successfully used the difference in economic conditions and digital skills in their techno-solutionist campaign for Ethiopia. The bridgehead between Cardano and Ethiopia is built through cooperation signed in the form of Memorandum of Understanding (MoU) between the elites of Cardano, Charles Hoskinson and John O'Connor with Getahun Mekuria as Minister of Science and Technology of Ethiopia in 2018. Using Galtung's lenses, this can be seen as the effort of the Centre to the Periphery centre to make sure that Ethiopia is tied using the 'harmony of interest' between them.

The cooperation takes the form of training in the Haskell programming language, which is used to create software compatible with the Cardano blockchain technology. The Cardano blockchain would initially address issues with Ethiopia's coffee supply chain. In an interview, O'Connor stated that coffee production in Ethiopia predominantly relies on small-scale holdings and rural farms, constituting around 95% of the total output. To enhance coffee yield and optimise marketing strategies, several measures can be implemented. One of the foremost issues, for instance, pertains to substantiating the provenance of coffee. This is the point at which the blockchain technology becomes involved. Furthermore, O'Connor explained that blockchain technology would be utilised for the purpose of documenting the entire coffee production process, starting from the cultivation stage by farmers and extending all the way to the point of purchase by customers (Castor, 2018).

The blockchain technology purports to facilitate the democratisation of massive data, finance, and various governance mechanisms. The governance concepts of 'enhanced transparency, accountability, and efficiency' (Jutel, 2021). Blockchains offer an inherent solution that enables the sharing of comprehensive transaction records across participants in a complex and fragmented supply chain. This facilitates enhanced transparency, resilience against fraudulent activities, and improved operational efficiency. Smart contract applications have the potential to automate payments throughout supply chains by leveraging blockchains (Tredinnick, 2019).

In Ethiopia, agriculture holds significant importance, with a substantial contribution of 35.8% to the GDP. Furthermore, it accounts for nearly 90% of the country's exports, approximately 72.7% of employment opportunities, and fulfils 70% of the raw material demands for various sectors inside the nation (Ayele et al., 2021; Eshete et al., 2020). The coffee industry contributes around 4-5% to the country's GDP, 10% to the overall agricultural production, 40% to the entire exports, 10% to the government's revenue, and 25-30% to the overall export earnings (Ayele et al., 2021).

However, in terms of coffee trade activities either import or export, there are issues regarding traders in Ethiopia operating 'fictitious trade' with unauthorized documents as one of money laundering strategies (Gobena, 2023). Cardano acknowledges the significant contribution of coffee as a resource in fostering economic growth inside Ethiopia. In addition to the aforementioned factors, it is noteworthy that coffee plays a significant role in Cardano's Africa Strategy, with Ethiopia being the primary focus of attention (Emurgo, 2019). Coffee, both as a stimulant and a valuable resource, has proven to be highly conducive to the emergence and advancement of capitalism (Topik, 2009).

The collaboration formed by Cardano and Ethiopia was only one month after the inauguration of the new Prime Minister, Abiy Ahmed Ali in April 2018. Unlike the previous Prime Ministers, Abiy Ahmed Ali has a background as a graduate in Computer Engineering. The educational background of leaders holds significance in driving policy changes, irrespective of the political regimes in place and the pre-existing socioeconomic systems (Li et al., 2020). In December 2018, Prime Minister Abiy implemented a policy titled 'Digital Ethiopia 2025: A Digital Strategy for Ethiopia Inclusive Prosperity' in which Cardano is mentioned to take part in the 'coffee blockchain initiative' (Law Ethiopia, 2018).

In addition to the Prime Minister and Minister of Science and Technology, the Chief Executive Officer (CEO) of the ECX holds a prominent position in shaping the coffee trade in Ethiopia. Eleni Gabre-Madhin remarked during the signing ceremony that the utilisation of blockchain technology carries significant consequences across various areas, including but not limited to healthcare, agritech, land management, and the economics (Abebe, 2018). The Government of Ethiopia or FDRE uses blockchain in an effort to strengthen their power through ECX as a commodity controlling authority in Ethiopia.

In November 2018, Abiy Ahmed enacted Regulation No. 433/2018, establishing The Coffee Marketing and Quality Control Council. This regulation stipulates that coffee trading

activities must be conducted exclusively through the ECX or other government-recognized trading systems. Coffee dealers can engage in direct trading, subject to a certification procedure and the completion of coffee tracking documentation, which enables the government to monitor the movement of coffee effectively. Regulation No. 433/2018 is an advancement of Proclamation No. 1051/2017, wherein the coffee tracking method is not sufficiently expounded upon.

This demonstrates that there has been a congruence of interests between Cardano as the Centre and Ethiopia as the Periphery through attempts to leverage blockchain as Cardano's Africa Strategy in boosting the coffee tracking process by ECX. This is comparable to how Carr and Hesse (2022) portray Large Digital Companies (LDC) in terms of their approach to negotiations, political scheming, and deceptive public relations techniques.

C. Vertical Interaction Relation Between Cardano And Ethiopia

When examining the vertical interaction relationship between Cardano and Ethiopia, it becomes evident through the trades conducted by both parties. Ethiopia utilizes blockchain technology by supplying intangible raw data derived from mapping tangible raw resources. This data is subsequently inputted into the Cardano blockchain system to conduct analyses. The outcome of this analysis is the development of a model that Ethiopia can use to make informed decisions.

In the context of the collaborative utilisation of blockchain technology through Haskell language programming training, IOHK, acting as the representative of Cardano in Ethiopia, assumed the responsibility of delivering the training. Simultaneously, the Ethiopian Ministry of Science and Technology contributed by facilitating the recruitment of students for the course and assisting IOHK in navigating the local business landscape. In addition, it was elucidated that the entirety of the student body recruited consisted exclusively of female students (Castor, 2018).

When examined through the lens of Galtung's framework of imperialism, the observed trend can be classified as a manifestation of cultural imperialism. This phenomenon entails establishing division of labour systems between educators and learners, which can be attributed to the influence of the 'gospels of Technology'. Furthermore, it is worth noting that the work system follows a vertical division, wherein Ethiopian students the government has enlisted will be instructed in the Haskell programming language. The ultimate objective of this instruction is to equip these students with the necessary skills to construct a blockchain system utilizing Cardano technology. According to Casilli (2017), in his study of digital labour, minorities who are racially and gender marginalised are a source of affordable labour, making them simpler to enlist. Casilli also claims that the Global South supplies labour to the Global North.

From Udofia's (1984) analysis of the Imperialism of Multinational Companies in Africa, the Cardano case in Ethiopia exhibits a comparable pattern. In this scenario, the collaboration between involved Parties results in the recruited students lacking a substantive role within the realm of responsibility, functioning solely as implementers. Furthermore, it is worth noting that multinational organisations, driven by capitalist principles, tend to prioritise exporting raw materials to their host nations. Consequently, it is seen that Ethiopian students residing in these countries are often not granted managerial roles in the blockchain cooperation programmes.

Table 2. Vertical work system division between centre actors constructed by author

No	Actor	Role
1	Cardano, IOHK, Emurgo as the Centre centre (Cc)	Provide training in the Haskell programming language and the Cardano blockchain technology.
2	Ministry of Science and Technology, Ethiopia as	Providing students as Haskell language learners, providing data from raw materials for analysis.

	Periphery center (Pc)

Table 3 Vertical work system division between periphery actors constructed by author

No	Actor	Role
1	IOHK programmers as the Centre periphery (Cp)	provided training in the development of blockchains using Haskell
2	Ethiopia student as the Periphery periphery (Pp)	Participate in training as a student who has been selected by the Government and learn Haskell Language and the Cardano blockchain.

In this training program, Ethiopian students assume the role of employees tasked with constructing Cardano's digital infrastructure, tailored to suit the specific constraints present in Ethiopia. Fuchs (2019) explains that contemporary proletariat is situated in precarious circumstances, exemplified by unpaid apprenticeships. Although these individuals engage in labour that may deviate from conventional forms, their contributions nonetheless generate value. Furthermore, the digital realm fosters a globalised division of labour system inside the framework of capitalism. Furthermore, Pasquale (2016) also criticises how 'platform capitalism' accumulate capital by not adhering to labour laws and other regulatory requirements, reducing the cost of labour with minimum standards to 'almost nothing', and making programmers treat workers 'like bits of code an continue to think of themselves as builders, not managers.'

In addition to the concept of division of labour, the presence of vertical structure can be observed within economic connections. Galtung observed the movement of raw commodities, capital, and financial goods and services between the entities. In this scenario, the primary focus lies in determining the party that stands to derive the most significant advantages from the transaction. This comparability can be observed by analysing the coffee export data and the financial gains Cardano acquired.

Numerous financial institutions exploit the potential of blockchain technology to build businesses in the field of financial technology, also known as FinTech. These startups aim to harness the capabilities of blockchain to provide financial services and support the infrastructure of cryptocurrencies (Rejeb et al., 2021). Hence, Cardano leverages its blockchain technology to generate revenue by offering their tokens, called ADA, for sale on the cryptocurrency market, similar to selling shares.

A comparative analysis of the benefits received by Ethiopia and Cardano shows an unequal distribution of income and benefits. For Ethiopia, there was a notable increase tripled in value when comparing 2021 to 2018. The export of products amounted less than 400 million U.S. dollars in 2018 and surge to more than 1200 million U.S. dollars in 2021(Kamer, 2023). However, Cardano achieved a market value of approximately 43.4 billion dollars as of February 2021 from the sale of its cryptocurrency. The price had also gone up in 2018 and 2021, in line with the project between Cardano and Ethiopia (Coinmarketcap, n.d.). During periods of uncertainty, when obtaining pertinent information is challenging, investors may opt to observe and imitate the decisions of other investors who are perceived to possess superior knowledge. This behaviour often leads to herding for cryptocurrency investors (Giudici et al., 2020). With the news of Cardano and Ethiopia cooperation, Cryptocurrency investors become well-informed and decided to buy Cardano cryptocurrency, making the price went up. Pasquale (2016) stated that the early platform achieving a substantial user base might exploit this advantage to secure significant financial resources. With Ethiopia as the justification of their blockchain system and cryptocurrency, Cardano can then accumulate trust as well as increase their market capitalization and cryptocurrency price.

D. Feudal Interaction Structure

According to Galtung, the feudal system imposes constraints on interaction, mobilisation, and organisation within the Periphery, resulting in a situation where the Periphery's activities were closely intertwined with the feudal framework. Sadowski (2019) explained there are various organisations actively involved in the collection of data, with the intention of catalysing novel approaches to conducting business and governing. The acquisition and aggregation of data are fundamental elements within the realm of political economics in our contemporary day. Sadowski further employs Marx's conceptualization of capitalism and draws parallels to the phenomenon of data capitalism, specifically referring to the utilisation of data for the purpose of generating profit or surplus value.

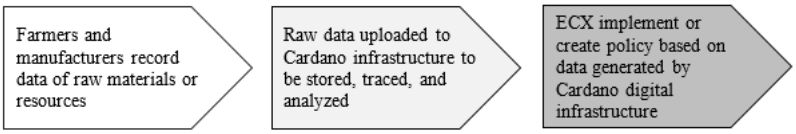


Figure 5. Data processing through blockchain modified from Alamsyah et al., (2023)

Cardano has implemented a mobile application to store information on the blockchain pertaining to the sourcing origin, processing dates, and other logistics data. This initiative aims to provide all stakeholders involved in the value chain with transparent access to the coffee's journey at any given moment (Lema & Rabellotti, 2023). Data from raw resources is uploaded to Cardano's blockchain for analysis, producing refined data for Ethiopian policymaking. However, access to this data is restricted, as blockchain ensures permanent preservation, with Cardano holding ultimate authority.

The implementation of a blockchain-based digital infrastructure tailored to the Ethiopian context can be regarded as a strategic initiative by Cardano to create feudal structure imposed to Ethiopia. Data serves as a fundamental building block for the development and implementation of digital systems and services. Digital systems and services rely on data for their operation, utilising both pre-existing data repositories and actively gathering fresh data streams (Sadowski, 2019). People cannot directly utilise any blockchain in order to use it, just as they cannot directly use the Internet. Instead, users utilise software that in some way or another leverages the underlying blockchain (Smolenski, 2018).

Cardano attracted Ethiopia by campaigning the advantage of blockchain technology which provides a durable and immutable ledger of all transactions. Authorised users have the ability to access and observe all documented transactions, which may be meticulously monitored inside the records. Furthermore, these transactions are characterised by their unchangeable and irreversible nature. Blockchain technology is widely acknowledged for its potential to enhance security, transparency, and tracking capabilities (Guo and Yu, 2022).

However, the current discourse surrounding data governance and data sovereignty highlights the significance of social practises pertaining to data access, sharing, control, and use, as well as the resultant models (Hummel et al., 2021; Micheli et al., 2020). According to Jutel (2021), the potential advantages offered by blockchain technology hid the disparities in data management between regions, particularly between developed and developing countries. Thus, blockchain experimentation in developing nations aims to control developing country resources through blockchain.

West (2019) also explains that capitalism leads to an imbalanced distribution of power and is characterised by the presence of actors who possess the necessary access and expertise to comprehend and utilise data. The perpetuation of this inequitable allocation is facilitated by the capitalist system and rationalised by linking network technologies to political and social advantages inside online communities, exploiting narratives associated with the idealisation of technology.

Due to the formation of a common interest or harmony of interest between Cardano and the Government of Ethiopia, the Government provided voluntarily, without coercion, data from its natural and human resources. However, the Ethiopian Government, as well as other users, then need to access the data via the Cardano blockchain software that has been created. Thus, interaction between users in obtaining mature data cannot be established without going through the blockchain.

E. Spin-Off And Spill Over

This section will talk about the creation of spin-off and spill over from the cooperation between Cardano and Ethiopia through Galtung's theory. Imperialism first emerged as cultural imperialism in the instance of Cardano and Ethiopia. Ethiopia prepared students who would later assist in the establishment of blockchain in Ethiopia, while Cardano built a learning model. Following that, agricultural commodities will be tracked using blockchain, with coffee as the initial focus. In April 2021, through an interview conducted by O'Connor with Getahun Mekuria as the Minister of Education of Ethiopia 2021, there is a plan to utilize blockchain to store digital student and teacher IDs (Hochstein & Baydakova, 2021; Input Output, 2021). The following partnership was made official in October 2021 by Charles Hoskinson and Berhanu Nega, the newly appointed Minister of Education, succeeding Getahun Mekuria (Loba, 2021). The World Bank has contributed foreign debt assistance of $200 million USD to this project's implementation in order to provide digital IDs for teachers and students as well as a national digital ID programme (Taye, 2022).

Cardano's efforts to apply blockchain in Ethiopia created a spin-off and spill-over effect from blockchain development on coffee tracking. Digital cultural imperialism, initially carried out through Haskell language training in studying the Cardano blockchain, then expanded to economic imperialism (spill-over effect) to trace its agricultural commodity's supply chain (spin-off effect). Apart from that, the development of the use of blockchain in recording digital identities for students is also a spin-off of blockchain, which is then used as a flow of student and teacher identity information as data communication imperialism (spill-over impact).

Spin-off and spill-over as the result of efforts to digitize Ethiopian commodities are Cardano's measures as capitalist in mapping Ethiopia's resources. Furthermore, as a proponent of capitalism, Cardano can leverage the rationales for employing blockchain technology in various industries as a means to exert greater influence over the Government of Ethiopia. Neoliberalism has led to the commercialization and privatisation of (nearly) everything in the economy, including data and communications. A surveillance-industrial complex has formed within the political system. An ideology that supports the notion that surveillance technology will deter and identify crime and terrorism has coexisted with this political-economic complex (Fuchs, 2019).

CONCLUSION

The cooperation between the Cardano Multinational Corporation, represented by IOHK, and Ethiopia stems from economic and cultural disparities, particularly the gap in GDP and digital capabilities between the global north and south. Cardano leverages these gaps to implement ICT campaigns using blockchain technology in Ethiopia, influencing its policies on coffee trading and digital adoption

The alignment of interests between Cardano and Ethiopia began in 2018 through elite interactions, facilitating Cardano's entry and expansion into the country. This Africa Strategy aims to establish capitalist relations with Ethiopia, shaping its digital transformation policies.

The collaboration led to a vertical structure of cultural imperialism, with Cardano providing Haskell language training for blockchain development in Ethiopia and implementing a hierarchical work system. Ethiopian students are relegated to the periphery,

working to extract value for coffee through data production using Cardano's equipment. This asymmetric economic distribution creates a feudal-like structure, where access to data relies on Cardano's infrastructure.

This vertical interaction and feudal structure give rise to spin-offs and spillovers, evolving from one form of imperialism to another. Following increased coffee trade facilitated by Cardano's blockchain, a new collaboration emerges, focusing on recording digital identities. This shift marks a progression from cultural to economic and communications imperialism.

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