Technology Adoption in the BRICS Construction Industry: Appraising the use of local currencies amidst the Trade War

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Abstract
The BRICS countries are lagging in adopting Industry 4.0 compared to other advanced countries. Since the Industrial Revolution provided a framework for adopting technology in the construction industry, it is also relevant in the BRICS construction industry. Hence, this study aims to examine the use of local currencies by BRICS countries to foster technology adoption in the BRICS construction industry. The methodology adopted for this study is a qualitative approach based on a scoping review of existing literature, underpinned by the Theory of Constraints. The findings of the study reveal that South Africa, Russia, and Brazil import a lot of technologies, and that BRICS countries, especially Brazil, Russia, India, and South Africa, face the challenge of insufficient adoption of technologies and backlog due to international trade regionalization and the development of these technologies in industrialized countries. Furthermore, the study reveals that using these local currencies will help reduce currency risk related to loans dominated by dollars, thereby fostering financial stability among member nations, reducing currency volatility, lowering transaction costs, and mitigating susceptibility to financial warfare and external economic pressures. The study reveals the implications for technology adoption in the BRICS construction industry, as the use of local currency among BRICS countries will enhance domestic production and consumption, and weaken the US's ability to impose economic sanctions effectively. This study makes an empirical and theoretical contribution to technology adoption among BRICS countries, as well as to fostering technology sharing and collaboration in the BRICS construction industries.

Keywords
BRICS, Local Currency, Industrial Revolution, Construction 4.0, Trade War, Technology Adoption.

1. Introduction

The BRICS founding countries were initially comprised of Brazil, Russia, India, China, and South Africa, and were established in 2009 (Nach & Ncwadi, 2024). These countries range between the lower-middle-income and upper-middle-income economies (World Intellectual Property Organization, 2025). The membership of the BRICS countries has been increased to include Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE, reflecting its growing geopolitical influence (Obasun, 2025). BRICS countries contribute to global economic growth, ranging from 43% to 45% in 2018 and 2019, respectively (Erdogan, 2021). The construction industries of these countries significantly contribute to their Gross Domestic Products (GDP). Megatrends, such as technological shifts, are constantly affecting the construction industry, requiring it to evolve continuously. This might become a significant hurdle for the construction industry in many BRICS countries to overcome, especially in the era of increased tariffs by the United States of America (USA), which is the primary trade partner of these countries.

York (2018) stated that trade enables nations to specialize in activities in which they have a comparative advantage, which makes them wealthy. Furthermore, the study noted that the U.S. dollar may appreciate in response to tariffs, offsetting the potential price increase for U.S. consumers and making it more difficult for exporters to sell their goods on the global market, resulting in lower revenues for exporters and ultimately poorer financial outcomes. The BRICS countries have a large cooperation potential in the areas of trade, investment, research, development, and innovation, but the level of integration among them is low (Oehler-Şincai, 2015). A primary goal of the BRICS countries, including the newly added members, is to reduce the dollarization of their economies and encourage trade based on the use of their local currencies.

The current global financial architecture, dominated by the US dollar, poses limitations, especially in addressing the challenges faced by emerging and developing economies, the strategic initiatives by BRICS nations to enhance the role of their currencies in international settlements represent a critical step towards economic independence and integration (Nach & Ncwadi, 2024). Hence, this study aims to examine the use of local currencies by BRICS countries to foster technology adoption in the BRICS construction industry. This study makes an empirical and theoretical contribution to the adoption of technology among BRICS countries, promoting the sharing and collaboration of technology.

2. Theoretical Framework

2.1 Theory of Costraints

Şimşit et al. (2014) introduced a management philosophy grounded in the belief that every system possesses at least one bottleneck, a challenge addressable through a focus on continuous improvement. Rahman (1998) defines the core of the theory of constraints, highlighting:

a) The presence of at least one constraint in every system.
b) The potential for improvement resulting from the existence of constraints.

Goldratt (1990) stated that if a process of ongoing improvement is to be effective, we must first of all find what to change (identify core problems), find what to change to (Finding simple and practicable solution), determine how to cause the change (Induce the appropriate people to invent such solutions) which are the three steps of the Theory of Constraints.

This can be related to the study in that reliance on the US dollar can constrain technological adoption in the construction industries of the BRICS countries due to currency volatility, increased transaction costs, and access restrictions to imported technological solutions. This necessitates integration among BRICS countries in terms of trade, innovation, and investment through the use of local currency.

3. Methodology

This study employs a qualitative approach, informed by a scoping review of existing literature from databases such as Google Scholar and Scopus. Google Scholar and Scopus were selected due to their comprehensive indexing of peer-reviewed academic sources, while Google Scholar additionally provided a comprehensive indexing of grey literature. This broad coverage is beneficial for conceptual and theoretical explorations. The study employs keywords such as "BRICS", "LOCAL CURRENCIES", "FOURTH INDUSTRIAL REVOLUTION ADOPTION", and "CONSTRUCTION 4.0" to guide the search. Additionally, it applies Boolean logic, such as "AND" and "OR", for searches in databases like Scopus. Due to the scarcity of studies on BRICS local currency and the BRICS Construction Industry, the study purposively selected 30 articles from these databases based on their relevance to the topic. The abstracts and the full text of these articles were read, and those irrelevant to the subject were not included in this study, as well as those not written in English. Furthermore, the research utilized thematic analysis to analyze 14 selected articles. Braun and Clarke (2006) stated that thematic analysis involves reading text, coding, theme development, and data interpretation.

4. Findings

4.1 Challenges of Construction 4.0 Adoption in the BRICS Construction Industry

Alaloul et al. (2018) Identified four main stages of the Industrial Revolution as the first industrial revolution, which was based on water and steam, the second industrial revolution, based on electrically powered mass production, the third industrial revolution, based on electronics and IT, and the fourth industrial revolution, based on Cyber-Physical systems. Furthermore, the study stated that the Industrial Revolution characterizes growth in three ways: Digitizing production, Automation, and linking construction sites to a supply chain.

Simachev et al. (2020) stated that South Africa, Russia, and Brazil import a lot of technology compared to other BRICS countries. Furthermore, the study stated that BRICS countries, especially Brazil, Russia, India, and South Africa, face the challenge of insufficient adoption of technologies and backlog due to international trade regionalization and the development of these technologies in industrialized countries. Robert (2021) stated that the Fourth Industrial Revolution provides a framework for Construction 4.0. Furthermore, the study highlighted the challenges of adopting construction 4.0 technologies, such as the high maintenance cost. Adepoju et al. (2022) identified the threats of digitalization, including high initial capital.

Young Practitioners in Construction (2024) identified the digital technologies required in the construction industry as: Artificial Intelligence, laser scanning, simulation and modeling, reality capture, virtual tours, Building Information Modeling, and metaverse. Aigbe et al. (2023a) identified the construction 4.0 technologies as: BIM, IOT, Drone, Robots, Augmented Reality, Virtual Reality, Mixed Reality, Cloud Computing, Big Data Analytics, and Semantic Technology. Furthermore, Aigbe et al. (2023b) described the construction 4.0 technologies as: LIDAR, Building Information Modeling (BIM), Big data, and Unmanned Aerial Vehicles. Singh and Misra (2021) revealed that the challenges to adopting IR 4.0 in the construction industry in India included: huge costs incurred in the implementation and maintenance. Furthermore, Oke et al. (2017) identified the dominant negative influence of construction automation in South Africa as high capital expenditures. Furthermore, Elabd et al. (2016) and Zahedi et al. (2023)stated that the adoption of Construction 4.0 technology, such as BIM, in the AEC industry in Middle East countries like the Kingdom of Saudi Arabia, the United Arab Emirates (UAE), and Iran faces adoption challenges related to the cost of adoption, the lack of availability of skilled personnel, and training. Elyamany (2016) identified the challenges to BIM adoption in Egypt as the cost of the BIM system and company experience issues related to the use of BIM. Demeke Wasse and Dai (2024) described the barriers to implementing BIM technology in the Ethiopian construction industry as: lack of knowledge and difficulty in finding the skilled workforce to work with BIM, lack of demand, and high costs to implement a BIM-based service.

Conclusively, Simachev et al. (2020) stated that it is important for BRICS countries to achieve equal access to digital technologies between and within regions.

Table 1. Challenges of Construction 4.0 Adoption in the BRICS Construction Industry

AUTHOR(S)	COUNTRY	CHALLENGE(S)
Singh and Misra (2021)	India	Huge costs incurred in the implementation and maintenance
Oke et al. (2017)	South Africa	High capital expenditures
Elabd et al. (2016) and Zahedi et al. (2023)	Middle East countries like the Kingdom of Saudi Arabia, the United Arab Emirates (UAE), and Iran	Cost of adoption, lack of availability of skilled personnel, and training
Elyamany (2016)	Egypt	Cost of the BIM system and company experience issues related to the use of BIM
Demeke Wasse and Dai (2024)	Ethiopia	lack of knowledge and difficulty in finding the skilled workforce to work with BIM, lack of demand, and high costs to implement a BIM-based service.

4.2 Benefit of Local Currency Adoption by BRICS Countries and Implications for the BRICS Construction Industry

Nach and Ncwadi (2024) stated that BRICS countries have always sought to establish financial sovereignty from the US dollar-dominated global financial system, hence the push for using local currencies in cross-border transactions. This aligns with the 2024 BRICS summit declaration, which supports the expansion of local currency financing by the New Development Bank (NDB) to boost investment flows, infrastructure, and sustainable development in member countries(Declaration, 2024). Nach and Ncwadi (2024) highlighted some of the benefits of the use of local currencies, such as reducing currency risk related to loans dominated by dollars, fostering financial stability among member nations, reducing currency volatility, reducing the cost of transactions, promoting currency diversification, promoting a multipolar global financial system, and fostering a more interconnected and self-reliant economic bloc. Obasun (2025) stated that using local currencies enhances export tax collection, credit ratings, and makes it easier for small and medium-sized exporters to participate in global trade. Furthermore, the study stated that countries that trade in local currencies are less susceptible to financial warfare and external economic pressures. This aligns with the 2024 BRICS summit declaration, which supports the enhancement of cooperation financially among member countries through cross-border payments that are fast, efficient, low-cost, and transparent, aimed at reducing barriers to trade and discrimination (Declaration, 2024). The impact of local currencies usage can only be achieved through scale achievement; hence, encouraging trade cooperation among BRICS countries through free trade zones (FTZs) could help countries pursue their common interests, resolve conflicts of interest, adapt to new economic globalization trends, facilitate domestic economic structural adjustment, and establish a new regional economic system that is open-ended.(Johnson & Harvey-Wilson, 2018; Xiujun, 2020). This aligns with the 2024 BRICS summit declaration, which recognizes the need for Special Economic Zones (SPZ) to enhance trade and industrial cooperation among member countries, information technology and its enabled services, technologies development, and commercialization(Declaration, 2024).Within this framework, the broader adoption of local currencies becomes more practical and sustainable, thereby enhancing financial independence, reducing dependency on dominant global currencies, and fostering a supportive environment for technological advancements and innovation across key industries, including construction.

This has implications for technology adoption in the BRICS construction industry, as the use of local currency among BRICS countries will enhance domestic production and consumption, thereby weakening the US's ability to impose economic sanctions effectively (Obasun, 2025), and reducing the cost implications of imported technologies. Using local currencies among BRICS countries can lead to a lower commercial exchange rate for BRICS currencies, which can be an implicit subsidy for domestic cooperation. (Zharikov, 2019), thereby fostering technology diffusion in the construction industry, reducing reliance on importation, and encouraging innovations locally. This aligns with the 2024 BRICS summit declaration, which encourages joint activities by BRICS countries in the area of digital infrastructure (Declaration, 2024). For example, the bilateral trade between China and Russia was conducted through the use of the yuan and the ruble (Local currencies), which helped mitigate the impact of US sanctions(Kluge, 2024).

5. Implications for South African Communities

In South Africa, there is a high rate of unemployment and poverty. With the use of local currencies for transactions within BRICS countries and the subsequent adoption of technologies within the BRICS construction industry (especially in South Africa), the populace will be economically empowered as more workers will be employed in the industry, which will boost their purchasing power and lead to more money in the economy. Additionally, it will help address unemployment in other sectors of the country, as the construction industry is a significant contributor to the country's Gross Domestic Product (GDP). This aligns with SDGs 1, 2, and 8: reducing poverty, achieving zero hunger, promoting decent work, and fostering economic growth.

6. Conclusion

The BRICS countries are lagging in adopting Industry 4.0 compared to other advanced countries. BRICS countries, such as South Africa, Russia, and Brazil, import a significant amount of technologies. However, most of these countries, especially Brazil, Russia, India, and South Africa, face the challenge of insufficient technology adoption and a backlog due to international trade regionalization and the development of these technologies in industrialized countries. Using local currencies will help mitigate currency risk associated with loans dominated by dollars, promote financial stability among member nations, reduce currency volatility, lower transaction costs, and decrease susceptibility to financial warfare and external economic pressures. This has implications for technology adoption in the BRICS construction industry, including enhancing domestic production and consumption, as well as weakening the US's ability to impose economic sanctions effectively. This study is limited to secondary data; further studies could be conducted using primary data to investigate how local currencies influence technology adoption in the BRICS construction industry.

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