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Analyzing the effects of green sukuk on poverty alleviation in Indonesia

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Abstract: This study aims to analyse the effect of Green Sukuk on poverty alleviation in Indonesia. Poverty alleviation is measured using the human development index (HDI), inflation, and unemployment rate. The type of research used is quantitative research with the time series data of Green Sukuk, human development index, inflation, and unemployment rate for the 2019-2023 and was analysed using the cointegration technique. *VAR (Vector Auto-Regressive) and VECM (Vector Error Correction Model*) were used to analyze the hypothesis with E-Views 12. The data used in this study were monthly data from each variable from 2018 to 2023. The results of the Granger causality test indicate a relationship between HDI and GSI, suggesting a short-term effect between these variables. This study showed that there is a cointegration effect between Green Sukuk on Poverty Alleviation through poverty rate, Human Development Index (HDI), inflation, and unemployment rate. The relationship between Green Sukuk, a Green Economy, Sustainable Development Goals (SDGs), and poverty alleviation is complex and interconnected. Green Sukuk, as Islamic bonds designed to finance eco-friendly projects, are pivotal in advancing a Green Economy by supporting sustainable development efforts.

Keywords : Green Sukuk; HDI; inflation; poverty; SDGs; unemployment rate

INTRODUCTION

Indonesia's exceptional biodiversity, stemming from its tropical and island geography, also makes it vulnerable to frequent climate change issues like floods, landslide and droughts. Moreover, rising temperatures contribute to higher disease rates and reduced agricultural output. Therefore, since 2009 the Indonesian government has aimed to cut greenhouse gas emissions. In 2016, through the Paris Agreement and National Determined Contributions (NDC), they set targets to reduce emissions by 29%, or up to 41% with international aid. A study reveals that substantial funding is essential to tackle climate change, with early government support vital to motivate private sector investment, thereby highlighting the critical role of the state budget (M. of F. Indonesia, 2023).

The Green Economy concept serves as an operational policy agenda to achieve measurable progress in economic and environmental sustainability. It acts as a pillar for implementing sustainable development and transitioning towards a low-carbon economy(Djihadul Mubarok, 2023; Prabawati, 2022). Today, Green Economy concepts and frameworks are shaping policies in many countries. This economic system is designed to be more efficient and environmentally friendly, utilizing resource-saving technologies to mitigate climate change impacts both in the short and long term(Kristianto, 2020; Prabawati, 2022).

Many nations are actively pursuing transitions towards a 'Green Economy,' and Indonesia stands out as a leader in this movement(Sukhdev et al., 2014). To maximize the efficiency of climate change budgets, the government launched the Budget Tagging Mechanism. This tool assesses spending effectiveness and promotes performance-based budgeting that prioritizes outcomes. Since its implementation in 2018, the mechanism has enabled the government to raise over USD 3.9 billion through Green Sukuk for funding green initiatives (M. of F. Indonesia, 2023).

Islamic finance has considerable synergies with the concept of sustainable development and fits well with the ethical requirements of green projects that aim to improve the general welfare of society(Karina, 2019). Green sukuk is an innovative financial instrument to support Indonesia's commitment in greenhouse gas emission reduction based on Islamic Law. The issuance principle is guided by the Green Bond and Green Sukuk framework, and reviewed by international independent reviewers CICERO (Center for International Climate Research)(Karina, 2019; Risanti et al., 2020). Thus Islamic financial instruments get the opportunity to contribute to sustainable development. development. The principles of Sharia finance substantially embody the concept of environmentally sustainable development. The Quran is against any form of actions that cause damage on earth (QS 38:27-28, QS 30:41).

Green Sukuk is a financial instrument designed to support green projects that contribute to climate change mitigation and adaptation, as well as Sustainable Development Goals (SDGs)(Kemenkeu, 2020). This policy is part of the climate change management strategy and aligns with the SDG pillar focused on environmental development, particularly in enhancing resource availability and improving environmental quality (with programs currently being implemented)(Kurnia & Suwita, 2024). The SDGs and poverty alleviation are closely linked, with Indonesia aiming to reduce poverty by at least 50% by 2030(BAPPENAS, 2023).

In Islamic development theology and the concept of development development concept, there is one principle that human beings are an important factor in development. This human quality factor is closer to the problem that has always been a concern of many people who are inherent in attention of many circles that are inherent in human nature, namely the quality of HDI and unemployment. In addition, Islamic development theology also states that development is a a necessity . Development that is carried out holistically and integralistically will certainly have an impact on the improvement of the quality of the various objects of development that are characterized by the progress of development itself, including economic growth (Abdillah, 2001).

The empirical study by Qaisar Ali explores the economic, social, and financial perspectives of Green Sukuk issuance in Indonesia. The research found that Green Sukuk positively impacts economic growth, social development, and financial performance. By funding environmentally friendly projects, Green Sukuk contributes to job creation, income generation, and improved living standards, indirectly reducing poverty (Ali et al., 2024). Mirdha Fuadi et.al, that the long-term estimation of Sukuk has a positive and significant effect on economic growth (Fuadi et al., 2022). Then according to Suriani et al., (2021), sukuk exhibits a two-way causal relationship with economic growth via asset prices and exchange rate channels

Based on the various studies and theories described above, it can be concluded that there is an indirect effects of Green Sukuk issuance on poverty alleviation. However, there is still a research gap regarding the results of the study which indicates that not all macroeconomics indicator are affected by the macroeconomic policy, such as Green Sukuk issuance. Apart from that, previous research has not succeeded in revealing the direct and indirect effects of Green Sukuk and SDGs Goal, especially poverty alleviation. Previous studies have primarily focused Previous research focused on revealing the opportunities and challenges of Green Sukuk towards the implementation of the Green economy, not specifically on poverty alleviation.

Green Economy focuses on minimizing environmental risks and ecological scarcities while pursuing sustainable development without harming the environment. This economic model integrates environmental health with economic prosperity, emphasizing low carbon emissions, efficient use of resources, and social inclusivity. By promoting renewable energy sources, sustainable agriculture, and green technologies, a Green Economy supports long-term economic growth, job creation, and poverty reduction while preserving the planet's ecological balance (Kristianto, 2020; Loiseau et al., 2016).

The Sustainable Development Goals (SDGs), created by the United Nations, consist of 17 interconnected goals that address global issues such as poverty, inequality, climate change, environmental degradation, and justice. A Green Economy is vital in achieving these goals by promoting practices that sustain economic growth and protect natural resources. For example, SDG 7 emphasizes affordable and clean energy, while SDG 13 focuses on climate action, both aligning with the principles of a Green Economy. By merging sustainable development goals with economic policies, nations can work towards a future that is both equitable and environmentally sound (U. Indonesia, 2024; UNDP, 2023).

Green Sukuk, also known as Islamic green bonds, have become a key financial tool for supporting sustainable development projects while following Sharia principles. These bonds, which do not involve interest or speculative activities, meet the ethical standards of Islamic finance. They are essential for tackling environmental challenges like climate change by financing renewable energy projects, sustainable transportation, and other green initiatives. Their alignment with the Sustainable Development Goals (SDGs) ensures that investments promote both environmental sustainability and economic growth (Fahad & Areeba, 2022; Ulfah et al., 2023).

Research highlights the positive market response towards Green Sukuk, demonstrating its potential to attract investors committed to sustainable finance. Despite its promising prospects, Green Sukuk faces challenges, including low public literacy, insufficient socialization, and regulatory hurdles. Addressing these issues through targeted policies and increased awareness can further enhance the effectiveness and reach of Green Sukuk (Supriyadi et al., 2023; Ulfah et al., 2023).

Poverty is a state in which individuals lack the financial resources and essentials for a basic standard of living. It can have diverse causes, including environmental, legal, social, economic, and political factors. Poverty is often associated with poor health, low levels of education, and an inability to work. The effects of poverty are harmful to both individuals and society, leading to increased risk of mental illness, homelessness, and food insecurity (Rahardja & Manurung, 2008; Sukirno, 2011).

The poverty rate measures the percentage of the population living below the poverty line, which varies by country. For instance, in Indonesia, the poverty rate was 9.36% in March 2023, with 25.90 million people living

in poverty. This rate has been gradually decreasing, reflecting efforts to improve living conditions. Globally, around 8.5% of the population lives on less than $2.15 per day, the extreme poverty line for low-income countries. Tracking the poverty rate helps policymakers and organizations develop targeted interventions to lift people out of poverty(BPS, 2023).

Economic growth refers to the increase in the production of goods and services in an economy over time, typically measured by the gross domestic product (GDP). It is a crucial factor in reducing poverty, as it creates jobs, increases income, and improves living standards. However, economic growth must be inclusive to ensure that the benefits reach all segments of society. In recent years, global economic growth has been uneven, with some regions experiencing significant progress while others lag behind due to factors like climate change and political instability. Inclusive economic growth is essential to sustainably reduce the poverty rate and address the root causes of poverty (Mankiw, 2022; Uddin et al., 2014).

The Human Development Index (HDI) is a composite measure developed by the United Nations to assess the social and economic development of countries. It considers three dimensions: life expectancy, education, and per capita income, providing a broader perspective on human development beyond just economic growth. The HDI has been widely used to compare the development levels of different countries and to inform policy decisions aimed at improving living standards. Inflation, the rate at which the general level of prices for goods and services rises, has significant implications for economic stability and growth. High inflation can erode purchasing power and savings, while deflation can lead to reduced consumer spending and economic stagnation(Nugroho, 2016).

The relationship between inflation and economic growth is complex and varies across countries and time periods. The unemployment rate, the percentage of the labor force that is unemployed and actively seeking work, is a critical indicator of economic health (Mankiw, 2022). High unemployment can lead to reduced consumer spending, lower economic output, and social challenges. Poverty rate, the proportion of the population living below the poverty line, reflects the extent of economic inequality and the effectiveness of social policies. Reducing poverty is a key goal for many governments and international organizations, as it is closely linked to improved health, education, and overall well-being. These interconnected factors highlight the multifaceted nature of economic development and the importance of a balanced approach in policy-making (Ginting & Rasbin, 2010; Ho & Iyke, 2018; Suriani et al., 2021).

The relationship between Green Sukuk and poverty alleviation can be interpreted as an investment relationship. It uses poverty rate, Human Development Index (HDI), inflation and unemployment rate as the proxies of poverty alleviation, that can be done through Green Sukuk as green economy instrument.

This investment relationship positively impacts economic growth. Investment involves spending on capital goods and equipment to enhance the production capacity of goods and services in the economy. According to Harrod-Domar's theory (Sukirno, 2011), investment is crucial for economic growth, affecting aggregate demand through income generation and aggregate supply through increased production capacity. The endogenous growth theory highlights that investment in physical and human capital significantly influences long-term economic growth. Savings and investments promote sustained economic growth (Mankiw, 2022).This theory suggests that as a country's aggregate production increases, investment returns will also rise. Private and public investments in human capital or resources can create positive externalities and boost productivity, counteracting the trend of diminishing returns to scale. While technology remains important, the endogenous growth model posits that it is not the sole factor needed to explain long-term economic growth and lead to alleviation of poverty.

Most research on the opportunities and challenges of green sukuk in addressing poverty alleviation focuses on qualitative analysis. Fitri Kurnia et.al conclude that Green Sukuk plays a crucial role in aiding Indonesia to meet its Sustainable Development Goals (SDGs) by promoting sustainable development and mitigating environmental issues. These financial instruments fund renewable energy projects to foster a green economy and combat climate change, aligning with maqashid sharia principles to ensure community welfare and the preservation of natural resources. However, there are challenges in leveraging Green Sukuk for SDG implementation, including issues related to their structure, government regulations, public literacy, and the nature of green projects. These challenges can be addressed through targeted government policies and heightened awareness among investors and issuers about the importance of Green Sukuk issuance (Kurnia & Suwita, 2024).

Risanti et al. conducted a study on Green Sukuk, highlighting its role in achieving sustainable development in Indonesia. Both global and retail Green Sukuk issued in Indonesia are entirely used to finance projects that meet the criteria of 9 eligible green sectors, with measurable contributions rated according to CICERO standards. Of these, Green Sukuk funds have been allocated to 5 key sectors: Sustainable Transport, Climate Change Resilience for Highly Vulnerable Areas & Disaster Risk Reduction, Energy Efficiency, Waste to Energy & Waste Management, and Renewable Energy. These sectors contribute significantly to long-term environmental sustainability (ranging from medium to dark green). Additionally, they play a crucial role in improving the lives of Indonesians by providing eco-friendly transportation and infrastructure, electricity in rural areas, flood disaster mitigation, and environmentally friendly energy utilization (Risanti et al., 2020).

By using narrative review of various sources, Pujiantoro et.al, indicates significant opportunities for Indonesia to develop green sukuk. Factors supporting this include the continuously growing Islamic financial

market, increasing investor awareness of environmental issues, and high demand for energy supply. However, challenges exist, such as low public literacy about green sukuk, insufficient socialization efforts, and certain investor characteristics (Pujiantoro et al., 2021). Thus, Islamic financial innovations like Green Sukuk in Indonesia hold significant potential to support economic development while promoting environmental conservation. Although they have received positive market responses, there are numerous opportunities to further develop Green Sukuk. At the same time, practical challenges can be minimized to maximize their impact (Karina, 2019).

Several studies have looked into numerous connection between Sukuk and poverty rate, direct or indirectly using economic growth. According to Mirdha Fuadi et.al, that the long-term estimation of Sukuk has a positive and significant effect on economic growth (Fuadi et al., 2022). Then according to Suriani et al., (2021), sukuk exhibits a two-way causal relationship with economic growth via asset prices and exchange rate channels. However, there is no causal link between sukuk and inflation through these channels. Additionally, sukuk has a causal relationship with monetary policy variables, such as interest rates and stock prices, through asset prices and exchange rate channels (Suriani et al., 2021).

Research conducted by Mohammed Ayoub Ledhem shows that Sukuk financing is enhancing economic growth in Southeast Asia, highlighting the crucial role of Islamic financial markets in promoting economic development through Sukuk(Ledhem, 2022). Contrary to Echchabi et al., who found that Sukuk issuance has no significant impact on economic growth, recent findings demonstrate the opposite effect, highlighting Sukuk's substantial role in driving economic development in Southeast Asia (Idriss et al., 2018).

The cointegration test is one way to test the market efficiency hypothesis of a capital market which was first introduced by Granger in 1986. The assumption used is that if prices in two capital markets have a cointegration relationship, it is very possible to predict stock prices through prices on the previous day. In international financial markets, cointegration can arise due to market segmentation caused by national boundaries. The capital market is said to be efficient if there is no cointegration relationship between the capital markets (Fu & Pagani, 2010). The analytical method applied is cointegration to address the first research objective, which is to assess the equilibrium of Green Sukuk's impact on poverty alleviation by examining factors such as the poverty rate, Human Development Index (HDI), inflation, and unemployment rate. H1 = There is cointegration effect of Green Sukuk on Poverty Alleviation through poverty rate, Human Development Index (HDI), inflation, and unemployment rate.

METHOD

Sample and Data Sources

This research is a quantitative study with an observation period from 2018 to 2023. This study uses secondary data in the form of panel data with monthly data taken from data sources, such as the Central Statistics Agency (BPS) and the Financial Services Authority's public reports (OJK). The monthly data on Green Sukuk, HDI, Inflation and Unemployement rate are based on 72-month sample.

Data Analysis

The analysis method used in this research is the Vector Auto Regression (VAR) method if the data used has been stationary at the level level. However, if the data is not stationary at the level, then the analysis will be adjusted by using the Vector Error Corection Model (VECM) method. This needs to be done in order to avoid the phenomenon of spurious regression. The use of this method is expected to represent how Green Sukuk can affect variables related to poverty alleviation and vice versa.

Testing the causality effect between one variable and another is used granger causality test. The results will then be compared between one variable and another. In this research, the author will analyze the data using the econometric program EViews 12 which is equipped with its interpretation. The relationship in this study can be modeled into 8 equation below: Log $PovR_t = \beta_1 + + \sum_i^2 \beta t Log PovR + \sum_i^2 \beta t Log\ GSI + \sum_i^2 \beta t Log\ HDI + \sum_i^2 \beta t Log\ Inf + \sum_i^2 \beta t Log\ UnR_{t-1} + \varepsilon_t$. Explanation: β = constant, $PovR_t$ = Poverty Rate, GSI_t = Green Sukuk Indonesia, HDI_t = Human Development Index, Inf_t = Inflation, UnR_t = Unemployment Rate, ε_t = *error*.

Cointegration Test

Table 1. Co-integration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.180903	56.17794	47.85613	0.2292
At most 1	0.087628	31.68564	29.79707	0.6645
At most 2	0.042838	13.16021	15.49471	0.6921
At most 3	0.008163	1.654873	3.841466	0.3295

Trace test indicates no cointegration at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values. Source: Author Analysis (2024)

Based on the cointegration test for Green Sukuk and Poverty Alleviation indicator, it can be seen that the trace statistic value is bigger than the critical value, which indicates that there is a significant cointegration at = 5%. This shows that there is a long-term balance relationship between Green Sukuk and Poverty rate, through HDI, Inflation and Unemployment Rate as the proxy of poverty alleviation. Furthermore, from the results of this cointegration test, it can be determined that for further analysis the VECM in difference model will be used for analyzing the effects of Green Sukuk on Poverty Alleviation through all those research variable.

Granger Causality Test

Based on the determination of the lag in the previous stage, the optimum lag selected for Poverty Rate was lag 5, so the Granger causality test will be carried out at lag 5. Table 2 revelas that there is one causality or mutually influencing between HDI and GSI. Some variables have a unidirectional relationship with other variables, meaning that statistically these variables affect other variables but not vice versa.

Table 2. Granger Causality Test

Null Hypothesis	Obs	F-Statistic	Prob.
PovR does not Granger Cause GSI	1127	3.36495	0.0051
GSI does not Granger Cause PovR	0.97293	0.0031	
HDI does not Granger Cause PovR	1228	0.79535	0.5530
PovR does not Granger Cause HDI	3.67938	0.0026	
GSI does not Granger Cause HDI	1077	0.32966	0.8952
HDI does not Granger Cause GSI	1.65567	0.1426	
Inf does not Granger Cause GSI	1127	0.80387	0.5469
GSI does not Granger Cause Inf	2.58595	0.0246	
PovR does not Granger Cause Inf	1070	1.30765	0.2582
Inf does not Granger Cause PovR	2.40637	0.0351	

Source: Author Analysis (2024)

VECM Test for Conventional Indices

D(PovR) = -0.429558*D(PovR) + 0.458638*D(GSI) – 212.1485* D (HDI) – 0.057248D(Infl) – 0.057248D(UnR) +0.018923D(PovR(-1)) + 0.067010D(GSI(-1)) + 86.96764D(HDI(-1)) – 0.164272D(Inf(-1)) - 0.000470D(UnR(-1))

The cointegrating vector estimation results in the four equations above show that GSI(0.45863) and HDI (-212.1485) have a significant effect on the cointegrating vector. This means that GSI and HDI contributed significantly to the long-term relationship with the Inflation, Poverty rate and unempleyment rate. From these four equations, the speed of adjustment coefficient on the cointegrating vector for PovR is -0.429558 statistically significant. This means that when there is a disequilibrium condition in the short term to the long term balance, the PovR will adjust negatively by 0.429558.

RESULTS AND DISCUSSIONS

The first hypothesis states that there is cointegration effect of Green Sukuk on Poverty Alleviation through poverty rate, Human Development Index (HDI), inflation, and unemployment rate. The first hypothesis is answered by comparing the value of the t-trace statistic with the statistical value. Green sukuk is said to have a long-term relationship with poverty alleviation if the t-trace statistic > critical value. Based on the cointegration test that has been carried out, the results show that the t-trace statistic value (56.18) > critical value (47.85) so that H0 is rejected and the equation is cointegrated.

Hypothesis testing is done by looking at the results of Granger causality to see the mutual relationship because the method used is the VECM method. The results of the Granger causality test analysis revealed that, in general, the Green Sukuk is quite dominant in influencing the poverty alleviation proxies, especially Human Development Index (HDI) and Unemployment rate.

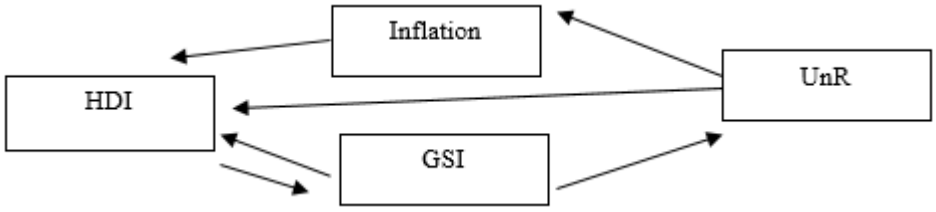

Figure 1. Granger Causality Test

Based on the analysis, it can be concluded that there is a cointegration effect between Green Sukuk on Poverty Alleviation through poverty rate, Human Development Index (HDI), inflation, and unemployment rate,

so the hypothesis is accepted. The existence effect of Green Sukuk with Economic growth, which is in this study specializes in research on poverty reduction, are in line with the results of research conducted by Ali; Fuadi et.al ; Ledhem; Suraini and Yıldırım et al., 2020 (2024; 2022; 2022; 2019; 2020). These studies reveal the results that there is a mutually influencing relationship which indicates a direct and/or indirect effect between Green Sukuk, Green economy and Economic growth. Qaisar Ali et.al explores the economic, social, and financial perspectives of Green Sukuk issuance in Indonesia. The research found that Green Sukuk positively impacts economic growth, social development, and financial performance. The study employs the resource-based view (RBV) theory and institutional theory to develop its theoretical underpinnings (Ali et al., 2024).

The results of the Granger causality test also show that there is a mutually influencing relationship between the one causality or mutually influencing between HDI and GSI, which indicates a short term effect between those variables. The two-way relationship or mutual influence between the Green Sukuk and Human Development Index as one proxy to measure poverty alleviation occurs as a result of the strong direct relationship between the two items. Research indicates that public social spending on education and health, which are key components of GSI, positively impacts the dimensions measured by HDI, such as life expectancy, education, and income levels. This short-term effect highlights the immediate benefits of social investments on human development outcomes (Paliova et al., 2019).

The relationship between Green Sukuk, Green Economy, Sustainable Development Goals (SDGs), and poverty alleviation is multifaceted and interconnected. Green Sukuk, which are Islamic bonds used to fund environmentally friendly projects, play a crucial role in promoting a Green Economy by financing sustainable development initiatives(Dewananda et al., 2023). These initiatives contribute to achieving the SDGs, particularly those related to clean energy (SDG 7) and climate action (SDG 13)1. By addressing environmental challenges and promoting sustainable practices, Green Sukuk helps create jobs, improve income levels, and enhance living standards, thereby indirectly alleviating poverty2(Dewananda et al., 2023; Leniwati, 2023).

CONCLUSIONS

Based on the cointegration test, statistically there is a effect between Green Sukuk on Poverty Alleviation through poverty rate, Human Development Index (HDI), inflation, and unemployment rate. Hence, the hypothesis is accepted. The studies also reveal a mutually influencing relationship, indicating that Green Sukuk directly and/or indirectly impacts the Green Economy and Economic Growth.

The relationship between Green Sukuk, a Green Economy, Sustainable Development Goals (SDGs), and poverty alleviation is complex and deeply interconnected. Green Sukuk, as Islamic bonds designed to finance environmentally friendly projects, are essential in advancing a Green Economy by supporting sustainable development efforts. These efforts are crucial in meeting SDG targets, particularly those related to clean energy (SDG 7) and climate action (SDG 13). By addressing environmental challenges and fostering sustainable practices, Green Sukuk create job opportunities, raise income levels, and improve living standards, thus indirectly aiding in poverty alleviation.

The Sharia financial market, as a variable Sharia financial instrument, offers an alternative to monetary policy in evaluating the effectiveness of Sharia financial instruments in promoting economic development. This study underscores the importance of advancing the Sharia financial market to ensure Indonesia's sustained economic growth. Efforts should include community education and outreach programs to highlight the vital role of the Sharia capital market and Sharia banking in enhancing investment contributions to the national economy.

The study's findings are intended to guide investors in making informed decisions about investing in the Islamic financial market. Additionally, the government can use these insights to review economic policies, which may lead to increased interest in Sharia finance in Indonesia. This relationship is further supported by the results of the Cointegration Bound test, demonstrating the interconnectedness of these financial instruments with broader economic development goals.

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