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Digital Green Carbon Trading Integrating Local Wisdom And Islamic Economy For Sustainable Development In Central Kalimantan

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Abstract

*This article discusses the potential of **digital green carbon trading** in Central Kalimantan based on local wisdom and Islamic economic principles. Carbon dioxide (CO_2) emissions remain the leading cause of global warming, primarily driven by industrial and human activities. The study highlights how integrating **digital technology**, such as blockchain-based carbon registries and online trading platforms, can enhance transparency, accountability, and community participation in carbon markets. By empowering Dayak communities through digital access to carbon credit trading, environmental protection becomes an inclusive economic opportunity. This research uses a descriptive-qualitative method with a literature-based approach involving references related to carbon trading, digital economy transformation, Dayak local culture, and Islamic economics. The findings reveal that combining **digital innovation, local wisdom, and sharia-based economic values** offers a sustainable model for managing natural resources. This synergy not only reduces carbon emissions but also promotes the economic welfare of forest-dependent communities and strengthens digital local economies aligned with Maqasid al-Shariah and the Sustainable Development Goals (SDGs).*

Keywords: Digital Economy, Carbon Trading, Central Kalimantan, Local Wisdom, Islamic Economic, Sustainable Development

INTRODUCTION

Background

Today, there has been a lot of news, and news has been heard that nature and the environment we live in today have suffered much damage due to many factors. One of them is artificial. Reported via Antara (Antara, 2023), According to NDMA or the National Disaster Management Authority, there were 1,862 disasters from January to July 2023 caused by humans (human-made). This happens due to several activities, such as illegal logging, industrial activities, and land use change. The global

temperature increase is caused by carbon release due to human economic activities. These carbon emissions will impact temperatures worldwide over a long period and with uneven geographic variation (Cruz & Rossi-Hansberg, 2021).

Global climate change is an environmental problem now a significant challenge that needs to be addressed urgently. As reported through The Conversation page (Forster, 2023), Greenhouse gas emissions on our planet are now at an all-time peak, with an annual amount of 54 billion tons of CO2 equivalent. This is driven by the development of human civilization, which caused an increase in the earth's surface temperature to reach 1.14 degrees Celsius at the end of the 19th century, which is a rapid increase of 0.2 degrees Celsius every decade. As carbon emissions increase, global temperatures also rise. In addition to health problems, global warming can cause disasters such as floods, droughts, and fires that ultimately impact agriculture, ecosystems, and infrastructure. Global warming is also affecting melting ice in the Arctic, threatening the lives and habitats of many species.

Global environmental problems began to emerge along with the development of industrial and technological activities. According to Rypdal in the IPCC National Greenhouse Gas Inventory Guidelines, carbon dioxide (CO2) emissions are one type of greenhouse gas emissions that cause global warming. Global warming is closely related to human activities. According to the Intergovernmental Panel on Climate Change (IPCC), several sectors significantly impact global warming, including energy use, industrial processes, land use and forestry, and waste. In particular, industrial activities such as the production of cement, iron and steel, paper, petrochemicals, ceramics, and the use of carbonate materials in the production process are significant contributors to CO2 emissions (Y. M. Pratama, 2021).

As noted on the data page Indonesia. id (*8 Kota Dengan Tingkat Polusi Tertinggi Di Dunia, 15 Agustus 2023*), Carbon emissions exacerbate air pollution. Jakarta, one of the cities in Indonesia, ranks as the fourth most polluted city in the world. Air pollution that causes a decrease in air quality is closely related to the number of people with respiratory diseases, both toddlers and adults. The World Health Organization (WHO) states that about 3.8 million premature deaths occur due to air pollution. The causes of death were pneumonia as much as 27%, stroke as much as 18%, chronic obstructive pulmonary disease as much as 20%, ischemic heart disease as 27%, and lung cancer as much as 8%.(Sudaryanto et al., 2022). Some hydrocarbon components in vehicle exhaust, such as polycyclic aromatic hydrocarbons (PAHs) in diesel particulates, are known to cause cancer. Carbon emissions can also affect your blood's ability to carry oxygen, thus worsening heart disease (Strategi et al., 2021).

Energy consumption and industrial activities have a significant impact on generating carbon emissions and causing global warming. In 2022, it is estimated that human activities will produce CO2 emissions of 40.6 billion tons, while the earth's sequestration capacity will only bear as much as 380 billion tons of CO2 in the next few years. This amount of annual emissions in 2022 seriously threatens global climate

stability. If emissions trends do not change, there is a 50% chance that average global temperatures will increase by 1.5°C within nine years (Jozwiak, 2022).

Forests are a much-needed sink of carbon emissions to address this. With the absorption of these emissions, it will automatically be able to reduce the effect of greenhouse gases to reduce the impact of global warming. Carbon trading is an innovative solution to mitigate these impacts (Azizi MJ et al., 2023). Besides helping overcome environmental issues, of course, carbon trading also positively affects the economy of communities around forests and the country through empowerment.

Central Kalimantan is one of the provinces still firmly held by its tribal culture, the Dayak Tribe. Some local wisdom that was born continues to be maintained to this day. Dayak people appreciate the nature around them. This is shown by the prohibition of excessive exploitation of forests through cultural and customary law.

Islam also pays great attention to the sustainability of the environment. Many words of Allah Almighty show this in several letters in the holy book of the Quran, one of which is Surah Al-A'raf verse 56, which prohibits humans from damaging nature. Another thing is also seen in some hadiths of the Prophet Muhammad and the science of Fiqh Bi'ah, which focuses on nature and the environment.

Reseacrh Objectives

This study aims to explore how the integration of digital technology, local wisdom, and Islamic economic principles can shape a sustainable and inclusive carbon trading model in Central Kalimantan. It seeks to examine the potential of digital green carbon trading as an innovative mechanism to reduce carbon emissions while empowering local Dayak communities through environmentally responsible economic participation. The research further intends to analyze how traditional ecological ethics, such as *handep hapakat*, *tajahan*, and *pukung himba*, can be harmonized with Islamic values of *amanah* (trust), *adl* (justice), and *maslahah* (public welfare), supported by digital infrastructures like blockchain and IoT-based verification systems. Ultimately, this study aspires to develop a conceptual model, the Digital Green Carbon Trading Model (DGCTM), that ensures transparency, justice, and sustainability, aligning with both *Maqasid al-Shariah* and the Sustainable Development Goals (SDGs) in promoting eco-justice and community-based green economy transformation in Indonesia.

LITERATURE REVIEW

Carbon Trading Theory

Carbon trading theory originates from environmental economics and market-based approaches to mitigate greenhouse gas (GHG) emissions. The concept was institutionalized through the Kyoto Protocol, which introduced carbon credits as tradable instruments representing verified emission reductions. These credits allow organizations that emit less carbon to sell excess allowances to others, creating

financial incentives for sustainability (Tampubolon, 2022) (Azizi MJ et al., 2023). The theory assumes that market mechanisms can efficiently allocate emission reduction responsibilities and costs across participants. In this framework, the carbon market becomes a platform for achieving environmental goals through economic efficiency. Moreover, the use of carbon credits reflects the idea that environmental preservation can coexist with economic growth, as companies are motivated to invest in greener technologies to gain financial benefits from their emission reductions. This theoretical basis supports the argument that carbon trading can be an effective instrument for addressing climate change while promoting sustainable economic activities.

Sustainable Development Theory

Sustainable development theory emphasizes the balance between economic progress, social equity, and environmental protection. Originating from the Brundtland Commission Report (1987), this concept defines sustainable development as meeting present needs without compromising the ability of future generations to meet theirs. Within the context of carbon trading, sustainable development theory underscores how emission reduction mechanisms can contribute to long-term ecological balance and inclusive economic growth. The United Nations Sustainable Development Goals (SDGs), particularly SDG 13 (Climate Action) and SDG 15 (Life on Land), serve as a global framework for this balance (Barus & Wijaya, 2022). Carbon trading contributes to these goals by encouraging industries to adopt cleaner technologies, improving community livelihoods through conservation incentives, and fostering environmental accountability. In regions like Central Kalimantan, sustainability theory also aligns with efforts to empower local communities, integrating economic benefit with ecological restoration.

Local Wisdom Theory

Local wisdom theory, or kearifan lokal, refers to a set of values, beliefs, and practices developed by indigenous communities through their long-term interactions with nature. These practices serve as cultural mechanisms for environmental preservation and sustainable resource management (A. Pratama, 2013). In the Dayak context, local wisdom manifests in traditions such as handep hapakat (cooperation), tajahan (sacred forest zones), and pukung himba (protected forest areas). These practices reflect ecological ethics deeply embedded in Dayak cosmology, which emphasizes harmony between humans and nature (Usop, 2020). Local wisdom theory thus provides a socio-cultural foundation for environmental governance by integrating moral, spiritual, and practical dimensions of ecological stewardship. The preservation of forests, customary sanctions for environmental damage, and communal management systems all demonstrate how local knowledge can serve as an endogenous mechanism for sustainable carbon management. When integrated into modern frameworks such as carbon trading, these cultural values enrich the ethical and social legitimacy of environmental policies.

Islamic Economic Theory

Islamic economic theory is grounded in Sharia principles that emphasize justice (adl), trust (amanah), and collective welfare (maslahah). The theory views wealth as a trust from Allah that must be managed responsibly for the benefit of society. Economic activities, including trade and investment, are regulated by prohibitions against riba (usury), gharar (uncertainty), and maysir (gambling), ensuring fairness and moral integrity in transactions (Bakar, 2020). In the context of carbon trading, Islamic economic theory offers an ethical foundation that aligns environmental conservation with spiritual responsibility. The principle of Maqasid al-Shariah which seeks to preserve religion (hifz al-din), life (hifz al-nafs), intellect (hifz al-aql), wealth (hifz al-mal), and progeny (hifz al-nasl) provides a comprehensive moral framework for sustainable economic activities (Suardi, 2021). Carbon trading that promotes ecological preservation, social welfare, and economic justice can thus be seen as consistent with Islamic values. Moreover, Islamic finance instruments such as green sukuk and waqf carbon models can support environmentally responsible investments that uphold both ethical and economic objectives. Therefore, Islamic economic theory extends the scope of carbon trading from a market mechanism to a moral and spiritual endeavor rooted in divine accountability.

Previous Research

1. (Azizi MJ et al., 2023) discuss carbon trading mechanisms as one of the market instruments for climate change mitigation in Indonesia. This research provides a conceptual basis for this study in understanding how carbon market mechanisms can be integrated with the sharia economic system and local values in the context of regions such as Central Kalimantan.
2. (Sukadi et al., 2020) on the Katingan Mentaya Project (KMP) in Central Kalimantan provides empirical evidence on how carbon trading projects can serve as a means of empowering local communities and preserving forests. This study introduces the concept of Good Environmental Governance, which emphasizes transparency, accountability, and community participation. The results show that the involvement of the Dayak indigenous community in conservation and carbon monitoring activities directly increases the effectiveness of carbon trading programs.
3. (Liu et al., 2024) developed a blockchain-based renewable energy trading model that is relevant for application in digital carbon trading systems. This study shows that blockchain technology can improve the transparency, accuracy, and security of transactions through an immutable ledger system. In addition, the information entropy theory used in this study explains how data flow can be optimized to avoid manipulation and fraud in the digital carbon market.
4. (Iqbal, 2025) examined the effect of adopting Sustainable Development Goals (SDGs) on the financial performance of Islamic and conventional banks. The results show that banks that implement sustainability principles tend to have

more stable and long-term oriented performance. This finding reinforces the view that integrating sustainability values and social responsibility can strengthen the competitiveness of Islamic financial institutions.

5. (Akbar et al., 2025) examined the integration of carbon trading and indigenous peoples' knowledge to support food security and sustainable development in Central Kalimantan. Their study applied a qualitative descriptive design through extensive literature review and found that the participation of indigenous Dayak communities, guided by values such as *handep hapakat* and *tajahan*.
6. (Prakoso, 2023) highlights the dynamics and tensions between Islamic economic principles and modern digital economics. Through conceptual analysis, he finds that the development of the digital economy presents great opportunities for Islamic financial innovation, but also requires the strengthening of business ethics and regulations based on Islamic values. This study emphasizes that digitalization is not only technological, but also moral and normative, and must therefore be accompanied by the application of the values of maslahah and distributive justice.
7. (Suardi, 2021) on maqasid al-shariah in Islamic economics emphasizes the importance of the principles of benefit and social welfare as the main objectives of the sharia economic system. He explains that true welfare in Islam is not only measured in material terms, but also in spiritual and ecological terms.

Although previous studies have extensively discussed the intersection between carbon trading, sustainability, and Islamic economic principles, several research gaps remain. this study fills these gaps by proposing a **Digital Green Carbon Trading Model (DGCTM)** that integrates blockchain-based transparency, Dayak cultural stewardship, and Islamic economic ethics to establish a holistic framework for sustainable and equitable carbon governance in Central Kalimantan. The results of previous literature reviews indicate that there is room for integration between digital technology, local wisdom, and Islamic economic principles in developing a fair, transparent, and sustainable carbon trading system. The combination of these studies provides an empirical and theoretical basis for this study to develop a Digital Green Carbon Trading model oriented towards sustainable development and Maqasid al-Shariah.

RESEARCH METHODS

Data

Primary data were obtained from books and peer-reviewed journal articles related to carbon trading, Dayak cultural wisdom, and Islamic economics, while secondary data were drawn from thematic references and verified online publications (Bowen, 2005). Documentation techniques were used to collect and synthesize data from various academic sources, analyzed gradually to ensure thematic coherence and

methodological rigor (Bowen, 2009). The data in this study is secondary qualitative data obtained through literature reviews from various academic and institutional sources. The main sources include international journal articles, books, government agency reports, and secondary data from global and national environmental organizations relevant to the theme of carbon trading. Among them, data from the Intergovernmental Panel on Climate Change (IPCC) and the Ministry of Environment and Forestry of the Republic of Indonesia provide an overview of carbon emission levels, carbon absorption capacity, and climate change mitigation policies in Indonesia (Barus & Wijaya, 2022) (Azizi MJ et al., 2023). In addition, reports from the Peatland and Mangrove Restoration Agency (BRGM) and the Katingan Mentaya Project study (Ulfa, 2023) (Siagian & Arifin, 2022) were used to explain the economic potential of forest and peatland-based carbon in Central Kalimantan. Other sources include literature discussing the values of local wisdom of the Dayak people, including customary systems, the philosophy of handep hapakat, and mechanisms for protecting customary forests that have been passed down from generation to generation (Djungan, 2021) (Setiawan & Lisnawati, 2023). This data is important for understanding the social and cultural context that forms the basis for the implementation of community-based carbon trading systems. In addition, Islamic economics and sharia finance literature, such as the works of (Bakar, 2020) and (Suardi, 2021), were used to formulate the integration of maqasid al-shariah principles in the design of digital carbon trading. The selection of this secondary data is based on the relevance and credibility of the sources in answering the research questions. This approach allows researchers to gain a comprehensive understanding of the relationship between environmental, social, technological, and religious dimensions in the context of carbon trading. Thus, the data used not only supports conceptual analysis but also strengthens the empirical argument that carbon management can be integrated with local values and sharia principles as the basis for sustainable development in Central Kalimantan.

Data Analysis Methods

This study employs a qualitative descriptive method designed to produce comprehensive analytical outcomes through a library research approach (Creswell & Creswell, 2017). The discussion is structured holistically to explore the Islamic economic perspective on carbon trading and its association with Dayak local culture as a potential driver of sustainable environmental practices. Given the increasing severity of the greenhouse effect caused by industrial CO_2 emissions, this study examines carbon trading as an Islamic-based response to environmental degradation through a normative-descriptive analysis that integrates textual and conceptual review. Through qualitative descriptive analysis, this research provides a detailed narrative of how carbon trading aligns with Islamic economic principles, particularly justice (*adl*), trust (*amanah*), and social welfare (*maslahah*) and supports environmental ethics rooted in indigenous Dayak values.

RESULT

Carbon Trading System

Carbon trading is a market system that uses a mechanism for negotiating and exchanging rights for greenhouse gas emissions. The Kyoto Protocol regulates this market mechanism, which can take place both at the national and international level, as long as the rights of negotiation and exchange are allocated fairly to all market participants. The ability to accurately calculate the amount of carbon stored is required to assess the value of forest land in terms of carbon storage potential. Using the latest technology, such as satellite imagery and computer modeling, can facilitate calculating carbon stocks quickly and accurately (Purnobasuki, 2012). Carbon trading involves buying and selling carbon credit certificates instead of carbon or gas. In this context, traded goods are efforts to control or reduce carbon emissions, represented in carbon credit certificates (Tampubolon, 2022). Carbon trading plays a significant role in reducing carbon emissions in Indonesia. Using carbon trading mechanisms, Indonesian businesses can help reduce carbon emissions by selling carbon credits to other companies. This encourages businesses to adopt eco-friendly practices and improve energy efficiency, reducing emissions nationwide. Carbon trading in Indonesia has several advantages. For example, it can help Indonesia achieve its Paris Agreement carbon emissions targets on climate change. Using carbon credit trading, countries or companies that produce carbon emissions can purchase carbon credits from other countries or companies that have successfully reduced their carbon emissions. Conversely, governments or companies that have successfully reduced their carbon emissions can sell their carbon credits to other countries or companies that still need to reduce their carbon emissions. This can help reduce overall carbon emissions (Cadizza, 2024). Carbon trading is the trading of carbon credit certificates. The goods being traded are carbon credit certificates, indicating that efforts have been made to reduce CO2 emissions in the air through activities and projects related to reducing greenhouse gas emissions. So, carbon pollutants in the air are not sold in this buying and selling activity (Azizi MJ et al., 2023). Carbon trading has conditions like general trading, including sellers, buyers, prices, goods, and agreements. As mentioned earlier, the object traded is a certificate of reduction in greenhouse gas (GHG) emissions with a size of tons of CO2. Carbon trading trades six types of greenhouse gases listed in the Kyoto Protocol. In carbon markets, carbon credits are products of reduced carbon dioxide (CO2) emissions, which have been certified and meet applicable requirements and requirements. Typically, one ton of carbon dioxide (CO2) is converted into one unit of carbon credit (Husen, 2018). Each unit that produces specific carbon emissions will have a quota. If the carbon emissions produced exceed the given quota, the unit can buy quotas or credits from other units with quota allotments.

Dr. Siti Nurbaya, Minister of Environment and Forestry, represented the President of the Republic of Indonesia when signing the Paris Agreement. After the

Paris Agreement, the Indonesian government issued Law Number 16 of 2016. The Paris Agreement stipulates that Indonesia will reduce greenhouse gas (GHG) emissions by 29% by 2030, compared to 2010 by its efforts and means, and with the help of other countries, will reduce GHG emissions by 41%. The Government of Indonesia expresses this commitment through nationally determined contributions through Nationally Determined Contributions (NDCs) (Barus & Wijaya, 2022). This agreement shows that the Indonesian government will actively participate in reducing greenhouse gas emissions. This carbon trading system fulfills the Paris Agreement and the Indonesian government's efforts to address environmental issues. By reducing carbon emissions, the sustainability of living things and the environment will be better, and the effect of greenhouse gases can be reduced.

Local Culture of the Dayak Tribe

There are approximately 405 sub-tribes or ethnicities on the island of Kalimantan alone. Even with hundreds of them, these sub-tribes still have some characteristics and similarities culturally and in others (Itsnaini, 2021). The Ngaju tribe, the largest sub-ethnic of the Dayak tribe in Central Kalimantan, has a fairly wide distribution. They are mainly concentrated in Palangka Raya City, Pulang Pisau Regency, Gunung Mas Regency, and Kapuas Regency and scattered in other districts throughout the Central Kalimantan region. The culture and customs of the Dayak Ngaju people are very diverse. However, not many cultures of the Dayak Ngaju tribe are publicized because their culture and customs are only spread by word of mouth. Although the Dayak Ngaju tribe is the largest parent tribe of the four other tribes living in the Kapuas watershed, the sub-tribe consists of 53 children of the Dayak Ngaju tribe, eight children of the Ma'anyan tribe, 21 children of the Lawangan tribe, and 24 children of the 1979 Dusun Riwut. Dayak Ngaju culture consists of spoken and non-verbal language. The local wisdom of the Dayak tribe consists of communicated and uncommunicated cultures, such as oral traditions or relics. The Dayak Ngaju community not only has wealth in the form of oral folklore, some in the form of oral, but also rich in non-oral folklore. This non-oral folklore is part of the items owned by the Dayak Ngaju community as an artistic expression in Central Kalimantan. The types of goods owned by the Dayak Ngaju community generally contain magical values and cultural symbols (Lastaria et al., 2022).

Many verbal and non-verbal symbols are found in the local wisdom of the Dayak community that are interrelated to protect and preserve the environment to realize harmony and balance between nature and humans. These symbols guide action and explain their meaning in Dayak culture, especially the Ngaju Dayak Tribe in Central Kalimantan Province. In the dynamics of forest management in Central Kalimantan, Batang Garing, known as the Tree of Life by the Dayak people, symbolizes the balance between humans and nature. In addition to functioning to meet human needs, forests must also fulfill their rights to maintain the environment and natural resources that

will be passed on to the next generation. A message or peteh lives in Dayak society: "Ingat peteh Tatu Hiang, petak danum akan kolunen harian andau" meaning remember the message from ancestors, land and water for the next human life. This concept forms the foundation for the sustainable utilization of wealth alam (Usop, 2020).

The culture of handep hapakat, or cooperation, is a value found in various activities and local wisdom of the Dayak tribe. One of them is from human activities. They grew crops known as manugal, which began by hollowing out the soil with wooden sticks and then sowing plant seeds. The repudiation or people who are manugal will cooperate. Man urgently needs nature, created by God, to meet his needs, so human activities also pay attention to preserving nature. A sense of need and bonding is the foundation of good forest management. Because human activities will be disrupted if the forest is damaged (Djungan, 2021). Although some human activities still use the traditional way of clearing land, namely by burning, at this time, the community has begun to make the rest of the land clearing as organic fertilizer without burning as before.

The terms "tajahan" and "pukung himba" are part of local culture in forest management. Tajahan is considered a protected location by the Dayak tribal community, especially those who adhere to the kaharingan faith. This place has a small house with small statues that are considered the house of spirits. People believe that these statues are representations of family members or relatives who have died, and their function is to prevent them from disturbing the surviving family. In addition, Himba trawls are jungles that should not be cleared or exploited. This is because the trees are giant and old and have never been damaged by humans, so there is still much wildlife in them (Hujjatusnaini, 2016). It is forbidden to cut trees, hunt, or perform other actions that are considered to violate the pali in these two locations, which still seem haunted. This Pali is deemed to be able to harm those who violate it. In addition, according to Dayak beliefs, forest guardian spirits (Gana) are sent to the himba pukung area for rituals at the time of land clearing. In this situation, it sounds too mystical. However, if reasoning and understanding are carried out, it can be concluded that banning in the area positively impacts forest conservation.

Furthermore, the customary laws of the Ngaju Dayak tribe such as jipen and singer, are still applied by the people of Central Kalimantan. It is a customary fine imposed on a person who has committed an offense to the environment (nature) or a fellow human being. In 2018, PT Sawit Mandiri Lestari was fined Rp5,000,000,000 for destroying customary forests in Lamandau Regency, Central Kalimantan Province. In addition, perpetrators who use poison to catch fish in the Pangkut Village River in West Kotawaringin Regency are also fined Rp5,000,000. In these cases, the fine may change depending on how much or small the damage is caused by the perpetrator's actions (Setiawan & Lisnawati, 2023). The customary law and customary fines applied

show the Dayak people of Central Kalimantan's concern for environmental sustainability.

The Implementation of Carbon Trading in Central Kalimantan Province

With carbon trading, Central Kalimantan Province gets new economic opportunities, which will also impact communities around forests. Well-maintained forests sequester atmospheric carbon, and forest management can yield financial benefits. Carbon trading and industrial and technological advances are crucial to reducing greenhouse gas emissions that damage the Earth's atmosphere. These greenhouse gas emissions cause the world to become hotter and result in a dangerous climate crisis. Indonesia's carbon market is still voluntary (Djaenudin et al., 2016). The same is the case with carbon trading implemented in Central Kalimantan Province.

According to the Paris Agreement in 2015, the Katingan Mentaya project, overseen by PT Rimba Makmur Utama (RMU) in Central Kalimantan, conducts carbon trading through carbon offsets. The Katingan Mentaya project, or KMP, conserves forests processed through carbon service businesses. Two strategies can be applied in carbon markets: trading and credits.

KMP uses a carbon offset system to operate. This means reducing carbon production in one location to offset excessive carbon production in another. In other words, carbon offsets are a reimbursement method for companies that produce carbon dioxide emissions by seeking to reduce their effects by reducing emissions in different regions. Over a 60-year concession period, an average of 7.5 million tonnes of CO2 was stored yearly. This means eliminating emissions from 2 million cars annually in this KMP forest area. This results from carbon calculations of the Verified Carbon Standard (VCS) and Community and Biodiversity Standards (CCB). These carbon stores are sold using a carbon trading system known as carbon offsets. The proceeds will maintain and protect the ecosystem and help fund the company (Ulfa, 2023).

The existence of a carbon trading system shows community participation in terms of empowerment provided by the government and related private parties. On this occasion, the community participated in the empowerment carried out by PT Rimba Makmur Utama in collaboration with the Puter Foundation. These activities include rubber tree planting, fish farming, handmade souvenir making, and other activities without harming nature. The local Dayak Customary Council has power in its administrative area. DAD is tasked with resolving land disputes between companies and communities and maintaining forest and natural ecosystems by Dayak customary law and the belief in harmony and balance between humans and nature (Sukadi et al., 2020).

In addition, this KMP has succeeded in protecting the largest peat forest area in Southeast Asia, covering an area of 149,800 hectares, home to Central Kalimantan orangutan species such as Bornean proboscis monkeys (Nasalis larvatus), South Borneo Gibbons (Hylobates albibarbis), and Bornean Orangutans (Pongo pygmaeus). Carbon trading benefits economic, social, and environmental sustainability, especially in the Central Kalimantan region, where there are many forests and the potential for local wisdom to support.

In addition, according to the Peatland and Mangrove Restoration Agency of the Republic of Indonesia (BRGM), mangrove forests have four to five times the carbon

stock compared to terrestrial forest types. According to research conducted by the Indonesian Institute of Sciences (LIPI), Indonesia's mangrove forests can suck 52.85 tons of CO2/ha per year. Thus, Indonesia has potential reserves to absorb or suck 177.8 million tons of CO2/ha per year (Siagian & Arifin, 2022). In addition, Central Kalimantan has many mangrove forests, which can serve as carbon sequestration reserves. This is especially true for carbon trading in Central Kalimantan. The mangrove forest area, which includes Kahayan Kuala and Sebangau Kuala Districts, has a potential of approximately 17,574.12 hectares according to data provided by the Environment Office (DLH) of Pulang Pisau Regency, Central Kalimantan (Redaksi Metro, 2022). Mangrove forest areas and other forests on the mainland of Central Kalimantan have enormous economic potential, especially related to carbon trading. Therefore, all types of forests in Central Kalimantan require good management and preservation.

Carbon Trading in Sharia Economic Perspective

The Islamic economic system is based on Islamic Shari'a, or the rules of Allah. This system is centered on Allah, with the ultimate goal being Allah, and uses methods that cannot be separated from Islamic law. Whether in buying and selling, saving and borrowing, or investment, man's economic actions must be by God's provisions. According to Islamic belief, treasure belongs to Allah entirely, and man serves as caliph over that treasure. In addition, the religion of Islam strictly prohibits acts such as Maishir, Gharar, Haram, Dzalim, Ikhtikar, and Riba (Ansori, 2016). Islamic economic theory is a field of social science that studies how Islamic values affect the economic life of society. Islamic economics and modern economics are the same in terms of significant issues. There is a difference between its properties and volume. Therefore, the main difference between the two systems of economic science can be found by considering how the problem of choice is handled (Bakar, 2020). The concept of tawhid, namely the Islamic belief in the oneness of God, is the basis of Islamic economic principles. Other principles, such as the concept of zakat, namely, a person's obligation to give some of their wealth to people in need, are based on this concept. The prohibition of speculation (gharar), gambling (maysir), and interest (riba) is another principle of Islamic economics. One of the main goals of Islamic economics is to create a just and equitable society by ensuring that wealth is distributed fairly. The market is seen in Islamic economics as a means to achieve this goal, not as an end. The government is responsible for ensuring that economic activities are conducted by Sharia and providing a safety net for those in need (Prakoso, 2023).

Islam is very concerned about the preservation of the surrounding environment. In Islamic economics, the term maslahah is used. Maslahah is divided into two, namely al-mashlahah and al-muthabarah, in which maslahah is used as evidence and signs, and there is no doubt in its implementation. Then the second is al-maslahah al-mursalah, which is defined as a benefit to humans and does not invite or cause harm and evil (Achyar & Hakim, 2023). In Q.S. Al-A'Raf verse [56], This verse clarifies that

man is not allowed to destroy the created earth and must take care of nature. This is also related to the principle of responsibility taught in Islam (Ratnasari & Chodijah, 2020). In this case, the responsibility lies in managing natural resources to meet economic needs and maintaining and preserving nature and the natural resources contained therein. Industrial activities that constantly exploit nature are, of course, prohibited and violate the responsibilities taught in Islam. Nature that Allah Almighty has created as a blessing that should be maintained because it has met human needs is not even used arbitrarily for human satisfaction and greed.

All human economic activities and other activities must also comply with the maqasid of sharia. Sharia maqasid is the values and principles that must be implemented and fulfilled to create benefits (Suardi, 2021). This principle consists of the maintenance of religion, the maintenance of the soul, the maintenance of reason, the maintenance of property, and the maintenance of offspring. This principle must be fulfilled to create a good balance and benefits.

When viewed from the perspective of Islamic economics, carbon trading will undoubtedly be exciting. Carbon trading systems and mechanisms are still relatively new and have not only economic impacts but also environmental responsibility. If examined more deeply, carbon trading is by Islamic economic regulations. In terms of benefits, carbon trading has had many economic impacts, as well as the development of regional potential and its communities. This happens because carbon trading empowers forest communities to carry out forest management projects they have known for a long time and carry out various positive activities such as tree planting, fish farming, craft making, and many others without damaging the surrounding environment. In addition, in terms of environmental conservation, of course, carbon trading has a significant impact.

Good and fertile forests are needed to absorb carbon emissions in carbon trading activities, which will later be traded. Of course, forests are a significant asset in this activity. Actors or companies in this context must care for and maintain their forests and often even plant trees regularly, which will undoubtedly benefit the environment. Furthermore, if analyzed based on sharia maqasid, carbon trading also fulfills this principle.

1) Protection of Religion *(ad-din)*

   The protection and maintenance of religion are the main objectives of Muslims. In carbon trading, this activity is a step and effort to reduce the effects of greenhouse gases that occur globally while opening and providing jobs for the surrounding community. Islam puts work as worship to meet personal needs. Islam has placed three roles for man on earth (Langsa, 2022). (a). As Enforcer of Ihsan and Justice, Allah says in the Qur'an Surah An-Nahl verse 90. This verse shows that excessive use of natural resources and production waste that can damage the earth is a disaster. This, of course, contradicts the principles of Ihsan and justice in environmental management. Carbon trading is an effort to reduce

waste that will damage the environment. So, carbon trading has fulfilled the principles of ihsan and justice. (b). Become God's representative (caliph) on Earth, Earth does not belong to humans but is entrusted by the creator to be well guarded. Man has been given the mandate to become a caliph on earth. As Allah says in the Qur'an Surah Az-Zumar verse 10. According to this proposition, humans are forbidden to mistreat nature. Nature's destructive behavior, of course, will be accounted for in the future. Therefore, through carbon trading, humans have sought to become caliphs as demanded to protect the earth. (c). Prospering the Earth, The Caliph, if examined again, will lead to the earth's prosperity. With this task, humans must avoid and keep away from earth-destructive behavior. As in the Qur'an Surah Al-Araf verse 56. This verse is an excellent prohibition from God to man not to destroy the earth. The destroyer of the world will not be honored by Allah and will not be rewarded in the Hereafter for humans who are greedy and tyrannical to nature.

2) Protection of Life *(an-nafs)*

Environmental care is a form of care and care for the soul. It is undeniable that humans cannot live without the earth and its environment. Therefore, the more damaged the world eats, the more damaged human life will be. Carbon trading is a step to minimize damage to the planet and sustainably improve ecosystems. Environmental care for the soul also becomes interrelated because a damaged environment can cause various diseases for living things on earth.

3) Protection of Intellect *(al-aql)*

The reason is a differentiator for humans and other creatures. The intellect makes man able to think and distinguish between good and evil. In carbon trading, the community will have a positive impact through various nature empowerment and conservation activities, which will undoubtedly change the community's mindset to continue to protect the surrounding nature through carbon trading activities that bring economic benefits as well.

4) Protection of Property *(al-mal)*

Possessions are essential and need to be fulfilled by humans. Therefore, various economic activities must be undertaken to meet these needs. The preservation of wealth through carbon trading is seen through multiple community empowerment activities that generate financial income for people who work as employees or participate in managing forests. In addition, various activities that do not emit carbon emissions, such as making handicrafts made from nature and forests, will bring selling value to these products.

5) Protect of lineage *(an-nasal)*

Maintaining and caring for the offspring in question will make our children and grandchildren a wise and positive generation in managing and utilizing natural resources. Through carbon trading, we can introduce conservation projects to the next generation while bequeathing nature and the environment

with all the natural resources contained therein to continue its management so that it does not become extinct and continues to be sustainable.

Digital Empowerment of Local Communities in Carbon Trading; the framework of Digital Green Carbon Trading Model (DGCTM)

The rapid development of digital technology has opened up new opportunities for local communities in Central Kalimantan to participate directly in the emerging carbon economy. Through **digital carbon trading platforms,** Dayak communities can register, monitor, and sell verified carbon credits generated from forest conservation activities. These platforms are supported by technologies such as blockchain, Internet of Things (IoT), and satellite-based monitoring, which increase the accuracy of carbon measurement and transaction accountability (Liu et al., 2024). The integration of these tools enhances transparency, prevents manipulation, and ensures that economic benefits are distributed fairly to grassroots actors (Iqbal, 2025). Digital transformation also allows for the establishment of **blockchain-based registries** that record every emission reduction activity in immutable ledgers. This mechanism aligns with the Islamic principle of *amanah* (trust) and *adl* (justice), emphasizing fairness and accountability in all economic exchanges (Bakar, 2020). By adopting these systems, the Dayak people gain access to verified digital markets, ensuring that forest protection is not only an ecological duty but also an economically rewarding activity that complies with sharia principles (Suardi, 2021).

Several **pilot initiatives in Indonesia and ASEAN** have demonstrated the effectiveness of digital carbon marketplaces supported by *fintech* and *Islamic social finance* instruments. Examples include projects linking carbon offsets with *green sukuk* and *waqf* funds, which channel capital into conservation-based community enterprises (Azizi MJ et al., 2023). This model resonates with the Dayak philosophy of *handep hapakat* and simultaneously embodies Islamic ethical finance, where wealth creation must coexist with social benefit (Prakoso, 2023). By embedding **digital inclusion** into the carbon economy, local Dayak communities can overcome the barriers of remoteness and market inaccessibility. Digital platforms act as intermediaries connecting forest-based carbon producers with global buyers while preserving cultural integrity (Usop, 2020). This process transforms traditional ecological wisdom into modern economic value, empowering indigenous groups to contribute actively to Indonesia's nationally determined contributions (NDCs) under the Paris Agreement (Barus & Wijaya, 2022). (Akbar et al., 2024) demonstrated that optimizing regulations and synergizing Islamic banking with the government, industry players, and educational institutions can strengthen the halal cosmetics industry ecosystem in Indonesia. This synergy pattern is relevant for replication in the development of a sharia-compliant green carbon market in Central Kalimantan.

Integrating carbon trading with **Islamic microfinance and waqf-linked platforms** can generate a *Digital Green Waqf Carbon Model*. Each transaction within

this model not only represents an emission reduction certificate but also a form of *sadaqah jariyah*. This innovation aligns with *Maqasid al-Shariah* objectives, ensuring the preservation of wealth (*hifz al-mal*), life (*hifz al-nafs*), and progeny (*hifz al-nasl*). this synergy between **digital innovation, local wisdom, and Islamic economic ethics** forms a resilient foundation for a digital local economy in Central Kalimantan. It enables environmentally sustainable growth while fostering inclusive participation from indigenous and rural populations. In alignment with the **Sustainable Development Goals,** specifically SDG 8 (*Decent Work and Economic Growth*), SDG 13 (*Climate Action*), and SDG 15 (*Life on Land*), this approach exemplifies how Islamic green finance and digital technology can collaboratively enhance both ecological preservation and social empowerment.

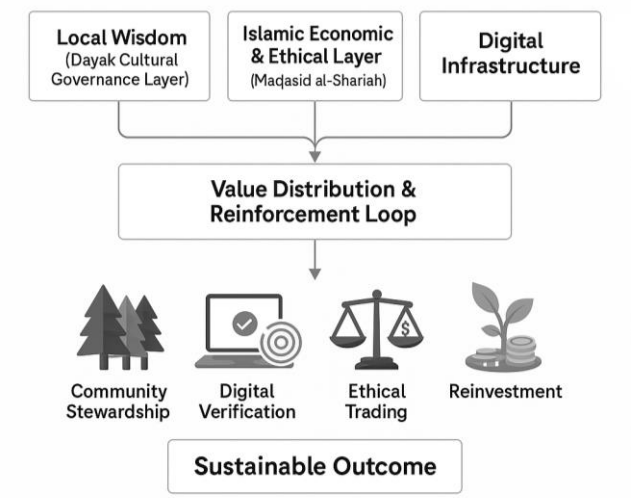

Figure 1. Framework Digital Green Carbon Trading Model (DGCTM)
Source: Made by Author

The proposed **Digital Green Carbon Trading Model (DGCTM)** integrates digital innovation, Dayak local wisdom, and Islamic economic ethics to form a sustainable and inclusive carbon trading framework in Central Kalimantan. It bridges traditional ecological stewardship and modern financial technology under moral and spiritual principles. The model builds upon Dayak cultural values such as *handep hapakat* (collective cooperation), *tajahan* (protected forest zones), and *pukung himba* (restricted forest areas), ensuring environmental accountability through community-based governance. At the same time, Islamic economic principles *amanah* (trust), *adl* (justice), and *maslahah* (public welfare) aligned with *maqasid al-shariah* objectives, guide ethical wealth distribution via instruments like *green sukuk*, *carbon waqf*, and Islamic microfinance. Supported by blockchain registries, IoT monitoring, and smart contracts, the DGCTM guarantees transparency, fairness, and traceability in carbon transactions. It operates through a circular process: community stewardship, digital verification, ethical trading, and reinvestment in local green enterprises, reinforcing Dayak values of harmony with nature. Through this integration, DGCTM transforms

carbon trading from a conventional market tool into a holistic platform for eco-justice, community empowerment, and sustainable climate resilience.

CONCLUSION

This study concludes that digital based green carbon trading is a transformative and sustainable step in carbon emissions management in Central Kalimantan, especially when integrated with the local wisdom of the Dayak community and Islamic economic principles. The results show that the application of digital technologies such as blockchain-based carbon registries and online trading platforms can increase transparency, accountability, and community participation in carbon market mechanisms. This innovation opens up opportunities for indigenous Dayak communities to play a direct role in carbon trading activities, thereby making environmental conservation a source of economic empowerment.

Ecological values in Dayak culture such as handep hapakat (mutual cooperation), tajahan (sacred forest), and pukung himba (protected forest) provide a moral and social foundation that maintains the legitimacy and sustainability of carbon trading practices. Meanwhile, the integration of the carbon trading system with the principles of Maqasid al-Shariah which emphasize justice (adl), public interest (maslahah), and responsibility for the earth (isti'mar al-ard)—shows that this activity is in line with Islamic values and can be categorized as a form of mu'amalat that combines economic and spiritual dimensions.

The Digital Green Carbon model offered in this study combines digital innovation, local cultural values, and Islamic economic ethics into a single framework that supports sustainable development and community welfare. This synergy not only contributes to Indonesia's commitment to Nationally Determined Contributions (NDCs) under the Paris Agreement, but also serves as a concrete example of how sharia green finance through instruments such as green sukuk and carbon waqf can strengthen digital inclusion, environmental justice, and carbon emission reduction. Thus, digital-based green carbon trading in Central Kalimantan reflects a holistic approach to sustainable development that integrates technology, tradition, and theology, and can be used as a model for other regions seeking to harmonize environmental preservation with ethical economic transformation.

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