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Empowering Youth through Fourth Industrial Revolution Technologies: Contextual Analysis and Design Framework for a Youth Resource Centre in Owerri

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Abstract
Fourth Industrial Revolution (4IR) capitalises on such technologies as AI and blockchain to empower young people in urban areas. The paper is a proposal of 4IR-driven youth resource centre in Owerri, Nigeria, to tackle youth unemployment and urban restlessness (>70%). The centre can be integrated with the master plan of Owerri, as it combines the concepts of inclusive urbanism and visual computing (e.g. visualisation of urban analytics using AI), which promotes better spatial equity and accessibility. Results indicate the 4IR training might decrease criminal activities by half by providing employment, and with the support of African tech hubs such as Konza Technopolis. Urban planning is optimised through AI and IoT visualisations. It is recommended that policy reforms and partnering with stakeholders should be implemented to improve urban resilience.

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1. Introduction

The Fourth Industrial Revolution (4IR) is a revolutionary change in the world communities, which combines physical, digital, and biological systems with the help of advanced technologies artificial intelligence (AI), machine learning (ML), Internet of Things (IoT), robotics, blockchain, and big data analytics (Schwab, 2016) [23]. Contrary to the earlier industrial revolutions, 4IR will be distinguished by its unparalleled pace, reach, and systemic nature with the ability to transform urban economies, the labour market, and social relationships (World Economic Forum, 2018) [30]. As part of the 4IR foundation, visual computing is expected to improve urban planning by using AI-based urban analytics and data visualisation based on IoT to model the spatial patterns, optimising the infrastructure and inform the policymaking (Batty, 2018) [4]. An example of this is the use of AI visualisation to map the trends of unemployment in cities, and the use of IoT dashboard to track infrastructure performance in real time to create a data-driven urban resilience. In less developed countries such as Nigeria, where the population counts more than 217 million people, and the number of people below the age of 70 is more than 70 million, these technologies provide the untapped potential of empowerment through skill building, entrepreneurship, and innovation (UNICEF, 2018). Nonetheless, if not integrated strategically, 4IR will increase disparity because of the existence of digital and infrastructure gaps, especially in urbanised cities with fast growth (UN-Habitat, 2020) [26].

The state of Imo, in southeastern Nigeria, with Owerri as its capital, is one example of such challenges. Owerri, with a population of over 1 million people, is a very active trade, educational and governmental centre, but is marred with extreme socio-economic challenges. The unemployment rate is over 70 percent, which is much higher than the 53 percent national average of Nigeria, and is one of the highest in the world (Adieye, 2023; National Bureau of Statistics, 2022) [1, 16]. Rural-urban migration (3% per year growth), inefficient curricula that fails to meet 4IR needs and lacks infrastructure (less than 40 per cent of roads paved) drive this economic exclusion, which leads to restlessness and insecurity in cities (Okehielem *et al*., 2021) [9]. The empirical

research reveals that half of the offenses in Owerri consist of kidnapping and vandalism committed by unemployed youth, which proves the nexus between economic marginalization and urban instability (Ebebe & Uzoagba, 2023) [17]. These challenges are made even worse by the digital divide, as limited access to reliable internet is gained by only 24 percent of young people in Owerri, restricting their involvement in 4IR-powered opportunities (International Telecommunication Union, 2021) [12].

Inclusive urbanism provides an opportunity to guide urban planning to deal with these issues by encouraging spatial equity, accessibility and sustainability (UN-Habitat, 2020) [26] [26]. Inclusive urbanism supports mixed-use zoning, availability of open spaces, and technology-based interventions to make certain that the marginalised populations, including youth and women, get to enjoy urban development. The implementation of urban planning with 4IR technologies in Owerri may legalise the informal economy (65 percent), increase connectivity, and reduce crime by using interventions (Imo State Development Plan, 2021-2025). Here, visual computing is crucial: AI-based city management can visualize the areas of unemployment, whereas IoT dashboard can be used to optimize a transportation network (as the example of 15 percent of traffic jam in Lagos reduced with the help of AI analytics, UNECA, 2024) [27]. These tools are consistent with the National Development Plan (2021-2025) of Nigeria that focuses on the empowerment of youth and intelligent urbanisation (African Union, 2015) [2].

This research paper will offer a 4IR-based youth resource centre in Owerri to empower 10,000 youth every year by training them on skills in AI, IoT and blockchain coupled with entrepreneurship and innovation programmes. The centre employs visual computing to improve urbanisation and provides AI visualisation to map the results of training and IoT dashboards to measure the efficiency of infrastructure. Based on the African experience, including Konza Technopolis in Kenya that has developed 2,000 jobs in the country because of 4IR-driven technology zones, and Tshimologong in South Africa that has developed 1,500 jobs because of university-community collaboration, the proposed centre is in tandem with the master plan of Owerri, to make sure that it is accessible and sustainable (Konza Technopolis Development Authority, 2023; Tshimologong, 2025) [13, 25]. The research question that drives this research is as follows: How can a youth resource centre based on 4IR, with visual computing, combat unemployment and restlessness in Owerri and at the same time fit in inclusive urbanism? This question is vital in addressing the urban problem aspects of Owerri; unemployment, crime and infrastructural gaps with interventions that are spatially integrated and technology based. The significance of the study can be related to the fact that it will help to bridge the digital divide, to align the development objectives of Nigeria with the discourse on smart urbanisation, and will also provide a model that can be followed by other African cities experiencing similar socio-economic pressures.

2. Literature Review

2.1. 4IR Technologies and Urban Youth Empowerment

The Fourth Industrial Revolution (4IR) combines the new technologies, namely, artificial intelligence (AI), Internet of things (IoT), blockchain, robotics, and big data to transform urban systems and economies (Schwab, 2016) [23]. The technologies allow smarter infrastructure, e.g. AI-based city analytics to optimise traffic and IoT dashboard to monitor urban services in real-time, improving city planning and resilience (Batty, 2018) [4]. As an example, smart city project in Lagos has served to effectively cut down traffic jam by 15% due to visual AI visualization, which illustrates the effectiveness of visual computing in managing cities (UNECA, 2024). In Africa, 4IR technologies lead to the empowerment of youth by providing employment in technological or tech-oriented fields such as fintech and e-commerce, as tech startups in Nigeria brought in a total of 1.2 billion dollars in 2022 (African Union, 2023) [2]. Nevertheless, the digital divide is also limiting: only a quarter of African young people have access to a reliable internet connexion, which restricts access to opportunities of 4IR (International Telecommunication Union, 2021) [12]. The concept of inclusive urbanism, focusing on equitable access by using mixed-use zoning and public space, offers a platform to implement 4IR technologies into urban planning such that benefits can be realised among minority groups, such as youth and women (UN-Habitat, 2020) [26]. This can be refined by visual computing, which can map digital access disparities and visualise infrastructure requirements, e.g. in the IoT-based urban renewal in Johannesburg (City of Johannesburg, 2020) [6].

2.2. Urban Youth Challenges

On the world level, 1.8 billion young people are at a high risk of skills shortage, 30% of whom are expected to not have 4IR-related degrees in the near future, contributing to unemployment in cities (Deloitte, 2018). The youth unemployment is 53 percent on average in Nigeria, whereas it is above 70 percent in Owerri because of outdated education systems and 60 percent disparity between the skills of the young people and the demands of the market (Ebebe & Uzoagba, 2023; Nwosu, 2021) [17 20]. This economic marginalisation contributes to the city anxiety as half of the crimes committed in Owerri, including vandalism and kidnapping, were committed by unemployed youth (Ebebe & Uzoagba, 2023) [17]. Online learning and tech employment are also further limited by the digital divide, only 24% of which are internet users (International Telecommunication Union, 2021) [12]. Visual computing may solve these issues by mapping areas of unemployment and visualising skill shortages so that specific actions can be taken, as seen in developing settings where AI analytics, in turn, significantly increased vocational training outcomes (20% more) (Rodriguez, 2023) [22]. This is complemented by inclusive urbanism which facilitates availability of tech hubs and public Wi-Fi areas to eliminate digital inequalities (UN-Habitat, 2020) [26].

2.3. Comparative Urban Tech Hubs

African technology centres offer solutions to youth empowerment through 4IRs. The Konza Technopolis, an example of a smart city in Kenya, combining green zoning, and AI analytics by developing more than 2,000 jobs since 2019, is visualising land use and infrastructure optimally with AI (Konza Technopolis Development Authority, 2023) [13]. The Tshimologong Precinct, a university-community programme in South Africa uses the IoT dashboards to urbanise the area and create 1,500 employment opportunities and educate a cohort of 500 youth to code and become an entrepreneur every year (Tshimologong, 2025) [25]. Though

the Yaba Tech Hub in Nigeria encourages the emergence of more than 1,000 startups, the hub faces a significant problem of infrastructure shortages, including power outages of 60 percent, which hinders scalability (Micheni *et al*., 2021) [15]. These examples demonstrate the need to consider 4IR technologies in urban planning and visual computing to track progress and achieve inclusivity and at the same time emphasise the issue of funding and infrastructure shortages that Owerri needs to overcome.

2.4. Integration and Applicability to Owerri.

Seventy percent of the population is unemployed, half of the population is involved in crime, and the digital divide in Owerri is 24 percent, which can be seen as a reflection of other African urban indicators, but the situation is aggravated by the low level of 4IR integration in the city master plan (Okehielem *et al*., 2021) [9]. An example of aligning the Imo State Development plan (2021-2025) with a 4IR-oriented youth resource centre can be adding AI visualisations as a resource to train skills and IoT dashboards to monitor infrastructure and improve spatial equity and sustainability. Drawing upon the tech-based zoning of Konza and the community-based model of Tshimologong, the centre will be able to empower 10,000 youth every year, cut crime rates by half, and formalize the 65 percent informal economy of Owerri, visual computers will help in ensuring the data-driven integration of urban areas (UNECA, 2024).

Table 1: 4IR Technologies for Urban Youth Empowerment

Technology	Urban Benefits	Challenges
AI & ML	Careful preparation and the development of jobs	Lack of skills and exorbitant expenses
IoT & Robotics	Efficiency of infrastructure	Deficits in urban infrastructure
Blockchain	Safe urban transactions	Literacy and the digital divide
3D Printing	Localised manufacturing in metropolitan areas	Barriers to access and cost
Biotechnology	Urban health solutions	Complexities of regulations

3. Methodology

The conceptual analysis presented in this study uses secondary data (20162025) obtained through academic databases (Scopus, Google Scholar) and policy documentation to plan a 4IR-based youth resource centre in Owerri. This was to test its ability to use 4IR technologies and visual computing to tackle the issues of youth unemployment and urban restlessness and align with inclusive urbanism. The search involved the following keywords: 4IR youth empowerment Nigeria, Konza Technopolis urban planning, AI visualisation urban development, and IoT applications in smart cities, which returned 150 relevant sources, and 29 of them were picked in accordance to relevance to 4IR, urban planning, and Nigerian contexts. The sources were peer-reviewed journals, government reports (e.g. National Bureau of Statistics, 2022) [1, 16], and policy frameworks (e.g. Imo State Development Plan, 2021-2025).

Analysis of data was done using thematic coding method (Thomas and Harden, 2008) [24]. Open coding was used to identify critical issues, including 70 percent unemployment among youth and 50 percent of attributing crime to unemployed youth, and axial coding was used to put interventions into context, like tech hubs and visual computing applications (e.g., AI-driven urban analytics). NVivo software was used to make codes systematic, which makes sure that themes such as digital divides (24% internet access) and shortage of infrastructure (40% paved roads) were coded efficiently. To measure the effects of 4IR training, statistical analysis performed using SPSS was used to test correlations, including 4IR training and employability ($r=0.822$, $p<0.05$) and unemployment-crime ($r=0.741$, $p<0.05$). Synthesising data into AI-created visualisations, including the mapping of unemployment cycles (Figure 1) and operational structures (Figure 2), was integrated into visual computing because of the emphasis of VCIBA on computational approaches to visual computing (Batty, 2018) [4]. The case study area was Owerri, Nigeria, which has a large youth unemployment rate and is urban restless, hence, critical in terms of 4IR interventions. No primary data were involved and all data was publicly available and there was no need to use ethics approval. There are limitations such as use of secondary data, which might not be real-time, whereas policy reports might be biassed. To help alleviate this, several sources were cross-checked. Access to Data and Materials: This does not apply because no datasets were produced. The sources of all data include referred to sources, such as National Bureau of Statistics (2022) [16], Imo State Development Plan (2021-2025), or peer-reviewed articles mentioned in the References.

4. Contextual Analysis of Owerri

4.1. Economic and Urban Dynamics

Owerri, the capital of Imo State in Nigeria, is a thriving urban hub with a population of more than one million people, owing to a 3% yearly urbanisation rate. As a commerce, education, and governance hub, it has thriving markets and institutions, but it also confronts enormous economic issues. The informal economy accounts for 65% of economic activity, with street selling and small-scale businesses prominent due to a lack of official work prospects (Ogbuefi *et al*., 2025) [18]. Youth unemployment in Nigeria is among the greatest, at more than 70%, surpassing the national average of 53% (Adieye, 2023) [1]. This economic marginalisation is linked to urban unrest, with jobless youth accounting for half of all crimes like as vandalism, theft, and abduction (Ebebe & Uzoagba, 2023) [17]. Infrastructure deficiencies compound these problems: barely 40% of roads are paved, limiting transportation and trade, and frequent power outages (60% downtime) stymie company operations and technology adoption (Okehielem *et al*., 2021) [9]. Visual computing provides solutions: AI-driven spatial analytics can map economic activity and unemployment hotspots, as illustrated in Lagos' economic zoning models, and IoT dashboards may monitor infrastructure performance and highlight investment opportunities (UNECA, 2024). These instruments have the potential to formalise Owerri's informal economy and improve urban resilience, in line with Nigeria's National Development Plan (2021-2025) aims for economic diversification (African Union, 2015) [2].

4.2. Education and Skills

Owerri's school system struggles to equip young people for 4IR needs. Local curricula, which are largely focused on conventional disciplines, have a 60% skill mismatch with industry demands, especially in AI, IoT, and blockchain (Nwosu, 2021) [20]. Vocational training has a 30% financial shortage, restricting access to practical skill development (Imo Youth Development Agency, 2023). The digital divide further limits opportunities: just 24% of youngsters have reliable internet connection, compared to 36% nationwide, impeding online learning and tech employment involvement (International Telecommunication Union, 2021) [12]. This gap adds to a cycle of unemployment and restlessness, with 70% of young people lacking employable skills (Ebebe & Uzoagba, 2023) [17]. Visual computing can help to bridge this gap: AI-powered talent evaluation systems, such as those employed in South Africa's Tshimologong Precinct, can identify training gaps, while IoT-enabled learning platforms can supply real-time instructional content despite infrastructure restrictions (Tshimologong, 2025) [25]. Establishing a 4IR-focused resource centre might fill these shortages by educating 10,000 youngsters each year and prioritising 30% female involvement to enhance gender equity (UNECA, 2024).

4.3. Urban Planning and 4IR Integration

Owerri's urban planning framework, as defined in its master plan, does not use 4IR technologies, unlike Kenya's Konza Technopolis, which employs AI analytics for tech-driven zoning (Konza Technopolis Development Authority, 2023) [13]. Only 20% of Owerri's urban space is zoned for mixed-use development, restricting access for young people and marginalised groups (Okehielem *et al*., 2021) [9]. Poor connectivity (50% of communities lack dependable public transit) and insufficient public spaces create spatial disparities (Imo State Development Plan, 2021-2025). Inclusive urbanism, which prioritises fair access and sustainability, provides a solution, with visual computing playing an important part. AI visualisations can identify accessibility gaps, as shown in Johannesburg's smart city projects, and IoT sensors can improve public safety by monitoring high-crime areas in real time (City of Johannesburg, 2020) [6]. A 4IR resource hub integrated into Owerri's urban fabric, with 20% green areas and 30% technology facilities, has the potential to improve spatial fairness and connection, matching with the state's 50% connectivity objective by 2025 (UN Habitat, 2020) [26].

5. Results

5.1. Youth Unemployment and Urban Crime

The research finds a substantial association between Owerri's youth unemployment rate, reaching 70%, and urban crime, with 50% of incidents such as vandalism, theft, and kidnapping directly related to jobless youth ($r=0.741$, $p<0.05$) (Ebebe & Uzoagba, 2023) [17]. This economic isolation is fuelled by a 65% informal economy, with street selling and unregistered companies dominating due to a lack of official work prospects (National Bureau of Statistics, 2022) [16]. Specific crime hotspots, including Douglas Market and Okigwe Road, account for 30% of recorded crimes, indicating concentrated socioeconomic hardship (Ogbuefi *et al*., 2025) [18]. Visual computing provides disruptive solutions. AI-powered spatial analytics can map unemployment and crime patterns with high precision, pinpointing key locations for action. Rodriguez (2023) [22] explains how AI visualisations in underdeveloped countries decreased crime by 15% through focused policing and job initiatives. Similar techniques in Owerri might create heatmaps to identify high-risk zones, allowing the proposed 4IR resource hub to be strategically located near locations such as Douglas Market to maximise effect. These visualisations, which correspond with VCIBA's emphasis on computational techniques, enable policymakers to track socioeconomic cycles (Figure 1), exposing how insufficient education and skill mismatches feed unemployment and crime. Lagos' experience, in which AI-driven job programs reduced crime by 20%, highlights Owerri's ability to interrupt this loop with focused 4IR interventions (City of Lagos, 2023). Statistical models predict that tackling unemployment might cut crime rates by up to 50% (Chiekezie *et al*., 2024) [19].

5.2. 4IR Potential for Youth Empowerment

Research by Chiekezie *et al*. (2024) [19] found that 4IR training improves youth employability ($r=0.822$, $p<0.05$) and has the potential to cut crime by 50% by creating jobs in tech-driven industries. Training in AI, IoT, and blockchain can help Owerri solve its 60% skill gap by connecting education with industry demands in industries such as fintech, which earned $1.2 billion in Nigeria in 2022 (African Union, 2023) [2]. To achieve gender equity, the planned resource centre seeks to teach 10,000 adolescents annually, with 30% female involvement, based on examples such as South Africa's Tshimologong Precinct, which trains 500 kids in coding and entrepreneurship each year (Tshimologong, 2025) [25]. Visual computing improves these outcomes. AI-powered dashboards may monitor training progress, completion rates, and job placements in real time, as seen in Johannesburg, where IoT dashboards increased employment by 10% by tracking economic activities (City of Johannesburg, 2020) [6]. In Owerri, IoT-enabled technologies might track learner performance across AI and blockchain courses to ensure curriculum relevance. For example, a prototype IoT dashboard in Lagos followed 5,000 trainees and improved job placement by 25% using data-driven modifications (UNECA, 2024). Such technologies have the potential to formalise 20% of Owerri's 65% informal economy, offering long-term employment opportunities in e-commerce and digital firms. However, hurdles include a 30% financing gap for vocational programs and a 24% internet connection rate, requiring public-private partnerships and solar-powered infrastructure to assure scalability (Imo Youth Development Agency, 2023).

5.3. Urban Planning Gaps

Owerri's master plan does not incorporate 4IR technologies, with just 20% of urban spaces designated for mixed-use development, restricting access for youth and marginalised populations (Okehielem *et al*., 2021) [9]. Connectivity is weak, with 50% of localities without dependable public transit and just 40% of roads built, limiting economic mobility (Imo State Development Plan, 2021-2025). Public spaces are insufficient, with fewer than 15% of metropolitan areas designated as green or community zones, aggravating spatial injustice (UN Habitat, 2020) [26]. Visual computing can help bridge these gaps: AI-driven spatial models, such as those employed in Kenya's Konza Technopolis, improve zoning by visualising accessibility and infrastructure

requirements, resulting in a 15% gain in urban efficiency (Konza Technopolis Development Authority, 2023) [13]. AI visualisations in Owerri might map transport bottlenecks, driving investments in bus rapid transit systems, similar to how IoT sensors decreased congestion in Lagos by 10% (UNECA, 2024). IoT-enabled security systems may potentially improve safety in high-crime areas, as real-time monitoring reduced occurrences by 12% in Johannesburg (City of Johannesburg, 2020) [6]. Integrating the resource hub within Owerri's urban fabric, which includes 20% green space and 30% technology facilities, might help the state meet its 50% connectivity objective by 2025. However, the lack of technology-driven zoning restricts scaling, necessitating legislative changes that prioritise 4IR infrastructure and public Wi-Fi zones.

5.4. Comparative Insights

A comparative review of African technology centres reveals scalable models for Owerri. Kenya's Konza Technopolis, which uses AI analytics for green zoning, has produced over 2,000 employments since 2019, with visualisations that optimise land usage and reduce emissions by 12% (Konza Technopolis Development Authority, 2023) [13]. Tshimologong Precinct in South Africa employs IoT dashboards for urban revitalisation, creating 1,500 employment and training 500 young each year, with community participation helping to mitigate gentrification concerns (Tshimologong, 2025) [25]. Nigeria's Yaba Tech Hub, which supports over 1,000 businesses, suffers infrastructure restrictions, with 60% of power interruptions restricting expansion (Micheni *et al*., 2021) [15]. Owerri might use Konza's AI-driven zoning to optimise the placement of the resource hub, as well as Tshimologong's community model to ensure inclusion, particularly for women and rural migrants. Visual computing is essential: Konza's AI tools visualised economic consequences, enhancing investor confidence by 18%, while Tshimologong's IoT dashboards tracked training results, increasing program efficacy by 20% (UNECA, 2024). Owerri suffers comparable infrastructural issues to Yaba, such as 60% power outages and 40% paved roads, necessitating solar-powered labs and collaborations with tech corporations and universities to fill financing shortages. These findings highlight the necessity for Owerri to include visual computing into urban design in order to maximise the center's influence on youth empowerment and urban resilience.

Table 2: Comparative Analysis of African Tech Hubs

Hub	Urban Planning Features	Youth Impact	Challenges
Konza Technopolis	Green zoning, inteligent infrastructure	2,000+ jobs	High costs
Tshimologong	Urban renewal, community engagement	1,500 jobs	Gentrification risks
Yaba Tech Hub	Startup ecosystem	1,000+ startups	Infrastructure deficits

Source: Synthesized from Konza Technopolis Development Authority, 2023 [13]; Tshimologong, 2025 [25]; Micheni, *et al*., 2021 [15].

6. Design Framework for a Resource Centre in Owerri

6.1. Core Components

The 4IR-focused youth resource centre in Owerri intends to empower 10,000 adolescents per year by using Fourth Industrial Revolution (4IR) technologies artificial intelligence (AI), Internet of Things (IoT), and blockchain to solve 70% youth unemployment and 50% crime rates (Ebebe & Uzoagba, 2023) [17]. The framework consists of four main components.

1. Governance and Policies form a multi-stakeholder board consisting of government, corporate sector, and community members, in accordance with Nigeria's National Development Plan (2021-2025) (African Union, 2015) [2]. AI-driven visualisations will map unemployment patterns and skill shortages, allowing for data-driven policy decisions, as seen in Lagos, where AI analytics increased policy efficacy by 15% (City of Lagos, 2023). This fosters inclusion by aiming for 30% female involvement to reduce gender inequities, with dashboards visualising demographic engagement (UNECA, 2024).
2. Infrastructure includes solar-powered AI and IoT laboratories to fight Owerri's 60% power interruptions, drawing inspiration from Kenya's Konza Technopolis, which supported 2,000 tech employment with sustainable infrastructure (Konza Technopolis Development Authority, 2023) [13]. IoT dashboards will track energy usage and lab functionality, resulting in 10% operating efficiency, as observed in Johannesburg's smart city programs (City of Johannesburg, 2020) [6]. The complex will include 5,000 square meters of technology facilities, with 20% dedicated to green spaces for sustainability.
3. The curriculum addresses the 60% skill gap through hands-on AI, IoT, and blockchain training, with projects like as designing AI urban analytics tools and blockchain-based microfinance platforms (Nwosu, 2021) [20]. Drawing on South Africa's Tshimologong Precinct, which trains 500 youths each year, 20% of whom go into fintech, the curriculum will use online learning tools to overcome the 24% internet access barrier.
4. Monitoring uses AI analytics to track job creation, crime reduction, and training results, with dashboards visualising parameters like as employment rates and skill acquisition, as shown in Lagos' 25% increase in job placement with real-time tracking (UNECA, 2024). These components ensure that the centre tackles Owerri's socioeconomic concerns through technology-based empowerment.

6.2. Urban Planning Implications

The centre's incorporation into Owerri's urban fabric is consistent with inclusive urbanism, which promotes spatial fairness, accessibility, and sustainability (UN Habitat, 2020) [26]. Mixed-use zoning designates 20% green area for environmental resilience and 30% technology facilities to promote 4IR training, meeting Owerri's constrained 20% mixed-use growth (Okehielem *et al*., 2021) [9]. AI visualisations will improve site selection by mapping accessibility and closeness to high-unemployment locations such as Douglas Market, where 30% of crimes occur, ensuring that the centre serves marginalised youth (Ebebe & Uzoagba, 2023) [17]. This reflects Konza Technopolis' AI-driven planning, which increased urban efficiency by 15% (Konza Technopolis Development Authority, 2023) [13]. IoT-

enabled security technologies, such as real-time surveillance and traffic monitoring, will improve safety in high-crime areas, building on Johannesburg's 12% crime reduction achieved by IoT sensors (City of Johannesburg 2020) [6]. Connectivity, which is now restricted to 50% of Owerri's regions, will be improved by IoT-optimized bus rapid transit systems, similar to how congestion in Lagos was reduced by 10% (UNECA, 2024). Public Wi-Fi zones will solve the 24% internet connection rate by enabling online learning and e-commerce participation, with 20% of programs aimed at rural migrants to prevent urban isolation (International Telecommunication Union, 2021) [12]. Community participation, modelled after Tshimologong's method, will include local stakeholders in mitigating gentrification concerns and ensuring inclusive design. The centre supports Owerri's goal of 50% connectivity by 2025 by utilising AI dashboards to visualise spatial equity metrics such as access to training facilities and IoT systems to monitor infrastructure performance, ensuring seamless integration into the urban ecosystem (Imo State Development Plan, 2021-2025). This methodology uses visual computing to improve urban resilience and provides a reproducible model for African cities.

Table 3: Framework Phases with Urban Focus

Phase	Activities	Timeline	Urban Integration
Planning	Evaluation of needs and mapping of stakeholders	0-6 months	Alignment of the master plan
Implementation	Setting up a tech lab and creating a curriculum	7-18 months	Green infrastructure and zoning
Scaling	Partnerships and regional expansion	19+ months	Networks of urban growth
Evaluation	Impact metrics powered by AI	Ongoing	Evaluation of spatial equity

Source: Adapted from Imo State Development Plan, 2021-2025

7. Discussion

7.1. Addressing Youth Unemployment and Urban Restiveness

The proposed 4IR-focused youth resource centre in Owerri aims to address the city's 70% youth unemployment rate, which accounts for 50% of urban crime, such as vandalism and abduction (Ebebe & Uzoagba, 2023) [17]. Statistical analysis shows that 4IR training in AI, IoT, and blockchain improves employability ($r=0.822$, $p<0.05$) and has the potential to cut crime by 50% through job creation (Chiekezie *et al*., 2024) [19]. This is consistent with Lagos' experience, where tech-driven job efforts improved economic production by 15% while decreasing crime by 20% through targeted employment programs (City of Lagos, 2023). AI-driven visualisations are crucial in guiding the center's placement and outreach by mapping unemployment hotspots such as Douglas Market, where 30% of crimes occur (Ogbuefi *et al*., 2025) [18]. These visualisations, which are consistent with VCIBA's emphasis on computational solutions, enable targeted interventions by identifying high-risk juvenile demographics for training prioritisation (Batty, 2018) [4]. The center's curriculum, which addresses the 60% skill mismatch, will teach 10,000 adolescents per year, with 30% female involvement, promoting gender equity and formalising 20% of Owerri's 65% informal sector (National Bureau of Statistics, 2022; UNECA, 2024) [16]. However, constraints include a 30% financial gap and poor internet connection (24%), necessitating collaboration with digital companies to develop training and infrastructure (Imo Youth Development Agency, 2023). By tackling these impediments, the centre can break the cycle of unemployment and criminality, providing a scalable model for other Nigerian communities suffering similar socioeconomic issues.

7.2. Urban Planning and Spatial Integration

Integrating the resource centre within Owerri's urban fabric tackles spatial disparities, as only 20% of urban area is currently designated for mixed-use development (Okehielem *et al*., 2021) [9]. The suggested design includes 20% green areas and 30% technology facilities, which aligns with inclusive urbanism and improves accessibility and sustainability (UN Habitat, 2020) [26]. Unlike Nigeria's Yaba Tech Hub, which is constrained by 60% power outages and infrastructure deficits, the centre uses solar-powered labs and IoT dashboards to ensure operational reliability, as evidenced by Konza Technopolis' 15% urban efficiency gains (Konza Technopolis Development Authority, 2023; Micheni *et al*., 2021) [15]. AI visualisations optimise zoning by mapping connection gaps, with 50% of Owerri missing dependable public transport, prompting investments in bus rapid transit systems that decreased Lagos traffic congestion by 10% (UNECA, 2024). IoT-enabled security solutions improve safety in high-crime areas, adding to Johannesburg's 12% crime decrease from real-time monitoring (City of Johannesburg, 2020) [6]. Community involvement, inspired by Tshimologong's approach, reduces gentrification concerns by incorporating local stakeholders, with 20% of initiatives targeting rural migrants to prevent urban exclusion (Tshimologong, 2025) [25]. This method is consistent with Owerri's target of 50% connection by 2025, strengthening urban resilience through technology-driven design (Imo State Development Plan, 2021-2025). However, legislative reforms are required to incorporate 4IR technology into the master plan, addressing the absence of tech-driven zoning and ensuring scalability.

7.3. Visual Computing Contributions

Visual computing is critical to the center's success, as it uses AI-driven dashboards and IoT visualisations to optimise training and urban integration while matching with worldwide smart city trends (Batty, 2018) [4]. AI analytics visualise training results, such as job placement rates, which increases efficacy by 25%, as observed in Lagos' tech programs (UNECA, 2024). IoT dashboards track infrastructure performance to ensure energy efficiency in solar-powered labs, comparable to Johannesburg's 10% optimisation (City of Johannesburg, 2020) [6]. These techniques allow for real-time tracking of economic and social benefits, such as crime reduction and job growth, and provide policymakers with data-driven insights. For example, Konza Technopolis employed AI visualisations to boost investor trust by 18%, which is a tactic Owerri might apply to secure finance. Limitations include a 30% financing gap and inadequate digital literacy, with just 24% of teenagers having reliable internet access, necessitating public Wi-Fi zones and training to bridge the digital divide (International

Telecommunication Union, 2021) [12]. By incorporating visual computing, the facility not only solves Owerri's difficulties but also contributes to VCIBA's discussion of computational urban solutions, providing a repeatable framework for African cities to improve resilience and equity using 4IR technology.

8. Conclusion

8.1. Findings and Contributions

This study reveals that Owerri's 70% young unemployment rate contributes to 50% of urban crimes, including vandalism and abduction, underlining a serious socioeconomic concern (Ebebe & Uzoagba, 2023) [17]. The proposed 4IR-focused youth resource centre, using AI, IoT, and blockchain training, might cut crime by 50% by boosting employability ($r=0.822$, $p<0.05$), similar to Lagos' 20% crime reduction through tech-driven job initiatives (Chiekezie *et al*., 2024; City of Lagos, 2023) [19]. Visual computing is critical: AI-powered analytics visualise unemployment hotspots like Douglas Market, driving targeted actions, while IoT dashboards track job growth, reflecting Johannesburg's 10% employment increase (City of Johannesburg, 2020) [6]. Unlike Nigeria's Yaba Tech Hub, which is limited by infrastructural limitations, the center's solar-powered labs and mixed-use zoning enable scalability and accessibility (Micheni *et al*., 2021) [15]. By training 10,000 youths each year, with 30% female involvement, it tackles the 60% skill gap and formalises 20% of Nigeria's 65% informal sector, contributing to the National Development Plan (2021-2025) (African Union, 2015) [2].

8.2. Urban Planning Implications

The complex coincides with Owerri's target of 50% connection by 2025, with 20% green space and 30% technology facilities to improve spatial fairness (Imo State Development Plan, 2021-2025). AI visualisations optimise zoning, as evidenced by Konza Technopolis' 15% urban efficiency improvements, whilst IoT devices increase safety, cutting crime by 12% in Johannesburg. These solutions solve Owerri's 20% mixed-use zoning and 50% transit connection gaps, promoting urban resilience through inclusive urbanism (UN Habitat, 2020) [26]. Tshimologong-style community participation promotes inclusion while limiting gentrification dangers.

8.3. Limitations

Relying on secondary data restricts real-time insights and risks missing complex local dynamics (Yin, 2018) [31]. The 30% budget shortage and 24% internet connection rate provide scaling problems that necessitate collaboration and infrastructure investment (Imo Youth Development Agency, 2023; International Telecommunication Union, 2021) [12]. Low digital literacy among kids may impede 4IR training acceptance, necessitating foundational education initiatives.

8.4. Broader Impact

The system, which uses visual computing, provides a reproducible model for African towns experiencing high unemployment and urban restiveness. AI and IoT visualisations match with VCIBA's focus on computational urban solutions, as seen by Konza's 18% increase in investor confidence (Mazza, 2002; Konza Technopolis Development Authority, 2023) [13-14]. By tackling Owerri's difficulties, the centre contributes to global smart city debates and promotes sustainable urban development in underdeveloped countries.

9. Reference

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