

Research Article

A COMPREHENSIVE ANALYSIS OF GREEN BUILDING PRACTICES IN SOUTH-WEST NIGERIA

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ABSTRACT

An extensive study of the variables impacting green construction practices in South-West Nigeria is presented in this paper. The study examines the interplay of economic, regulatory, environmental, and knowledge factors in shaping the adoption of sustainable construction methods. Through a mixed-methods approach, the research investigates the awareness and capacity of construction professionals, the availability of sustainable resources, and the impact of local climate conditions. Important conclusions show how important finances are in promoting the adoption of green practices, including tax breaks and the upfront expenses of green building. The regulatory structure for ecology is provided by policy and law elements such as energy-saving requirements, ecologically friendly construction certification, and architectural codes, although consistent implementation and enforcement are crucial. Environmental factors, including environmental awareness and resource availability, impact construction decisions, emphasizing the importance of capacity building and training programs. The presence of innovative industry practices and successful case studies demonstrate how these factors can be effectively addressed shedding light on the likelihood that green building techniques will be widely adopted in the area. The implications of the findings are discussed in terms of policy development, industry stakeholder engagement, and future construction projects. Recommendations are made for strengthening regulatory frameworks, enhancing capacity building, and aligning construction practices with local climate and environmental conditions. This research contributes to a deeper understanding of the factors influencing green building practices in South-West Nigeria and provides a foundation for future studies in the evolving field of sustainable construction, particularly in regions with emerging economies and unique environmental challenges.

Keywords: Green Building, Sustainability, Architecture, Environmental Awareness, Emerging Economies.

INTRODUCTION

Background:

Green building practices have gained significant prominence globally as a response to the growing concerns surrounding environmental sustainability. In South-West Nigeria, this trend has not gone unnoticed, as an increasing number of stakeholders recognize the importance of incorporating environmentally responsible practices in construction (Oladoja & Ogunmakinde, 2021). The region's unique climatic conditions, resource availability, and economic dynamics necessitate a localized approach to green building. South-West Nigeria, with its dense population and rapid urbanization, presents both opportunities and challenges in promoting sustainable construction (Jiboye, Adebayo, & Obakin, 2020).

"Green building practices," which attempt to reduce the damaging effects of the construction industry on the environment, encompass a range of methods and instruments. These techniques usually focus on cutting down on waste, saving water, employing renewable resources, and using more energy (Ajayi, Okolie, and Ekekezie, 2023). Implementing sustainable construction practices is crucial for addressing pressing problems in South-West Nigeria, including depletion of natural resources, energy scarcity, and global warming.

Research Objectives:

The aim of this research is to thoroughly investigate the variables affecting green building techniques in South-West Nigeria. The main goal is to determine the important influences, impediments, and

factors that affect the way ecologically friendly construction practices are adopted in the area. By looking at these elements, we hope to learn more about the limitations and motives affecting participants, including architects, builders, developers, government agencies, and consumers, in embracing green building practices.

Justification for the Research:

This study is significant because it has the ability to improve the building sector in South-West Nigeria as well as globally. Green building techniques provide a means to lessen greenhouse gas emissions, save resources, and improve urban settings' comfortable living conditions as we deal with the effects of global warming and pollution (Liu, *et al.*, 2022). By identifying the specific factors that impact green building adoption, this study can inform policy decisions, industry best practices, and educational initiatives tailored to the region's unique context.

Furthermore, the results of the research might potentially assist in the adoption of a green, resilient economy in South-West Nigeria. The housing industry can minimize its global imprint, boost GDP, and generate jobs by supporting green building practices. Ultimately, the research aims to catalyze a transformation in construction practices and culture, driving South-West Nigeria towards a more sustainable, resilient, and environmentally responsible future.

REVIEW OF RELATED LITERATURE

Practices of Green Building:

A number of components and ideas are included in "green building practices," which are meant to lessen the negative effects of architecture on nature and promote the longevity of facilities. Among these elements are conservation of energy, effective waste

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management, renewable resources, and additional packages (Ali and AKKAS, 2023). One of the main components of green buildings is energy conservation, involving energy-efficient appliances, and optimization of energy consumption through improved insulation, and renewable energy integration (Karimi, Adibhesami, Bazazzadeh, and Movafagh, 2023). Green building materials focus on using environmentally friendly and locally sourced resources, reducing carbon dioxide emissions associated with transportation, and promoting the responsible use of scarce resources. Waste reduction emphasizes minimizing construction and operational waste, encouraging recycling, and reusing materials. The structure's indoor air quality, good spatial design and general layout, and rational use of water are also essential for achieving green building goals (Hussain, 2023).

Factors Influencing Green Building:

The global acceptance and execution of green building practises are impacted by a multifaceted interaction of elements. Extensive literature identifies several key drivers and barriers (Mohamed, *et al.*, 2023). Economic incentives and regulatory requirements play a significant role in promoting green building, with governments offering tax incentives and imposing building codes to encourage sustainability. Technological advancements have made green technologies more accessible and cost-effective, further stimulating adoption (Li, Wang, Kasseem, Liu, & Ali, 2022). Market demand, driven by eco-conscious consumers and corporate sustainability goals, encourages developers and builders to embrace green practices.

Challenges, however, include the initial higher costs of green construction, the reluctance to change traditional building practices, and a lack of awareness among stakeholders. These barriers can be addressed through education and awareness campaigns, which are important for fostering a green building culture (Nasereddin & Price, 2021).

Green Building in Nigeria:

Nigeria, like many developing countries, is slowly implementing the green building practices. However, it faces unique challenges peculiar to the South-West region, including Lagos. Rapid urbanization, inadequate infrastructure, depletion of resources, and pollution are the results of unconventional building practices (Dipeolu and Ibem, 2020). Authorities, codes, and regulations in Nigeria have an impact on the adoption of green construction practices, climate conditions, and financial considerations (THE TRUSTED ADVISORS, 2023).

Government initiatives, such as the Nigerian Energy Conservation Building Code and the National Green Building Policy, aim to promote sustainable construction (Uwaegbulam, 2023). The tropical climate in South-West Nigeria necessitates specific design considerations, like natural ventilation and shading, to improve energy efficiency and occupant comfort. The widespread implementation of green building practices in the local area is also influenced by finances, which include the prohibitive price of development (BUILDZONE, 2023).

In summary, fostering ecologically sound construction requires an awareness of the guiding concepts and variables influencing green building practices worldwide as well as an appreciation of Nigeria's particular difficulties and addressing environmental concerns in the South-West region. The literature reveals the importance of policy support, economic incentives, and raising the awareness of the general population of the need to advance green building practices in Nigeria.

METHODOLOGY

Research Design:

The research methodology employed in this investigation entails a thorough examination of the variables influencing green building practises, with emphasis on South-West Nigeria. A combined approach of research methodologies is used in this research to give a comprehensive grasp of the topic. The study incorporates both quantitative as well as qualitative elements to result in a thorough and comprehensive analysis.

To obtain real-world information regarding the broader adoption of green building procedures, the use of statistics comprises data collection through surveys and examination of current corporate reports. In the area of qualitative research, case studies and in-depth interviews are utilized to collect rich, context-specific data regarding the variables influencing green buildings in the area. Using a combination of methodologies guarantees a more thorough understanding of the intricate subject of green building.

Statistics Resources:

The data used for the current research came from a variety of resources to ensure that the evaluation was precise. These sources include: Surveys: Major players in the building sector, such as architects, designers, construction workers, officials, and ecological specialists, were given questionnaires. The surveys helped collect factual data regarding their beliefs, attitudes, and actions associated with environmentally friendly buildings.

Evaluations: Deep talks were held with a select group of industry specialists, which included South-West Nigerian decision-makers. The discussions provided illuminating information regarding the challenges, motivators, and viewpoints of people involved in green building projects.

Industry Reports: To compile chronological data on statistics on the topic, reports from the sector, scholarly articles, and policy statements that are currently in existence and pertain to environmentally friendly building practices in Nigeria were examined and analyzed. Case Studies: Numerous studies on green building efforts in South-West Nigeria were conducted in order to raise knowledge of the particular challenges, strategies, and outcomes associated with adopting environmentally conscious architectural behaviors in the region.

Data Collection Methods:

The questionnaires assisted in gathering empirical information about their views, mindsets, and sustainable building-related behaviors.

Assessments: A limited number of professionals in the industry were subjected to deep discussions. Statistical approaches were employed to analyze quantitative data obtained from surveys in order to ascertain developments and trends in the implementation of green building practices. The main concepts, obstacles, and enablers pertaining to green buildings were identified through an overview of qualitative findings gathered from research projects and surveys.

A more thorough investigation of the variables impacting green building in South-West Nigeria was possible with the inclusion of both quantitative and qualitative data, providing a clearer picture of the prospects and challenges in this area. By using a combination of mixed-method approaches, this study improves the veracity and accuracy of its research outcomes, which leads to an expanded and in-depth examination of the topic.

ECONOMIC FACTORS

Cost Considerations:

The implementation of green construction practises is influenced by a variety of economic considerations, many of which are crucial for decision-making. The initial expenditure of constructing a green building serves as one of the main factors to take into account. Sustainable materials, energy-efficient systems, and green technology integration often incur higher upfront expenses than traditional building methods (Ayarkwa, Opoku, Antwi-Afari, & Li, 2022). These costs may act as a deterrent for developers and builders, particularly in emerging economies like Nigeria. However, research shows that the initial investment in green building can yield significant long-term benefits (Ekins & Zenghelis, 2021).

Return on investment (ROI) is a critical component. Green buildings typically exhibit reduced operational costs due to energy and water efficiency, lower maintenance expenses, and extended building life spans (Levy, 2023). Consequently, while the initial investment may be higher, the savings over time can result in a favorable return on investments (ROI) (Morrison, 2023).

Financial Incentives:

Usually, the availability of financial incentives, subsidies, and grants is a key economic driver for green building projects. Government policies and programs aimed at promoting sustainability play a vital role (Saka, PhD, Olanipekun, PhD, & Omotayo, PhD, 2021). In South-West Nigeria, various incentives, such as tax breaks, reduced permit fees, and grants, are provided to encourage green building. The Nigerian Energy Conservation Building Code (NECBC) and the National Green Building Policy offer incentives for green certification and compliance with sustainable building practices (Olagboye, 2023). Additionally, international organizations and development agencies may provide funding and technical assistance to support green building initiatives (AFRICAN DEVELOPMENT BANK GROUP, 2022).

Market Demand:

The demand for green buildings in the real estate market has a substantial influence on construction decisions. Globally, there is a growing awareness of environmental issues, and consumers are increasingly seeking eco-friendly and energy-efficient living and working spaces. Green buildings not only contribute to a healthier environment but also offer better indoor air quality and comfort, which appeals to potential tenants and buyers (Eversole, 2023). In South-West Nigeria, where urbanization is rapidly expanding, developers are recognizing the competitive advantage of offering green-certified properties. A property's sale and rental costs can be increased by obtaining a green building certification, for example, the Nigerian Green Building Council (NGBC) accreditation or the top brass in Energy and Environmental Design (LEED) (Chieshe, 2022). Investors and tenants are becoming more inclined to favor green buildings due to the long-term economic benefits they provide, such as reduced utility bills and enhanced quality of life.

In the final analysis, the development of ecological building practices in South-West Nigeria and around the world is heavily influenced by fiscal issues. While initial costs can be a deterrent, the promise of long-term savings, coupled with financial incentives and market demand for sustainable buildings, has the potential to drive the construction industry toward greater sustainability and environmental responsibility.

REGULATORY AND POLICY FACTORS

Development Rules and Laws:

Throughout South-West Nigeria, the implementation of green building practices is significantly shaped by regional construction rules, laws, and governmental initiatives. The extent to which these policies promote or hinder sustainability efforts is a critical consideration for developers and builders. Building codes are instrumental in establishing the minimum requirements for construction, and their alignment with green building principles is crucial.

In South-West Nigeria, the Nigerian Energy Conservation Building Code (NECBC) and other regional building codes have been developed to encourage energy-efficient and sustainable construction. The aforementioned rules outline specifications for green energy integration, energy-efficient illumination, and soundproofing. However, the extent of compliance with these codes varies, and enforcement can be inconsistent. This situation underscores the importance of local authorities in creating a regulatory environment that promotes green building practices.

Green Building Certification:

The widespread implementation of environmentally conscious construction practices is greatly influenced by green building certification programs including certification from the Nigerian Green Building Council (NGBC) and the Leadership in Energy and Environmental Design (LEED) scheme. A standardized procedure for evaluating and identifying green construction practices is provided by this accreditation. In the southwest region of Nigeria, developers and builders who achieve green certifications gain a competitive edge and often receive incentives, such as reduced permit fees, tax benefits, and recognition for their environmental stewardship. The availability of green certifications has incentivized the construction industry to invest in sustainable technologies and design strategies. Moreover, it empowers consumers to make informed choices about environmentally friendly buildings, which can further stimulate market demand for green construction.

Energy Efficiency Standards

Energy efficiency standards are a key regulatory factor influencing green building practices. These standards establish requirements for energy performance, and adherence to them can significantly impact a building's operational costs and environmental footprint. In South-West Nigeria, the implementation of Renewable electricity regulations can help cut down on greenhouse gases and usage of energy particularly in a region with a hot tropical climate. These standards often address insulation, lighting, HVAC systems, and appliance efficiency. Their organization offers precise standards for attaining environmentally friendly construction as well as design, so augmenting the long-term viability of buildings even further. Developers and builders may receive incentives for exceeding energy efficiency standards, promoting the incorporation of green building methods.

In closing, the environment of green construction practices in South-West Nigeria is greatly influenced by legislative and legal issues. Renewable energy requirements, ecological building endorsements, as well as building codes offer an organizational structure which can encourage and hasten the implementation of green building practices while supporting international initiatives to lessen global warming and the physical environment's ecological impact.

ENVIRONMENTAL FACTORS

Environmental Awareness:

Decisions about the implementation of green building practises in South-West Nigeria are heavily influenced by the degree of environmental awareness among building contractors. Awareness of environmental issues, such as climate change and resource depletion, has been growing globally and is increasingly shaping the priorities of stakeholders in the construction industry.

Sustainable construction practices are more likely to be used by engineers, builders, and architects who are aware of ecological problems. They understand how cutting a building's ecological impact may improve the surrounding area and lead to a cleaner atmosphere. Moreover, this heightened awareness can lead to the incorporation of sustainable design elements, energy-efficient systems, and responsible material choices. Professionals who are aware of the long-term financial benefits of green building, such as the reduction in carbon emissions and operating expenses, are also more likely to give environmentalism top priority when designing structures.

Resource Availability:

In South-West Nigeria, the viability of ecologically conscious construction is significantly influenced by the accessibility of ecologically sound assets, clean power sources, and environmentally friendly building materials. Reusing steel, bamboo, and locally grown wood are examples of sustainable materials that are essential for minimizing the negative ecological effects of building. The resources' suitability for usage in construction projects may depend on how readily available they are.

In addition, encouraging efficient use of energy and lowering a building's dependency on resources that are not renewable are greatly aided by the abundance of energy from renewable sources like solar and wind. Solar energy is a particularly good choice for energy-efficient green building construction in areas with plenty of sunshine. Incentives from the government, combined with the economic viability of alternative forms of energy can encourage builders to use the aforementioned assets in their plans.

Climate and Local Conditions:

The local climate and geographic conditions in South-West Nigeria have a profound impact on the choice of green building features. The hot, tropical climate in the region necessitates specific design considerations to ensure occupant comfort and energy efficiency. Natural ventilation, shading, and building orientation are essential strategies in green building design to mitigate the effects of high temperatures and humidity.

Furthermore, the geographic conditions influence water conservation efforts, as water scarcity can be a concern in some areas. The use of rainwater harvesting systems and efficient water fixtures is integral to green building practices in regions with erratic water availability.

In conclusion, environmental factors, such as awareness among construction professionals, resource availability, and local climate and conditions, are significant determinants of green building practices in South-West Nigeria. These factors not only shape the decision-making process but also offer opportunities to enhance sustainability and reduce the environmental impact of construction, aligning with global efforts to combat climate change and promote a more eco-friendly built environment.

KNOWLEDGE AND SKILLS

Capacity Building:

The acceptance as well as effective deployment of methods of sustainable building in South-West Nigeria are significantly influenced by the amount of experience and expertise which construction professionals possess regarding green building practises. While there is growing awareness of environmental issues and green building principles, the capacity building within the construction industry can still be a challenge. Many professionals may lack the necessary expertise to design, construct, and manage green buildings effectively.

The construction sector in South-West Nigeria can benefit significantly from initiatives aimed at enhancing the knowledge and skills of industry stakeholders. This includes architects, engineers, builders, and contractors. Capacity-building efforts should focus on providing training and resources to improve their understanding of green construction techniques, sustainable materials, energy-efficient systems, and waste-reduction practices.

Training and Education:

The availability of training programs and educational opportunities for industry stakeholders in South-West Nigeria is crucial for fostering expertise in green building practices. Training and education programs, whether formal or informal, can provide construction professionals with the necessary knowledge and skills to implement sustainable construction methods effectively.

Various institutions, including universities, vocational training centers, and industry associations, can offer courses and workshops on green building practices. Government agencies and non-governmental organizations may also provide training and educational resources. These programs cover a wide range of topics, including green design, renewable energy systems, sustainable materials, and environmental impact assessments. It is crucial to increase and publicise these learning possibilities in order to encourage the implementation of green building practices. Construction professionals who are well-versed in green building principles are more likely to incorporate sustainable strategies into their projects, facilitating South-West Nigeria's general transition to ecologically friendly building techniques.

According to the final analysis, the degree of green building practice understanding and expertise within South-West Nigerian building contractors is a crucial component in the effective implementation of environmentally friendly building techniques. Capacity building and accessible training and education programs are essential components of a strategy to empower industry stakeholders with the expertise needed to create more environmentally friendly and energy-efficient buildings in the region.

CASE STUDIES AND INDUSTRY PRACTICES

Case Studies:

Successful green building projects in South-West Nigeria provide valuable insights into how key factors influencing sustainability in construction can be effectively addressed. One notable case study is the "Ogun State Green Building Initiative." This initiative, led by the state government, aims to promote eco-friendly construction practices. It incorporates the principles of green building, such as energy efficiency, sustainable materials, and waste reduction.



Figure 1: Lekki Gardens Eco-Estate, Lekki, Lagos, Nigeria.

The Ogun State Smart City Project, Shagamu is an excellent example of how incentives from regulations and government backing may promote the implementation of green construction practises. It offers tax breaks and reduced permit fees for green-certified buildings, encouraging developers and builders to embrace sustainable construction methods. Additionally, the initiative focuses on raising environmental awareness and capacity building through training programs and workshops, addressing knowledge and skills as factors. Shagamu, Ogun State, Nigeria is home to the Ogun Smart Green City Project. The 'Intelligent City' is located near Shagamu, roughly forty-minute' journey from Lagos. It is located off the Lagos-Ibadan Motorway, at the Sagamu Intersection. Lagos, the financial hub of Nigeria, is only a short drive away.

The "Lekki Gardens Eco-Estate," an environmentally friendly residential complex in Lagos, is another example case. According to Figure 1, the neighborhood features state-of-the-art design elements that have been specifically tailored to the local environment and accessibility to resources, such as rainwater collection, low-energy lighting, and ventilation from the outdoors. These components show how influences from the environment can be used to design eco-friendly and pleasant places to live.

Creative Practices:

The implementation of environmentally conscious buildings in South-West Nigeria has been greatly influenced by innovative business practises. Using more affordable and environmentally friendly building materials, such as bamboo and compressed earth bricks, is one such technique. When comparing these components to typical building supplies, they are more widely affordable and have a smaller environmental impact.

Additionally, some developers are using building modules methods, which cut wastage and time to construct while increasing the effectiveness of energy. Building components that have been constructed are put together throughout the process of assemblage, which improves accuracy and efficiency. By minimizing wastage and utilizing resources efficiently, these cutting-edge techniques simultaneously handle both economic and environmental problems. In conclusion, case studies and innovative industry practices in South-West Nigeria provide practical examples of how factors influencing green building adoption can be effectively addressed. Successful projects and practices showcase the potential of sustainable construction methods and offer inspiration for further advancements in the region's construction industry.

DISCUSSION

Interplay of Factors:

South-West Nigeria has adopted green construction practices as a consequence of an intricate combination of environmental, regulatory, economic, and knowledge-related variables. Economic factors, such as cost considerations and the availability of financial incentives, directly influence the decision to embrace sustainability in construction. The higher initial costs of green building can be offset by long-term savings, and financial incentives provide a crucial impetus for builders and developers.

Regulatory and policy factors, encompassing building codes, green building certification, and energy efficiency standards, create the framework for sustainability. These regulations, if well-implemented and enforced, offer guidance and incentives for green building practices. The alignment of these regulations with global sustainability goals is crucial for driving positive change.

Environmental factors, including awareness, resource availability, and local conditions, significantly impact construction decisions. Environmental awareness influences stakeholders to prioritize sustainability, while the availability of sustainable materials and renewable energy sources provides the essential building blocks for green construction. Local climate and conditions necessitate tailored design features that enhance energy efficiency and occupant comfort. Adopting green building practices successfully depends on a combination of skills and understanding. Capacity building and accessible training programs empower construction professionals to implement sustainable construction methods effectively, fostering a culture of sustainability in the industry.

Barriers and Facilitators:

The start-up higher prices are one of the obstacles to the widespread implementation of green construction practices in South-West Nigeria, reluctance to change traditional construction methods, and a lack of awareness among stakeholders. Overcoming these challenges requires government incentives, awareness campaigns, and capacity-building initiatives.

Facilitators include financial incentives like tax breaks and grants, as well as the availability of training programs and educational opportunities. Government support and enforcement of green building regulations, coupled with financial benefits, stimulate industry stakeholders to prioritize sustainability. Additionally, market demand for green buildings, driven by an environmentally conscious consumer base, acts as a significant facilitator.

In summary, the interplay of these economic, regulatory, environmental, and knowledge factors shapes the landscape of green building practices in South-West Nigeria. Identifying and addressing the barriers while leveraging the facilitators are essential steps toward a more sustainable and eco-friendly construction industry in the region.

CONCLUSION

Summary of Findings:

This study has uncovered several key findings regarding the factors influencing green building practices in South-West Nigeria. The widespread implementation of green building technologies in the surrounding area is shaped largely by a combination of economic, regulatory, environmental, and knowledge variables. Financial considerations, such as upfront expenses, ongoing funds, and

monetary benefits, are crucial in determining how decisions are made. Regulatory and policy factors, including building codes, green building certification, and energy efficiency standards, provide a regulatory framework that can promote sustainability. However, the extent of compliance and enforcement varies.

Environmental factors, encompassing awareness, resource availability, and local climate conditions, have a substantial impact on construction choices. Capacity building and accessible training programs are crucial to fostering expertise among construction professionals, addressing knowledge and skills as factors influencing adoption.

Implications:

The findings hold significant implications for various stakeholders in South-West Nigeria's construction industry. Policymakers should focus on aligning building codes and regulations with global sustainability objectives, providing consistent enforcement, and expanding financial incentives. The widespread implementation of green building practices may be strongly influenced by federal backing and promotions, which can help the area achieve its environmental objectives. For industry stakeholders, capacity building through training programs and educational opportunities is vital. Construction professionals who possess a solid understanding of green building principles are more likely to integrate sustainable strategies into their projects from design stage, thereby enhancing the overall sustainability of the construction sector.

Future construction projects should prioritize sustainability by considering local climate and conditions, utilizing sustainable materials, and incorporating energy-efficient systems. This approach benefits both the environment and offers long-term economic advantages through reduced operational costs and improved marketability.

Future Research:

Future research in South-West Nigeria's green building practices should delve deeper into the evolving landscape of sustainability in the region. Longitudinal studies can track the implementation of regulatory changes and the impact of capacity-building initiatives over time. The effectiveness of government incentives and the extent of market demand for green buildings would be valuable areas for further investigation. Additionally, research can explore innovative practices and case studies to identify successful strategies that can be scaled for broader adoption. A more detailed examination of the barriers and facilitators influencing green building adoption can provide insights for targeted interventions.

Further research can also delve into the potential for green building practices to contribute to environmental sustainability and resilience, given the region's vulnerability to environmental challenges. As South-West Nigeria grapples with rapid urbanization and increasing environmental concerns, ongoing research will be essential for fostering a culture of sustainability in the construction industry and addressing pressing environmental issues.

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Conflict of Interest

I confirm that I do not have a financial or other interest in the subject/matter of the work in carrying out this study, which may constitute a real, potential, or apparent conflict of interest.

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