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Developing a Content Matrix for Marketing Modular Gas Infrastructure in Decentralized Energy Markets

Paul Uche Didi [1*], Ololade Shukrah Abass [2], Oluwatosin Balogun [3]
[1-3] Independent Researcher, Lagos, Nigeria

Corresponding Author: **Paul Uche Didi**

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Abstract
The growing demand for reliable and scalable energy access in underserved and decentralized regions has positioned modular gas infrastructure—such as compressed natural gas (CNG) skids, mini-liquefied natural gas (LNG) systems, and virtual pipelines—as critical enablers of distributed energy supply. These flexible, transportable systems offer an efficient alternative to traditional fossil fuel logistics and can complement renewable energy in hybrid microgrids. However, the diversity of stakeholders involved—from policymakers and regulators to commercial end-users and development finance institutions—poses a unique challenge for marketers aiming to promote modular gas solutions. Each audience segment operates within distinct decision-making frameworks, technical competencies, and investment horizons, necessitating a strategic approach to communication. This proposes a content matrix framework designed to support targeted, multi-channel marketing of modular gas infrastructure within decentralized energy markets. The matrix aligns content types—such as white papers, case studies, technical datasheets, policy briefs, and digital tools—with segmented audience profiles and stages of the buyer journey: awareness, consideration, decision, and post-deployment engagement. By organizing marketing efforts around these intersecting dimensions, companies can improve message relevance, accelerate lead conversion, and build stakeholder confidence across different contexts. Key focus areas include audience segmentation (e.g., rural utilities, industrial off-takers, regulators), content customization (technical vs. non-technical formats), and platform optimization (digital channels vs. community-based outreach). The matrix also supports ESG-aligned storytelling, illustrating the role of modular gas in enabling cleaner, more resilient, and inclusive energy access. Ultimately, this strategic framework enhances the effectiveness of demand-generation campaigns, investor engagement, and policy advocacy, while supporting the broader goals of energy transition and economic development in emerging markets. By employing a content matrix approach, solution providers can communicate value more precisely, reduce information asymmetries, and scale adoption of modular gas infrastructure in high-impact, decentralized applications.

Keywords: Content Matrix, Marketing Modular, Gas Infrastructure, Decentralized Energy Markets

1. Introduction
Modular gas infrastructure—comprising technologies such as mini-liquefied natural gas (mini-LNG) systems, compressed natural gas (CNG) skids, and virtual pipelines—represents a transformative innovation in modern energy logistics. These systems enable the production, storage, and transportation of natural gas in scalable, portable units that can be deployed rapidly and cost-effectively (Otokiti, 2019; SHARMA *et al*., 2019). Unlike traditional pipeline networks, modular gas solutions are not constrained by fixed infrastructure, making them highly suitable for decentralized, off-grid, or energy-deficient environments. This flexibility positions modular gas infrastructure as a critical enabler for expanding energy access in remote industrial zones, peri-urban settlements, agricultural clusters, and isolated communities that lack reliable electricity or clean fuel alternatives (Lawal *et al*., 2014; Amos *et al*., 2014).
In decentralized energy markets, the role of modular gas systems is particularly important. They provide a cleaner and often more affordable alternative to diesel generators, which dominate off-grid power generation despite their high carbon footprint, noise pollution, and volatile fuel costs (Akinbola and Otokiti, 2012; Otokiti, 2017). Mini-LNG and CNG solutions can be used as primary energy sources or as backup systems for renewable energy microgrids, enhancing system reliability and operational continuity. Their rapid deployment capacity and modularity allow for phased scaling based on demand growth, further supporting sustainable development and energy resilience in emerging economies (Ajonbadi *et al*., 2015; Otokiti, 2017).
However, despite their technical and economic potential, the commercialization and widespread adoption of modular gas

technologies face significant marketing challenges. These include fragmented regulatory environments, limited public awareness, and a highly diverse stakeholder ecosystem (Otokiti, 2017; Otokiti and Akorede, 2018). The decision-makers span a wide spectrum—from national energy regulators, project financiers, and industrial offtakers to rural utility operators, local governments, and community leaders. Each stakeholder group brings distinct knowledge levels, priorities, and decision-making processes, ranging from technically sophisticated procurement officers to non-technical administrators seeking turnkey solutions (Otokiti and Akinbola, 2013; Ajonbadi *et al*., 2016). This heterogeneity necessitates a nuanced, audience-specific marketing strategy that speaks to different concerns, from cost-effectiveness and return on investment (ROI) to environmental impact and community development (FAGBORE *et al*., 2020; Nwani *et al*., 2020).

Traditional marketing approaches often fall short in addressing these variations, leading to information asymmetry, prolonged sales cycles, and misaligned expectations. Therefore, there is an urgent need for a systematic communication framework that ensures the right message reaches the right audience, through the right channel, at the right stage of the buyer journey (Olajide *et al*., 2020; Akinbola *et al*., 2020). A strategic content matrix serves this purpose by mapping content types—such as white papers, technical datasheets, explainer videos, policy briefs, and decision-support tools—against specific audience segments and their position within the awareness, consideration, decision, and post-deployment phases (Onifade *et al*., 2021; ODETUNDE *et al*., 2021).

The objective of this, is to design such a strategic content matrix tailored for marketing modular gas infrastructure in decentralized energy markets. By aligning content creation with stakeholder needs and decision-making timelines, the matrix aims to streamline marketing efforts, improve lead qualification, enhance stakeholder engagement, and ultimately accelerate the adoption of clean and decentralized gas-based energy systems. Furthermore, the content matrix approach supports ESG-aligned storytelling by emphasizing the social, environmental, and economic co-benefits of modular gas infrastructure, such as emissions reduction, job creation, and energy security. This positions it not merely as a technical solution, but as a driver of inclusive and sustainable energy transformation.

2. Methodology

The PRISMA methodology was applied to guide a systematic approach in developing a content matrix for marketing modular gas infrastructure within decentralized energy markets. The process began with a structured identification of relevant literature, technical reports, and industry case studies from academic databases (e.g., Scopus, Web of Science), organizational white papers (e.g., IEA, World Bank), and grey literature from energy development initiatives in emerging markets. Search terms included combinations of "modular gas systems," "decentralized energy," "energy marketing," "infrastructure promotion," and "energy access campaigns," ensuring relevance to both technological deployment and strategic communication in fragmented energy landscapes.

Screening was conducted in two phases. The initial screening involved title and abstract review to exclude unrelated studies, particularly those focusing solely on centralized gas networks or non-modular systems. This was followed by a full-text review to assess content against predefined inclusion criteria: relevance to gas infrastructure design or implementation, marketing or stakeholder engagement strategies, focus on non-grid or weak-grid regions, and contextual applicability to developing economies. A total of 145 records were initially identified, with 53 retained after full-text review and quality appraisal.

Data extraction focused on capturing core attributes such as infrastructure type (e.g., micro-LNG, CNG skids), deployment context (urban vs rural, industrial vs residential), value proposition elements (cost, reliability, scalability), and marketing communication approaches (messaging channels, stakeholder segmentation, branding strategies). Extracted data were organized into thematic categories that informed the design of a dynamic content matrix tailored to different audience tiers, including policy-makers, utilities, community leaders, and commercial users.

Analysis synthesized patterns across documented use cases, identifying best practices and content gaps in existing marketing approaches. These insights informed the matrix structure, aligning modular gas value propositions with localized energy needs, infrastructure readiness, and behavioral triggers. The PRISMA-based methodology ensured that the resulting content matrix was evidence-driven, context-sensitive, and aligned with the strategic goal of accelerating modular gas adoption in decentralized energy markets.

2.1 Understanding Modular Gas Infrastructure

Modular gas infrastructure refers to the use of compact, scalable, and transportable natural gas systems designed for flexible deployment outside conventional pipeline networks. These systems offer a decentralized approach to gas distribution, providing reliable and clean energy access to remote and underserved areas. The modular configuration facilitates rapid deployment, ease of scaling, and adaptability across diverse energy environments (ODETUNDE *et al*., 2021; SHARMA *et al*., 2021). With increasing energy demand in off-grid and peri-urban areas, modular gas infrastructure is gaining traction as a viable solution that supports energy security, emissions reduction, and economic development.

The core components of modular gas infrastructure include modular liquefaction units, compression systems, and transportable storage and regasification solutions. Modular liquefaction units are compact systems that cool natural gas to cryogenic temperatures (around -162°C), converting it into liquefied natural gas (LNG) for easier transport and storage. These units are typically skid-mounted and suitable for small-scale gas fields or remote locations where centralized processing is unfeasible. Compression units, on the other hand, are used to produce compressed natural gas (CNG) by pressurizing methane to about 200–250 bar. These units are vital for applications where liquefaction is cost-prohibitive or where CNG offers a better logistical fit.

Transportable storage forms the backbone of the modular concept. LNG is stored in cryogenic tanks, while CNG is kept in high-pressure cylinders or tube trailers. These mobile units can be transported by truck, rail, or barge, enabling a virtual pipeline that connects production points to consumption centers without the need for fixed infrastructure. On arrival, regasification or decompression systems convert LNG and CNG back to usable gas for end-use applications such as

power generation, industrial heating, or cooking fuel (Onifade *et al*., 2021; Ogeawuchi *et al*., 2021).

The applications of modular gas infrastructure are broad and impactful. In remote industrial operations—such as mining, oil drilling, and construction—modular gas systems provide a cleaner and more cost-stable alternative to diesel. In rural electrification, these systems can serve as primary energy sources for mini-grids or as backup generators to enhance the reliability of renewable energy installations like solar and wind. Their use in agro-processing and small-scale manufacturing helps boost local productivity while reducing reliance on carbon-intensive fuels. Additionally, modular gas infrastructure is increasingly being used as a backup for renewables, offering fast-ramping capacity that compensates for intermittency, especially in hybrid energy systems.

From a technical standpoint, modular gas systems offer high flexibility, short deployment timelines, and reduced site preparation compared to traditional infrastructure. Their plug-and-play design allows for rapid commissioning and integration with existing systems. Maintenance and operations are simplified due to standardized, skid-mounted configurations that can be easily replaced or upgraded (Olajide *et al*., 2021; Ojika *et al*., 2021). Furthermore, modularization enables staged investment, allowing operators to scale capacity in line with demand growth, thereby optimizing capital expenditure.

Economically, modular gas infrastructure offers significant value by reducing fuel costs, lowering emissions penalties, and improving operational reliability. For example, in regions with stranded gas assets, modular systems can monetize these resources without requiring extensive pipelines. In comparison to diesel, natural gas offers lower fuel costs and reduced volatility, improving budget predictability for industrial users. Moreover, the capital efficiency of modular units supports their adoption by small and medium-scale operators who might be excluded from large infrastructure investments.

Environmentally, natural gas produces significantly fewer carbon dioxide emissions per unit of energy compared to coal or diesel. Methane leaks and lifecycle emissions must be managed carefully; however, when properly deployed, modular gas systems contribute to substantial GHG emissions reduction, especially in replacing diesel generators in off-grid regions. Additionally, improved air quality, reduced particulate emissions, and noise reduction create favorable health and environmental outcomes for host communities.

Modular gas infrastructure offers a robust, scalable solution to the energy challenges faced in decentralized and remote contexts. By combining technological innovation with logistical flexibility, these systems unlock economic opportunities, reduce environmental impacts, and support the broader energy transition, particularly in emerging markets where energy poverty remains a pressing issue (Daraojimba *et al*., 2021; Ojika *et al*., 2021).

2.2 Target Audience Segmentation

Effective deployment and commercialization of modular gas infrastructure in decentralized energy markets require a nuanced understanding of diverse stakeholder groups. Tailored communication and engagement strategies, aligned with the unique priorities and technical literacy levels of each audience segment, are essential for successful adoption as shown in figure 1 (Owobu *et al*., 2021; Otokiti *et al*., 2021). This explores the segmentation of five critical target audiences—government agencies and regulators, industrial and commercial energy users, rural utilities and mini-grid developers, impact investors and development finance institutions (DFIs), and community leaders and non-technical stakeholders—and discusses how modular gas infrastructure propositions should be adapted to resonate with their specific expectations and decision-making frameworks.

Governments and regulatory bodies are key enablers of energy infrastructure deployment, providing the legal and institutional frameworks within which modular gas systems can operate. Their interests lie in national energy security, emissions reductions, rural electrification, and economic development. Communication targeting this group must emphasize how modular gas infrastructure aligns with policy objectives such as Nationally Determined Contributions (NDCs), energy transition strategies, and universal energy access goals. Demonstrating compliance with safety standards, environmental regulations, and reporting frameworks (e.g., OGMP 2.0, ISO standards) can improve regulatory acceptance. Moreover, showcasing successful pilot projects and providing data on job creation, cost-effectiveness, and reliability of supply can influence public sector procurement decisions and facilitate favorable regulatory adjustments.

Industrial and commercial users, including manufacturing firms, agro-processing facilities, and logistics hubs, prioritize energy reliability, cost stability, and scalability. For these users, modular gas infrastructure must be marketed as a flexible and secure alternative to diesel generators or unstable grid connections. Messaging should focus on operational resilience, energy autonomy, and potential savings through fuel switching to compressed natural gas (CNG) or small-scale liquefied natural gas (micro-LNG). Technical specifications, payback periods, and maintenance service models are critical decision factors for this segment. Additionally, alignment with ESG standards and carbon offset potential can appeal to corporate sustainability agendas and enhance stakeholder buy-in from investors and clients.

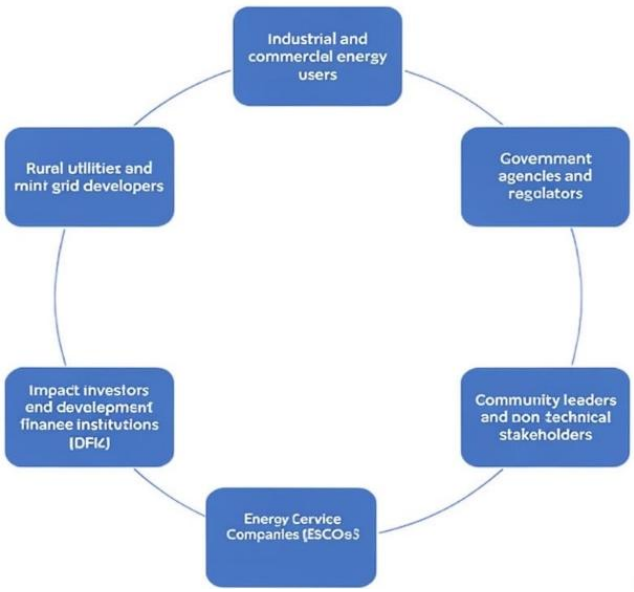

Fig 1: Target Audience Segmentation

Rural utilities and mini-grid developers operate at the frontline of decentralized electrification. These entities are

tasked with building, managing, or expanding energy access infrastructure in regions underserved by national grids. Their primary concerns include capital efficiency, modular scalability, ease of integration with existing systems (e.g., solar PV or diesel-hybrid mini-grids), and logistical feasibility in remote areas (Alonge *et al*., 2021; Otokiti *et al*., 2021). Marketing modular gas infrastructure to this group should highlight its role as a clean baseload or backup solution that complements intermittent renewables. Training programs, remote monitoring tools, and containerized deployment options can enhance the appeal of gas systems in off-grid or weak-grid environments. Further, co-development opportunities with rural energy cooperatives or energy-as-a-service providers can foster long-term collaboration and system sustainability.

Impact investors and DFIs provide catalytic capital for sustainable infrastructure projects in emerging markets. These stakeholders are motivated by triple-bottom-line outcomes—financial returns, social inclusion, and environmental sustainability. To attract their interest, modular gas infrastructure projects must present compelling investment cases supported by robust business models, risk mitigation strategies, and quantifiable development impacts. Metrics such as CO_2-equivalent emissions reduced, households or enterprises served, and number of jobs created are vital for impact reporting. Aligning projects with climate finance frameworks (e.g., Green Climate Fund, blended finance platforms) and ESG benchmarks improves their attractiveness to DFIs and sustainability-oriented venture capitalists. Transparent governance structures, local capacity-building initiatives, and inclusive stakeholder engagement also strengthen investor confidence and de-risk project pipelines.

Community leaders, local administrators, and non-technical stakeholders play a crucial role in shaping public perception and facilitating project acceptance at the grassroots level. Their concerns often revolve around affordability, safety, community benefits, and long-term viability. Simplified communication—through infographics, participatory workshops, and local language materials—can help demystify modular gas technologies and build trust. Emphasizing tangible benefits such as improved lighting, cooking services, reduced fuelwood dependency, and new livelihood opportunities can foster community support. Inclusion of local labor in construction and operations, along with feedback mechanisms for grievance redress and service quality monitoring, reinforces social license to operate. In regions with historical energy access deficits or environmental injustices, engagement must also acknowledge past grievances and clearly differentiate modular gas from extractive fossil fuel models (Alonge *et al*., 2021; Owobu *et al*., 2021).

Target audience segmentation is fundamental to the effective marketing and adoption of modular gas infrastructure in decentralized energy systems. Each group—government agencies, industrial users, rural developers, financiers, and community stakeholders—has distinct priorities, requiring tailored messaging and engagement strategies. By addressing these diverse needs through customized content, delivery channels, and value propositions, project developers and technology providers can accelerate deployment, build lasting partnerships, and enhance the overall sustainability and inclusivity of decentralized gas-based energy solutions.

2.3 Buyer Journey Stages in Decentralized Energy Markets

In decentralized energy markets, the buyer journey for energy solutions such as modular gas infrastructure follows a distinct and often complex path, shaped by technical constraints, financial risks, and diverse stakeholder needs. Understanding the sequential stages of this journey—awareness, consideration, decision, and post-deployment—is essential for designing effective marketing strategies and support services that guide customers from problem identification to long-term engagement (Shahin *et al*., 2019; Hai-Jew, 2020). Each phase requires tailored communication, technical assistance, and financial modeling to facilitate informed choices and ensure successful deployment as shown in figure 2.

The awareness stage begins when stakeholders identify a pressing challenge related to energy access, reliability, or cost efficiency. In many remote or underserved regions, electricity supply is either non-existent, unstable, or heavily reliant on diesel generators that are expensive, polluting, and logistically difficult to maintain. Industrial operations in off-grid areas, agro-processing facilities, rural health centers, and small towns often struggle with high operational costs due to unreliable energy. During this stage, buyers may not yet be aware of modular gas as a viable solution. Instead, their focus is on understanding the nature and scale of their energy problem—such as power outages, high diesel bills, or supply chain limitations. Therefore, marketing efforts must be geared toward educational content: white papers, community case studies, and policy briefs that explain the implications of energy deficits and introduce cleaner, decentralized alternatives. Public forums, sector conferences, and digital campaigns also serve as vital channels for raising awareness, especially among non-technical decision-makers.

In the consideration stage, potential buyers actively explore alternative energy solutions to address their challenges. This phase involves comparing multiple options, such as extending grid connections, deploying renewable mini-grids, continuing diesel use, or adopting modular gas systems. Here, stakeholders begin assessing the pros and cons of each solution based on technical performance, fuel availability, environmental impact, and capital costs. Modular gas infrastructure competes directly with diesel and renewables. Marketers must provide comparative tools, including lifecycle cost analyses, emissions calculators, and scenario-based ROI models. Technical datasheets, feasibility studies, and testimonials from peer institutions are critical assets at this stage, helping buyers visualize the operational and financial trade-offs of each option. Decision support content should address local energy needs, supply chain logistics, and integration with existing infrastructure to guide the buyer toward gas-based solutions when appropriate (Allaoui *et al*., 2019; Ramaswamy *et al*., 2020).

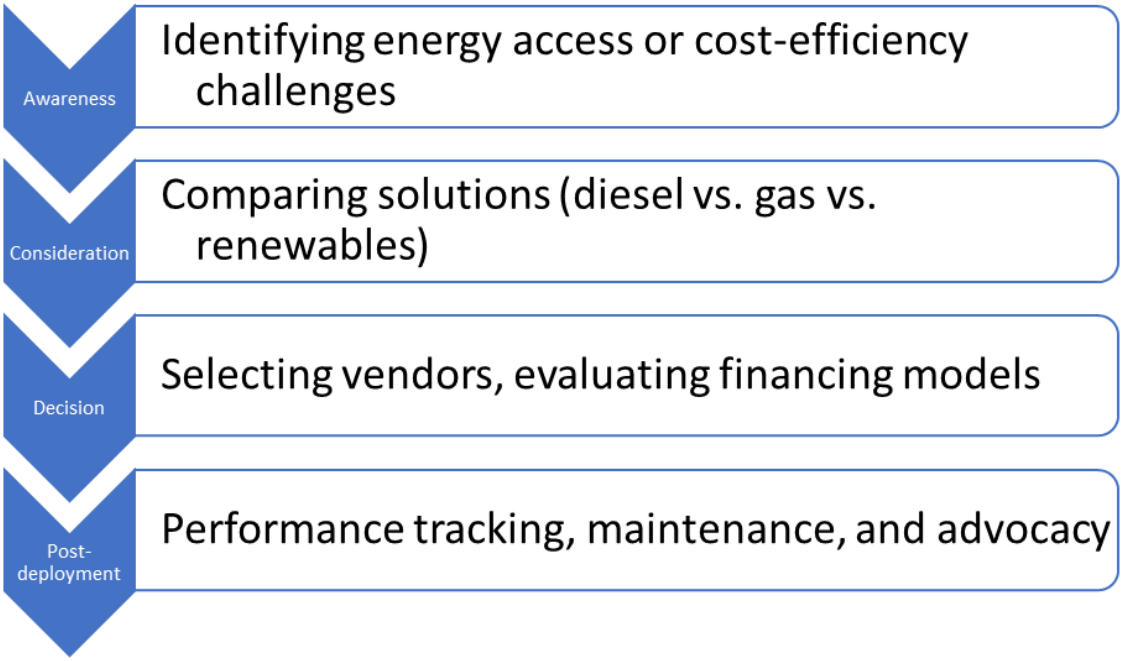

Fig 2: Buyer Journey Stages in Decentralized Energy Markets

The decision stage marks the point where buyers select vendors, negotiate contracts, and determine financing models. Key concerns here include equipment reliability, service quality, regulatory compliance, and financing flexibility. Vendors must differentiate themselves through clear value propositions, robust after-sales support plans, and proven technology performance. Buyers may request pilot projects, conduct technical audits, or seek endorsements from third-party experts. Flexible financing options—such as lease-to-own models, energy-as-a-service contracts, or blended finance packages—can significantly influence purchasing decisions. Transparency in cost structure, risk-sharing mechanisms, and compliance with environmental or ESG standards also weigh heavily in the final selection. During this phase, marketers must engage with procurement teams, financiers, and legal advisers, offering tailored proposals and due diligence documentation.

Finally, in the post-deployment stage, the buyer evaluates the actual performance of the deployed system. Key activities include monitoring fuel efficiency, emissions reductions, uptime reliability, and maintenance schedules. The success of modular gas infrastructure hinges on continued service quality and the responsiveness of the technology provider. Performance dashboards, remote monitoring systems, and field service plans are essential tools for building buyer confidence and satisfaction. Additionally, users in this stage often become advocates, sharing their success with peers, regulators, or development partners. Encouraging post-installation case studies, co-branded media coverage, and participation in energy forums can amplify the brand's visibility and reinforce its leadership in decentralized energy innovation.

The buyer journey in decentralized energy markets is multifaceted and driven by specific challenges, options, and risks. By aligning marketing and engagement strategies with each stage of this journey, providers of modular gas infrastructure can better support customer decisions, accelerate adoption, and foster long-term partnerships that contribute to inclusive and sustainable energy access (Bolton *et al*., 2018; Pramanik *et al*., 2019).

2.4 Content Types and Formats

Effective marketing of modular gas infrastructure in decentralized energy markets requires the strategic deployment of diverse content types and formats. Given the complex and multidisciplinary nature of energy systems, content must be curated not only to inform, but also to persuade, build trust, and facilitate decision-making across a wide array of stakeholders. From technical specialists and policy-makers to community leaders and financiers, each audience segment demands tailored messaging and delivery formats as shown in figure 3(McLeod *et al*., 2019; Setty *et al*., 2020). This explores key content types—ranging from white papers to interactive tools—and how they serve different functions within the communication ecosystem for modular gas infrastructure.

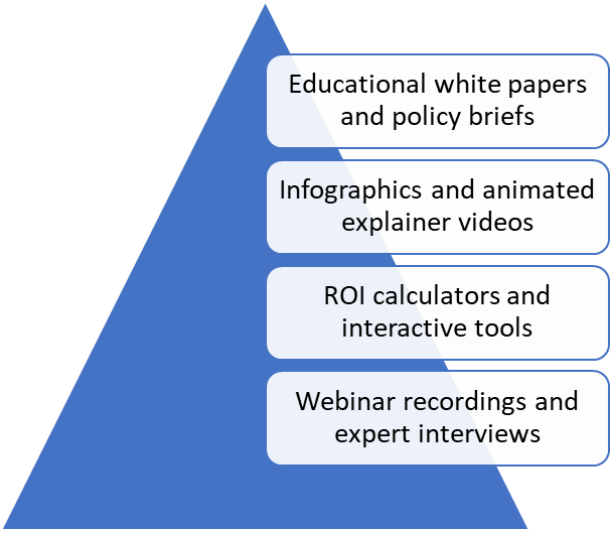

Fig 3: Content Types and Formats

White papers and policy briefs are essential tools for influencing decision-makers, particularly within government agencies, regulators, and development finance institutions. White papers provide comprehensive overviews of modular gas technologies, market potential, environmental benefits,

and policy alignment with national energy goals or global frameworks like SDG 7 and the Paris Agreement. These documents often integrate modeling results, deployment scenarios, and system-level benefits to support evidence-based policy. Policy briefs, on the other hand, distill complex information into concise, actionable insights. They are especially effective in time-constrained settings, such as stakeholder consultations or legislative reviews, where decision-makers require focused recommendations.

Technical datasheets cater to engineering teams, procurement officers, and industrial energy users who need detailed specifications before considering investment or deployment. These documents include information on modular system dimensions, gas throughput capacities, pressure ratings, fuel switching capabilities, and integration with existing power systems. Meanwhile, case studies provide real-world examples of system performance under varying operational conditions. By illustrating successful installations in agriculture, off-grid communities, or industrial parks, case studies help bridge the gap between technical potential and practical impact. They also contextualize performance metrics, such as uptime, fuel savings, and emissions reductions, which are critical for investors and utility operators.

To engage non-technical audiences, including community stakeholders and local administrators, visual formats such as infographics and explainer videos are highly effective. Infographics translate complex data into visually accessible narratives—such as how modular gas systems reduce firewood dependence or improve school lighting in rural areas. These visuals can be disseminated through social media, local print campaigns, or town hall presentations. Animated explainer videos further enhance comprehension by visually demonstrating the operational workflow of gas systems, from fuel supply to end-use (Bryant *et al*., 2018; Brigham and Imbertson, 2020). Such formats are particularly useful in multilingual or low-literacy environments, where traditional textual materials may be less effective.

Return on investment (ROI) calculators and interactive planning tools are vital for commercial and industrial users, as well as mini-grid developers, seeking to evaluate the economic feasibility of modular gas infrastructure. These tools allow users to input variables such as energy demand, fuel prices, and capital expenditure to simulate financial outcomes, including payback periods, internal rate of return (IRR), and total cost of ownership. Interactive tools can also be integrated into web platforms to help users configure system designs, compare technologies (e.g., CNG vs micro-LNG), or assess compatibility with renewable energy sources. By offering customized financial insights, such tools facilitate data-driven decisions and reduce perceived investment risk.

Personal narratives and success stories resonate deeply with community leaders, end users, and grassroots advocates. Testimonials from satisfied industrial clients, farmers, or mini-grid operators can validate the reliability, affordability, and social impact of modular gas systems. These narratives humanize the technology and offer relatable perspectives that build credibility. Video testimonials and photo-rich field reports are particularly powerful, as they combine emotion with evidence, fostering trust among skeptical or cautious stakeholders. Success stories can also be leveraged in funding proposals and public relations campaigns to demonstrate impact and scalability.

Webinars and expert interviews provide dynamic platforms for knowledge exchange, thought leadership, and capacity building. Featuring technical experts, policy-makers, and industry pioneers, these formats allow for real-time engagement on emerging trends, challenges, and solutions related to modular gas infrastructure. Recordings of webinars can be archived and shared widely, supporting continuous learning and outreach. Expert interviews, whether in video or podcast form, help distill complex themes into digestible content and offer authoritative perspectives that reinforce legitimacy and innovation.

A comprehensive content strategy leveraging diverse formats—white papers, datasheets, videos, calculators, testimonials, and webinars—can significantly enhance the marketing and adoption of modular gas infrastructure. By aligning content types with audience needs and cognitive preferences, stakeholders are more effectively informed, persuaded, and mobilized. Ultimately, content that bridges technical rigor with accessibility plays a pivotal role in scaling decentralized energy solutions across complex and diverse markets (Holeman and Kane, 2020; Kostis and Ritala, P, 2020).

2.5 Matrix Structure and Design

In the context of decentralized energy markets, marketing modular gas infrastructure requires a precise and structured approach to content creation and dissemination. This is due to the diversity of stakeholders involved, the complexity of the buyer journey, and the varying levels of technical and financial understanding across audiences. A content matrix offers a strategic solution to this challenge by organizing communication efforts through a cross-tabulation of audience segments, buyer journey stages, and content types (Leisch *et al*., 2018; Ansong and Boateng, 2019). This structured design ensures that each stakeholder receives the right message, at the right time, in the most appropriate format—enhancing message relevance, shortening decision cycles, and improving adoption rates.

The first axis of the matrix focuses on audience segmentation, which categorizes key stakeholders based on their roles and interests in the energy ecosystem. These segments typically include technical managers, procurement officers, government regulators, community decision-makers, financial investors, and development partners. Each group evaluates value propositions differently: technical managers prioritize performance and reliability; regulators are driven by policy alignment and public interest; and investors focus on risk-adjusted returns and ESG impact.

The second axis captures the buyer journey stages—namely, Awareness, Consideration, Decision, and Post-Deployment. In the Awareness stage, audiences seek to understand energy access gaps or inefficiencies. In the Consideration stage, they evaluate alternatives and request data-driven comparisons. The Decision stage involves final selection of vendors, financing, and project design. Post-Deployment focuses on ongoing performance tracking, service feedback, and potential expansion.

The third axis delineates content types, which vary based on the audience's knowledge level, the decision context, and communication preferences. These include policy briefs, white papers, cost-benefit analyses, case studies, technical datasheets, videos, webinars, interactive tools, and ROI calculators. By mapping content types to audience segments and journey stages, the matrix allows marketers to deploy

resources efficiently and achieve greater impact.

For instance, an effective matrix entry for a technical manager in the Consideration stage would be a detailed cost-comparison case study. This content should quantify capital expenditures, lifecycle operating costs, emissions savings, and reliability benchmarks across energy solutions—such as diesel generators, solar hybrid systems, and modular gas technologies (Esan *et al*., 2019; El Hannach *et al*., 2019). The case study should include real-world data and visual aids (e.g., charts and infographics) to support decision-making and facilitate internal presentations to procurement teams or C-suite executives.

A regulator in the Awareness stage, by contrast, would benefit from a policy brief on energy access impact. This document should highlight how modular gas systems can address last-mile energy gaps, reduce dependency on polluting fuels, and contribute to national electrification and climate targets. It may include socio-economic benefits, such as improved air quality, rural employment, and support for industrial growth, alongside references to international best practices and climate agreements.

For an investor in the Decision stage, a highly relevant tool would be an internal rate of return (IRR) modeling tool with an emissions reduction overlay. This interactive model would allow investors to input project-specific data—such as gas prices, installation costs, maintenance schedules, and carbon credit valuations—to generate project IRRs and payback periods. The overlay could show additional value derived from avoided emissions, eligibility for green finance, or alignment with ESG benchmarks (e.g., SASB or EU Taxonomy criteria).

Beyond individual entries, the matrix serves a dynamic function—guiding not just content creation but also distribution strategy. For example, content targeting policymakers might be delivered through policy roundtables and regulatory newsletters, while technical content for energy managers may be shared via industry webinars or engineering forums. Localization and translation can be layered into the matrix to adapt content for specific markets, further increasing relevance and accessibility.

The matrix structure and design approach enables energy solution providers to deliver targeted, contextually appropriate content to diverse stakeholders in decentralized energy markets (Katre and Tozzi, 2018; Sachs *et al*., 2019). By aligning audience needs with the stages of decision-making and suitable content formats, this method optimizes communication efficiency, fosters trust, and enhances the likelihood of successful deployment of modular gas infrastructure solutions.

2.6 Implementation Strategy

A structured implementation strategy is essential for the effective marketing of modular gas infrastructure, particularly within decentralized energy markets characterized by diverse stakeholders, fragmented information ecosystems, and varying levels of technical capacity. The implementation plan must align content dissemination with strategic objectives, ensure localization for different user contexts, and establish mechanisms for continuous performance measurement and feedback (Kirchner *et al*., 2018; Formentini *et al*., 2019). Key components of this strategy include content calendar and channel mapping, localization of content, and a robust feedback loop supported by quantitative and qualitative analytics.

The content calendar serves as a blueprint for the systematic release of marketing materials over a defined timeline, often structured quarterly or biannually. It ensures that content deployment aligns with relevant events such as energy summits, policy announcements, investor forums, or seasonal energy access campaigns. For instance, white papers and policy briefs could be published in the lead-up to government budget cycles or international climate meetings to influence policy discussions. Technical datasheets and ROI calculators may be synchronized with procurement periods for mini-grid projects or industrial fuel-switching programs.

Channel mapping, on the other hand, involves aligning specific content formats with optimal communication platforms to reach target audience segments. For example, LinkedIn and industry-specific newsletters are effective for engaging impact investors, DFIs, and industrial users, offering a professional environment for sharing thought leadership, success stories, and ROI data. Community radio, town hall meetings, and local WhatsApp groups are better suited to community leaders and rural stakeholders, especially in regions with low internet penetration. YouTube, Facebook, and mobile-optimized websites provide broader outreach to non-technical audiences via animated explainer videos, testimonials, and simplified infographics. The implementation strategy must integrate cross-platform consistency while customizing content tone and delivery for each channel.

Localization ensures that content resonates with stakeholders across geographic, linguistic, and socio-economic boundaries. This involves translating materials into local languages, adapting visual elements to reflect local culture and demographics, and contextualizing examples to match real-world challenges faced by target communities (Palsa and Mertala, 2019; Ratminingsih *et al*., 2020). For instance, case studies from dairy cooperatives in Kenya or cassava processors in Nigeria are more relatable for rural African stakeholders than generic global examples.

Technical depth must also be calibrated. Policy briefs for regulators should incorporate legislative references, environmental impact modeling, and cost-benefit analysis, whereas materials for rural community groups should emphasize tangible benefits such as cleaner cooking, reduced firewood use, and improved healthcare outcomes. Visual content, such as infographics, should avoid jargon and use universally recognizable icons (e.g., gas cylinder, school, solar panel). In some contexts, deploying culturally resonant metaphors or local success champions can further enhance relatability and trust.

Furthermore, content should be sensitive to local energy politics, land use concerns, and socio-economic dynamics. For example, in regions where fossil fuel extraction is politically sensitive, modular gas must be framed in terms of clean transition fuels and integration with renewables. Localization also extends to content delivery—ensuring offline availability through printed brochures or radio broadcasts in low-connectivity regions supports inclusivity and knowledge dissemination (Yunes, 2019; Barron *et al*., 2020).

An essential element of implementation is establishing a data-driven measurement and feedback system to assess content effectiveness and guide iterative improvements. Engagement analytics—including page views, video watch time, click-through rates (CTR), and social media shares—

can quantify reach and audience interaction. For platforms like LinkedIn or email campaigns, metrics such as download rates of white papers, webinar attendance, and form submissions for ROI tools provide insight into lead quality and conversion potential (Champion, 2018; McGruer, 2020; Deiss and Henneberry, 2020).

In parallel, stakeholder surveys, post-event feedback forms, and focus group discussions allow for the collection of qualitative feedback. These tools help assess clarity of messaging, perceived relevance, and barriers to adoption. For example, feedback from mini-grid developers may indicate a need for deeper integration guidelines, while community feedback might highlight safety concerns or unclear operating instructions.

A cyclical review process should be implemented, whereby content performance data is reviewed monthly or quarterly to inform updates to the content calendar, format selection, and messaging strategy. This adaptive management approach ensures that marketing remains aligned with stakeholder needs, market dynamics, and technological developments. Incorporating user feedback into content revision enhances legitimacy and stakeholder ownership, especially in participatory energy projects.

A well-executed implementation strategy integrates content planning, multi-channel dissemination, localization, and performance evaluation to support the effective marketing of modular gas infrastructure. By aligning content with the informational needs and preferences of distinct audience segments—ranging from investors to local communities—and embedding adaptive feedback mechanisms, this strategy maximizes stakeholder engagement and accelerates technology adoption in decentralized energy markets (Mitra *et al*., 2018; Dorgbefu, 2020; DiBella, 2020).

3. Conclusion

The successful promotion and adoption of modular gas infrastructure in decentralized energy markets depend not only on technical and economic merits but also on the clarity, relevance, and strategic delivery of information to diverse stakeholders. This necessitates a structured and deliberate communication strategy, such as the content matrix model, which aligns messaging with the specific needs, expectations, and decision-making stages of target audiences. From technical managers evaluating performance trade-offs to policymakers shaping energy access agendas and investors seeking ESG-aligned returns, each stakeholder requires tailored content to guide understanding and action.

Aligning technical messaging with audience context is essential in overcoming barriers such as information asymmetry, fragmented markets, and low familiarity with emerging gas technologies. Communicating in formats that resonate—whether policy briefs, cost-benefit analyses, or interactive modeling tools—not only improves comprehension but also builds trust, accelerates buying decisions, and fosters long-term engagement. The effectiveness of this approach lies in recognizing that a one-size-fits-all communication strategy is insufficient in complex and evolving energy ecosystems, particularly in regions characterized by varied infrastructure, regulatory frameworks, and levels of energy literacy.

Moving forward, the proposed content matrix should be tested through targeted pilot campaigns across representative market segments. These pilots can help validate the effectiveness of content formats, channels, and messaging for different audience profiles. Collecting audience feedback through surveys, interviews, and engagement analytics will inform iterative improvements to the matrix design and content delivery mechanisms. Once refined, the model can be scaled up to support broader marketing and outreach programs, reinforcing the market position of modular gas technologies and accelerating their role in the global energy transition. Ultimately, strategic communication is not a peripheral function—it is central to unlocking investment, adoption, and impact in decentralized energy systems.

4. Reference

1. Ajonbadi HA, Otokiti BO, Adebayo P. The efficacy of planning on organisational performance in the Nigeria SMEs. Eur J Bus Manag. 2016;24(3):25-47.
2. Ajonbadi HA, Aboaba Mojeed-Sanni B, Otokiti BO. Sustaining competitive advantage in medium-sized enterprises (MEs) through employee social interaction and helping behaviours. J Small Bus Entrep. 2015;3(2):1-16.
3. Akinbola OA, Otokiti BO. Effects of lease options as a source of finance on profitability performance of small and medium enterprises (SMEs) in Lagos State, Nigeria. Int J Econ Dev Res Invest. 2012;3(3):70-6.
4. Akinbola OA, Otokiti BO, Akinbola OS, Sanni SA. Nexus of born global entrepreneurship firms and economic development in Nigeria. Ekonomicko-manazerske Spektrum. 2020;14(1):52-64.
5. Allaoui H, Guo Y, Sarkis J. Decision support for collaboration planning in sustainable supply chains. J Clean Prod. 2019;229:761-74.
6. Alonge EO, Eyo-Udo NL, Chibunna B, Ubanadu AID, Balogun ED, Ogunsola KO. Digital transformation in retail banking to enhance customer experience and profitability. Iconic Res Eng J. 2021;4(9).
7. Alonge EO, Eyo-Udo NL, Ubanadu BC, Daraojimba AI, Balogun ED, Ogunsola KO. Enhancing data security with machine learning: A study on fraud detection algorithms. J Data Secur Fraud Prev. 2021;7(2):105-18.
8. Amos AO, Adeniyi AO, Oluwatosin OB. Market based capabilities and results: inference for telecommunication service businesses in Nigeria. Eur Sci J. 2014;10(7).
9. Ansong E, Boateng R. Surviving in the digital era–business models of digital enterprises in a developing economy. Digit Policy Regul Gov. 2019;21(2):164-78.
10. Barron M, Cobo C, Muñoz-Najar A, Ciarrusta IS. Exploring the Deployment, Perceived Effectiveness, and Monitoring of Remote and Remedial Learning. 2020.
11. Bolton RN, McColl-Kennedy JR, Cheung L, Gallan A, Orsingher C, Witell L, *et al*. Customer experience challenges: bringing together digital, physical and social realms. J Serv Manag. 2018;29(5):776-808.
12. Brigham JK, Imbertson P. Energy-Transition Education in a Power Systems Journey: Making the Invisible Visible and Actionable. Am J Econ Sociol. 2020;79(3):981-1022.
13. Bryant C, Rodgers C, Wigfall T, editors. New Modes: Redefining Practice. John Wiley & Sons; 2018.
14. Champion J. Inbound content: A step-by-step guide to doing content marketing the inbound way. John Wiley & Sons; 2018.
15. Daraojimba AI, Ubamadu BC, Ojika FU, Owobu O, Abieba OA, Esan OJ. Optimizing AI models for crossfunctional collaboration: A framework for

improving product roadmap execution in agile teams. IRE J. 2021;5(1):14.
16. Deiss R, Henneberry R. Digital marketing for dummies. John Wiley & Sons; 2020.
17. DiBella J. The spatial representation of business models for climate adaptation: An approach for business model innovation and adaptation strategies in the private sector. Bus Strategy Dev. 2020;3(2):245-60.
18. Dorgbefu EA. Using business analytics to tailor real estate messaging for inclusive housing solutions and investment impact. Int J Eng Technol Res Manag. 2020;4(12):156.
19. El Hannach M, Ahmadi P, Guzman L, Pickup S, Kjeang E. Life cycle assessment of hydrogen and diesel dual-fuel class 8 heavy duty trucks. Int J Hydrog Energy. 2019;44(16):8575-84.
20. Esan AB, Agbetuyi AF, Oghorada O, Ogbeide K, Awelewa AA, Afolabi AE. Reliability assessments of an islanded hybrid PV-diesel-battery system for a typical rural community in Nigeria. Heliyon. 2019;5(5).
21. Fagbore OO, Ogeawuchi JC, Ilori O, Isibor NJ, Odetunde A, Adekunle BI. Developing a Conceptual Framework for Financial Data Validation in Private Equity Fund Operations. 2020.
22. Formentini M, Ellram LM, Boem M, Da Re G. Finding true north: Design and implementation of a strategic sourcing framework. Ind Mark Manag. 2019;77:182-97.
23. Hai-Jew S, editor. Visual Approaches to Instructional Design, Development, and Deployment. IGI Global; 2020.
24. Holeman I, Kane D. Human-centered design for global health equity. Inf Technol Dev. 2020;26(3):477-505.
25. Katre A, Tozzi A. Assessing the sustainability of decentralized renewable energy systems: A comprehensive framework with analytical methods. Sustainability. 2018;10(4):1058.
26. Kirchner JE, Waltz TJ, Powell BJ, Smith JL, Proctor EK. Implementation strategies. In: Dissemination and implementation research in health: Translating science to practice. 2nd ed. 2018.
27. Kostis A, Ritala P. Digital artifacts in industrial co-creation: how to use VR technology to bridge the provider-customer boundary. Calif Manag Rev. 2020;62(4):125-47.
28. Lawal AA, Ajonbadi HA, Otokiti BO. Leadership and organisational performance in the Nigeria small and medium enterprises (SMEs). Am J Bus Econ Manag. 2014;2(5):121.
29. Leisch F, Dolnicar S, Grün B. Market segmentation analysis: Understanding it, doing it, and making it useful. 2018.
30. McGruer D. Dynamic digital marketing: Master the world of online and social media marketing to grow your business. John Wiley & Sons; 2020.
31. McLeod LJ, Please PM, Hine DW. Using human behaviour change strategy to improve the management of invasive species. In: Community-based Control of Invasive Species. CSIRO Publishing, Clayton, Australia; 2019.
32. Mitra A, O'Regan N, Sarpong D. Cloud resource adaptation: A resource based perspective on value creation for corporate growth. Technol Forecast Soc Change. 2018;130:28-38.
33. Nwani S, Abiola-Adams O, Otokiti BO, Ogeawuchi JC. Building operational readiness assessment models for micro, small, and medium enterprises seeking government-backed financing. J Front Multidiscip Res. 2020;1(1):38-43.
34. Odetunde A, Adekunle BI, Ogeawuchi JC. A Systems Approach to Managing Financial Compliance and External Auditor Relationships in Growing Enterprises. 2021.
35. Odetunde A, Adekunle BI, Ogeawuchi JC. Developing Integrated Internal Control and Audit Systems for Insurance and Banking Sector Compliance Assurance. 2021.
36. Ogeawuchi JC, Uzoka AC, Abayomi AA, Agboola OA, Gbenle TP, Ajayi OO. Innovations in Data Modeling and Transformation for Scalable Business Intelligence on Modern Cloud Platforms. Iconic Res Eng J. 2021;5(5):406-15.
37. Ojika FU, Owobu O, Abieba OA, Esan OJ, Daraojimba AI, Ubamadu BC. A conceptual framework for AI-driven digital transformation: Leveraging NLP and machine learning for enhanced data flow in retail operations. IRE J. 2021;4(9).
38. Ojika FU, Owobu WO, Abieba OA, Esan OJ, Ubamadu BC, Ifesinachi A. Optimizing AI Models for Cross-Functional Collaboration: A Framework for Improving Product Roadmap Execution in Agile Teams. 2021.
39. Olajide JO, Otokiti BO, Nwani S, Ogunmokun AS, Adekunle BI, Fiemotongha JE. A strategic model for reducing days-on-hand (DOH) through logistics and procurement synchronization. IRE J. 2021;4(1).
40. Olajide JO, Otokiti BO, Nwani S, Ogunmokun AS, Adekunle BI, Fiemotongha JE. Designing a financial planning framework for managing SLOB and write-off risk in fast-moving consumer goods (FMCG). IRE J. 2020;4(4).
41. Onifade AY, Ogeawuchi JC, Abayomi AA, Agboola OA, George OO. Advances in Multi-Channel Attribution Modeling for Enhancing Marketing ROI in Emerging Economies. Iconic Res Eng J. 2021;5(6):360-76.
42. Onifade AY, Ogeawuchi JC, Abayomi AA, Agboola OA, Dosumu RE, George OO. A conceptual framework for integrating customer intelligence into regional market expansion strategies. Iconic Res Eng J. 2021;5(2):189-94.
43. Otokiti BO, Akinbola OA. Effects of lease options on the organizational growth of small and medium enterprise (SME's) in Lagos State, Nigeria. Asian J Bus Manag Sci. 2013;3(4):1-12.
44. Otokiti BO, Akorede AF. Advancing sustainability through change and innovation: A co-evolutionary perspective. In: Innovation: Taking creativity to the market. Book of Readings in Honour of Professor SO Otokiti. 2018;1(1):161-7.
45. Otokiti BO, Onalaja AE. The role of strategic brand positioning in driving business growth and competitive advantage. Iconic Res Eng J. 2021;4(9):151-68.
46. Otokiti BO. Mode of entry of multinational corporation and their performance in the Nigeria market [doctoral dissertation]. Ota: Covenant University; 2012.
47. Otokiti BO. A study of management practices and organisational performance of selected MNCs in emerging market-A Case of Nigeria. Int J Bus Manag Invent. 2017;6(6):1-7.
48. Otokiti BO. Social media and business growth of women

entrepreneurs in Ilorin metropolis. Int J Entrep Bus Manag. 2017;1(2):50-65.
49. Otokiti BO, Igwe AN, Ewim CPM, Ibeh AI. Developing a framework for leveraging social media as a strategic tool for growth in Nigerian women entrepreneurs. Int J Multidiscip Res Growth Eval. 2021;2(1):597-607.
50. Owobu WO, Abieba OA, Gbenle P, Onoja JP, Daraojimba AI, Adepoju AH, *et al*. Review of enterprise communication security architectures for improving confidentiality, integrity, and availability in digital workflows. IRE J. 2021;5(5):370-2.
51. Owobu WO, Abieba OA, Gbenle P, Onoja JP, Daraojimba AI, Adepoju AH, *et al*. Modelling an effective unified communications infrastructure to enhance operational continuity across distributed work environments. IRE J. 2021;4(12):369-71.
52. Palsa L, Mertala P. Multiliteracies in local curricula: Conceptual contextualizations of transversal competence in the Finnish curricular framework. Nord J Stud Educ Policy. 2019;5(2):114-26.
53. Pramanik HS, Kirtania M, Pani AK. Essence of digital transformation—Manifestations at large financial institutions from North America. Future Gener Comput Syst. 2019;95:323-43.
54. Ramaswamy S, Madan T, Thyagarajan K, Pinto JM, Laínez-Aguirre JM. Advanced decision-support technologies for the design and management of industrial gas supply chains. In: Smart Manufacturing. Elsevier; 2020. p. 387-421.
55. Ratminingsih NM, Budasi IG, Kurnia WDA. Local Culture-Based Storybook and Its Effect on Reading Competence. Int J Instr. 2020;13(2):253-68.
56. Sachs T, Gründler A, Rusic M, Fridgen G. Framing microgrid design from a business and information systems engineering perspective. Bus Inf Syst Eng. 2019;61(6):729-44.
57. Setty K, Jiménez A, Willetts J, Leifels M, Bartram J. Global water, sanitation and hygiene research priorities and learning challenges under Sustainable Development Goal 6. Dev Policy Rev. 2020;38(1):64-84.
58. Shahin M, Zahedi M, Babar MA, Zhu L. An empirical study of architecting for continuous delivery and deployment. Empir Softw Eng. 2019;24(3):1061-108.
59. Sharma A, Adekunle BI, Ogeawuchi JC, Abayomi AA, Onifade O. Governance Challenges in Cross-Border Fintech Operations: Policy, Compliance, and Cyber Risk Management in the Digital Age. 2021.
60. Sharma A, Adekunle BI, Ogeawuchi JC, Abayomi AA, Onifade O. IoT-enabled Predictive Maintenance for Mechanical Systems: Innovations in Real-time Monitoring and Operational Excellence. 2019.
61. Yunes EE. Decolonizing Nunavut's Art Market. 2019.