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Effect of Industrial Design and Technical and Vocational Education Training on Economic Growth in Nigeria

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Abstract

The effect of Industrial Design and Technical and Vocational Education Training program through Small and Medium-sized Enterprises on Nigeria's economic growth are intertwined. The Nigerian government having realized the need to expand the program re-launched the scheme on May, 22nd, 2025 to booster its operation towards accelerated economic growth of the country but without divulging or linking the level of economic growth of the country to the activities of ID and TVET despite the problems and challenges facing or bedeviling the economy. In line with these circumstances, this study was conducted to find the nexus in order to ensure a successful ID and TVET operations for economic growth. Therefore, the study adopted an exploratory design by using secondary sources of data to scrutinize through the various literatures the contributions of the aforementioned concepts towards achieving the desired economic growth levels for Nigeria by leveraging on SMEs. The outcome of the study revealed that, ID and TVET are important for the economic growth of Nigeria through creating innovation, creativity and efficiency in the production of new products and the development of new skills and employment opportunities for the youth .It is therefore recommended that government should ensure that, SMEs are well trained on ID and TVET program to ensure high quality

products. They should also ensure the use of modern technologies (machinery and equipment) which is a global requirement for standardization and competitiveness. The government should also introduce variety of incentives for TVET participants (entrepreneurs) like ensuring adequate financing, skills improvement programs among others to ensure effective marketing to improve the demand of products in the market both locally and internationally learned during the TVET program. Also training and retraining of relevant staff in government agencies to acquire the necessary skills to augment the activities of the facilitators towards enhanced training for a sustainable economic growth in Nigeria.

Keywords: Industrial Design, Technical and Vocational Education Training, Economic Growth, Nigerian Economy, Small and Medium-sized Enterprises.

Introduction

The new initiative in Industrial Design (ID) conceptualization with the advocacy for inculcating Technical and Vocational Education Training (TVET) for global advancement in industrial manufacturing processes anchored on leveraging the activities of Small and Medium-sized Enterprises (SMEs) towards economic growth across nations is gaining traction. ID systems entail moving away from traditional methods to highly technological and automated techniques of training (SMEs) which have given rise to continuous innovation of technologies to cope with the growing demand for goods and services adjudged to be more in quality and standards due to the inherent involvement of ID and TVET that ensure adherence to technical details and specifications compliance.. The resultant outcome has led to an upsurge in economic activities accentuated through creating new job opportunities, poverty reduction and youth engagement thereby creating wealth resulting in economic growth.(Kolb, 2024; Huynh, 2021). Economic growth is the increase in the production of goods and services in an economy over a specific period, typically a nation. It is most commonly measured as the percentage increase in real Gross Domestic Product (GDP), which is inflation-adjusted economic output (Ulrich & Eppinger, 2015). Economic growth can be driven by factors like an increase in workforce, better technology, or greater productivity, and results in a quantitative increase in the economy's capacity growth seen in GDP, price stability, inflation reduction etc through technological and entrepreneurship among other factors (Pranowo et al., 2020). Nigeria's SMEs are essential contributors to GDP enhanced by the activities ID and TVET by creating new products and new markets respectively. .ID innovate new machines and design new products, push forth to the market by SMEs [Federal Ministry of Education, Nigeria], (2020).

Industrial design pushes for new aesthetic creation due to new products and services developed in the course of the innovativeness of technologists and invest resources in articulating awareness and marketing

program thereby creating opportunities for effective start-ups in the Nigerian economy leading to job creation, economic growth of industries and invariably national economic growth especially in GDP (Adelabu, 2020).).

Technical and vocational education training has become a new vehicle for Government's desire improved economic growth area is hinged on diversifying through SMEs from a mono-economy to ensure additional foreign exchange earnings for the country coordinated the Small and Medium-Sized Development Agency of Nigeria (SMEDAN) with adequate provision for financing of SMEs through Bank of Industry (BOI) and other necessary incentives for the growth of the Nigerian economy.

Statement of the Problem

However, despite these new efforts, the government's desire to achieve TVET objectives such as new skill development, entrepreneurial education and intention, poverty reduction, etc., may not be realized due to many challenges and that may hinder effective growth of the economy such as poor infrastructure, insecurity in rural areas which pose a serious problem to all value chain activities, etc, in the economy. Kolb (2021) argues that, curriculum gap is a serious problem. That, current curricula are outdated compared with the latest industry trends and technological advancements, Insufficient resources such as lack of funding, modern facilities, and essential equipments for practical training (Mbadiwe, 2012). Adeniran, (2018) postulated that, poor implementation of government policies and a lack of rigorous implementation and monitoring hinder program effectiveness for economic growth in addition to outdated mindset mentality that views technical education as inferior, leading to a discrimination against its graduates is also a militating factor towards achieving economic growth.

Moreover, there is scanty research works linking ID, TVET, and entrepreneurs to economic growth in Nigeria (Ejiomofo, 2015). Therefore, the researchers opted to make an attempt to conceptualize a framework to provoke further research in the area through a more holistic approach. It is therefore envisaged that, the outcome of this study will be useful to policy makers, experts in the education sector, managements of institutions, SMEs and the academics as it will provide a guide towards the understanding of the effect of ID and TVET for the economic growth of Nigeria.

Concept of Economic Growth

Economic growth is usually seen as the increase in the production of goods and services in an economy over a specific period. Others see it as an increase in the capacity of an economy to produce goods and services from one period to another (Ulrich & Eppinger, 2015). It is most frequently measured by the percentage increase in real GDP, which is the total market value of all final goods and services produced within a country in a given time period (nominal value) but, when adjusted for inflation, it is referred to as the real value. Scholars have identified factors that influence economic growth include among others; -an increased

workforce size, improvements in productivity, technological advancements, increased investment, etc. (Oluwaseun & Bello, 2022). SMEs in Nigeria and other countries play an important role for many reasons. They provide employment to a large number of personnel, such as skilled artisans and unskilled workers that forms a very important income source for many families thereby contributing to the GDP in Nigeria,

Economic growth is the increase in the production of goods and services in an economy over a specific period, typically a year. It is most commonly measured by the percentage increase in a nation's inflation-adjusted gross domestic product (GDP), which represents the total market value of all final goods and services produced. Economic growth can be achieved by using more resources (extensive growth) or by using resources more efficiently and productively (intensive growth). Extensive growth occurs by increasing the quantity of resources used, such as labor, land, and capital. This can lead to a higher GDP, but if the population grows at the same rate, per capita income may not increase. Invariably, intensive growth occurs through increased productivity, often due to technological advancements. This allows an economy to produce more goods and services with the same or fewer resources, leading to a rise in per capita income and living standards. Still, some scholars postulate that economic growth usually measured as a percentage increase in the real gross domestic product (GDP) over time. GDP which is the market value of all finished goods and services produced within a country's borders can also be seen from two perspectives i.e financial and non financial perspectives as suggested by scholars

Concept of Industrial Design

Industrial design is the process of creating and developing products for mass production by combining functionality, usability, and aesthetics. It involves a creative and strategic approach that considers how a product will be manufactured, used, and marketed, balancing user needs with business goals (Ejimofor et al., 2019)

Industrial design is the process of creating and developing products for serial production by combining technical and functional requirements with aesthetics and user experience. It involves a multidisciplinary approach that includes market research, concept development, and engineering to create physical solutions that are functional, safe, useful, and commercially viability

Rapid technological advances have produced major disruption to industries in recent decades. The products industry in Nigeria is a credible source of livelihood to many families (Agwaziam et al, 2025). This fact highlights the importance of industrial design concept in the economy and marketing efficiency and marketing performance in achieving business success. (Chima, 2019). Aesthetics technology revolutionized business systems by providing new and innovative ways of reaching and engaging customers. It enhances product value to the extent of meeting and exceeding customers' expectation (Onwumere & Ozioma 2015). Mbadiwe (2012) considered the impact of technological advancement, relevant options and channels.

Scholars view ID from different perspectives. Ulrich and Eppinger (2015) focus on features such:

1. **The whole product lifecycle:** Industrial design is not just about how a product looks, but also its entire development from the initial idea to the final, mass-produced item.
2. **Combines art and science:** It integrates principles from art, science, and technology to create products that are both appealing and practical.
3. **Aesthetic and functional balance:** Industrial designers aim to balance the visual and ornamental aspects of a product with its technical features and how it functions in the real world.
4. **User-centered approach:** A key goal is to understand and address the needs of the end-user, ensuring the product is intuitive, comfortable, and meets user expectations.
5. **Adaptability:** The field constantly adapts to new technologies and evolving market demands, focusing on innovation and improving the user's life through better product solutions through the ID process mechanisms. While others like Adelabu, (2020) see it from the context of the ID process such as
    a. **ID processes of Research:** Understanding user needs, market trends, and emerging technologies;
    b. **Concept development:** Generating and refining a wide range of preliminary ideas;
    c. **Prototyping:** Creating physical models to test and validate the design concept;.
    d. **Manufacturing:** Designing the product to be efficiently and cost-effectively manufactured, 5.Testing**:** Evaluating prototypes for performance, usability, and safety and
6. Production planning**:** Developing the final plan for mass production are necessary for TVET program to enhance SMEs efficiency and productivity leading to economic growth

Concept of Technical and Vocational Education Training

No single person is credited with inventing technical and vocational education (TVET) as it evolved from different movements. However, figures like **Everett Hughes** significantly contributed to the *sociological study* of occupations, while Wilhelm Vou Humboldt influenced the philosophical foundation of a balanced education that includes general and vocational aspects. Historically, the "practical arts" movement and "trade school movement" also laid the groundwork for modern TVET. These two contributed significantly to present day understanding of TVET as itemized below (Adelabu, 2020).

1. Practical Arts Movement**:** This movement developed curriculum for skill-based learning in areas like domestic science and agriculture, alongside general education.
2. Trade School Movement**:** This movement aimed to formalize trade-specific training, which was a more structured approach than traditional apprenticeships.

TVET is an educational concept focused on providing individuals with the practical skills, knowledge, and attitudes necessary to succeed in a specific occupation and contribute to economic and social development. It emphasizes hands-on learning for a wide range of jobs and trades, aiming to combat unemployment, foster entrepreneurship, and meet the demands

of the labor market. Scholars of TVET.such as Ulrich and Eppinger, (2015) highlighted on the need to understand key areas of interest in TVET for economic growth, viz,

1. Skill and Knowledge Acquisition**:** TVET provides specific skills, knowledge, and competencies needed for jobs in various sectors, including the "study of technologies and related sciences;.
2. Focus on Employment: A primary goal is to prepare individuals for the world of work, ensuring they can find employment as skilled workers or entrepreneurs;
3. Economic and Social Development: It is seen as a vital tool for national economic growth by supplying a competent workforce, boosting employment, and generating wealth;
4. **"**3Hs" Philosophy**:** Some models of TVET emphasize the "3Hs": head (knowledge), hand (dexterity), and heart (conscientiousness);
5. Versatility: TVET encompasses a broad range of fields and can be offered at different levels, from secondary to tertiary education;
6. Response to Market Needs: TVET is designed to be responsive to the evolving needs of industries, providing skills for the "jobs of tomorrow" enabling employability to reduce joblessness and poverty to help in Nigeria's economic growth.

Overview of the Nigerian Economy

Nigeria used to be the largest economy in Africa, with mixed-economy structure and a large, youthful population. However, it is now heavily reliant on petroleum exports, although, it also features growing sectors like manufacturing, services, technology, and entertainment. SMEDAN, (2025) described the Nigerian economy in terms of its structure and key sectors.

1. Mixed economy: Nigeria has a mixed economy that blends private sector freedom with government intervention and regulation.

2. Largest in Africa: It is the largest economy in Africa by nominal GDP.

3. Diversified but oil-dependent: While increasingly diversifying into services, manufacturing, technology, and entertainment, the economy remains heavily dependent on its substantial oil and gas reserves, which account for the vast majority of its export profits.

4. Agriculture: The agricultural sector is dominated by small-scale farmers and produces a varietyof crops, with cocoa beans being a major export. Having described the Nature of Nigeria's economy, SMEDAN, (2025) also enumerated some of the challenges that may hinder its growth which includes, weak infrastructure, high inflation, and low foreign direct investment, although the government is implementing reforms to address these issues, such as removing fuel subsidies and unifying the exchange rate.

Contributions of SMEs to Economic Growth in Nigeria.

SMEs are vital to Nigeria's economy, contributing approximately 48% to the GDP, and are responsible for about 96% of all businesses and 84% of employment. They drive economic growth, create jobs, foster innovation, and have a significant impact on poverty reduction. However, they face challenges like a lack of access to finance, poor infrastructure, and an

unfavorable regulatory environment, which hinder their growth. According to Huynh, (2021), Pranowo, et al., (2020) and Mbadiwe, (2012), some of the contributions include among others:

1. Gross Domestic Product (GDP)**:** SMEs contribute significantly to Nigeria's GDP, with a 2022 estimate showing a contribution of 48%..
2. Employment**:** They are a major source of employment, accounting for about 84-87.9% of the nation's workforce.
3. Economic growth and stability**:** As engines of economic progress, SMEs are crucial for national economic growth and can help create a more stable and competitive private sector.
4. Poverty alleviation**:** Through wealth and job creation, SMEs are a critical tool for alleviating poverty and fostering stability in local communities.
5. Innovation**:** SMEs are often hubs for innovation, driving technological advancements and creative solutions within the country.

However, despite theses numerous benefits to the economy, SMEs in Nigeria face a lot of challenges as enumerated by (Akinbode, 2019; SMEDAN, 2023; UNESCO, 2015),

1. Access to finance**:** Many SMEs struggle to access the necessary financing to start or expand their businesses due to lack of necessary collateral / security.
2. Infrastructure**:** Deficits in public infrastructure, particularly unreliable electricity, are a major operational challenge and a high cost for SMEs such as poor road networks , power outages, etc.
3. Regulatory environment**:** Unfavorable government regulations and bureaucracy can hinder the growth of SMEs.
4. Lack of skills**:** Some entrepreneurs lack the necessary skills in business management, financial organization, and investor readiness.

Effect of ID in Promoting Economic Growth.

Industrial design impacts economic growth in Nigeria by enhancing TVET through a curriculum that aligns with industry needs, thereby creating a skilled workforce for manufacturing and entrepreneurship (Ejimofor. et al., 2019; Adelabu, 2020;) This integration boosts productivity, fosters innovation, and encourages self- reliance by reducing dependency on imported goods and promoting local production. Effective industrial design training equips graduates with the skills to transform local resources and meet market demands, contributing directly to economic growth (.Chima, 2019; Huynh, 2021; Oluwaseun & Bello, 2022).

Effect of TVET in promoting Economic Growth

Industrial design significantly enhances Technical and Vocational Education and Training (TVET) in Nigeria by aligning curriculum with industry needs, leading to a more skilled workforce for economic growth. By integrating industrial design principles, TVET programs can produce graduates with practical and creative skills, bridging the gap between training and market demands, which fosters job creation, reduces unemployment, and drives industrialization.

Hence, by integrating ID into TVET, Adelabu (2020) and Fagge, (2020) opined that, this will lead to economic growth in different areas as it will:

1. Creates a skilled and employable workforce**:** Industrial design training produces graduates with the practical skills needed in manufacturing and other sectors, directly addressing the skills mismatch in Nigeria's labor market.
2. Boosts local production**:** By providing the technical and design knowledge, it enables the local transformation of Nigeria's abundant natural resources into finished products, reducing the reliance on imported goods.
3. Drives innovation and entrepreneurship**:** Incorporating industrial design principles into TVET fosters an entrepreneurial mindset and the capacity for innovation, empowering youth to start and run their own businesses.
4. Enhances competitiveness**:** Training in industrial design can improve the quality and design of local products, making them more competitive in both domestic and international markets.
5. Supports economic diversification**:** A strong TVET system with an industrial design component is crucial for industrialization and economic diversification, which are key to long-term economic growth and stability.
6. Reduces unemployment**:** By equipping young people with in-demand skills, this approach can significantly contribute to reducing the high youth unemployment rates in Nigeria The grasp of the effect of ID and TVET on economic growth is best suited or anchored for clarity on theories as presented in the study's theoretical framework.

Theoretical Framework

The intersection of industrial design and technical and vocational education for economic growth is explained through theories centered on human capital, innovation, and product value creation. Industrial design drives market competitiveness and product differentiation, while TVET builds the skilled workforce necessary for industrialization and innovation drawn from theories with TVET's impact on economic growth primarily focusing on human capital and skill development such as the followings as postulated by (Ulrich & Eppinger, 2015; Kolb, 1984))

1. Developmental Vocational Theory**:** This theory implies that occupational choice is a lifelong process and that TVET plays a crucial role in preparing individuals for the "working environment or a replica of the working environment". It emphasizes the practical, hands-on training that makes graduates job-ready and adaptable to evolving labor market needs.
2. Innovation and Product Cycle Theories**:** These theories highlight the role of design as a medium that transforms scientific and technological achievements into actual, marketable products. By focusing on creative innovation, functionality, and aesthetics, industrial design extends the product lifecycle and helps firms compete based on differentiation rather than just low costs.
3. Value Addition Theory**:** Industrial design significantly improves the added value of products by enhancing their usability, aesthetics, and overall user experience. This

increased value allows companies to command premium pricing, build brand loyalty, and succeed in competitive global markets, directly contributing to higher profits and national GDP.

4. Design as a Strategic Asset: A modern perspective views design as a strategic tool for business success and national development, not merely an afterthought. Countries like South Korea, Germany, and Japan have established strong industrial design bases, recognizing that it is a core driving force for enterprise competition and economic growth.
5. Market Competitiveness Theory**:** This theory posits that well-designed products naturally attract more attention and interest from buyers, leading to increased sales and market success. By focusing on human-centered problem-solving and market demands, industrial design ensures products meet user needs and perform effectively in the market.

The Value Addition Theory aptly captures the variables **of** Industrial design and TVET for economic growth by emphasizing on the added value of products in enhancing their usability, aesthetics, and overall user experience through TVET program. This increased value allows companies to command premium pricing, build brand loyalty, and succeed in competitive global markets, directly contributing to higher profits and national GDP.

METHODOLOGY

The methodology adopted in this study is exploratory research design and secondary data were generated from government publications, textbooks, journals and articles in order to analyze and discuss the conclusion that was drawn from the identified effects of ID and TVET on the economic growth of Nigeria.. The researchers developed a conceptual model for Nigeria's economic growth through ID and TVET. Hence, now, the need to explore the model to guide further research as idealized by Iacovidou et al. (2017) in terms of the linkage between ID and TVET on economic growth of Nigeria. The researchers' decision to suggest a conceptual model is premised on the study's theoretical framework to explore all options in ID and TVET for economic growth anchored on the value addition theory as presented in Figure 1.

Industrial Design and TVET Conceptual Model for Nigeria's Economic Growth

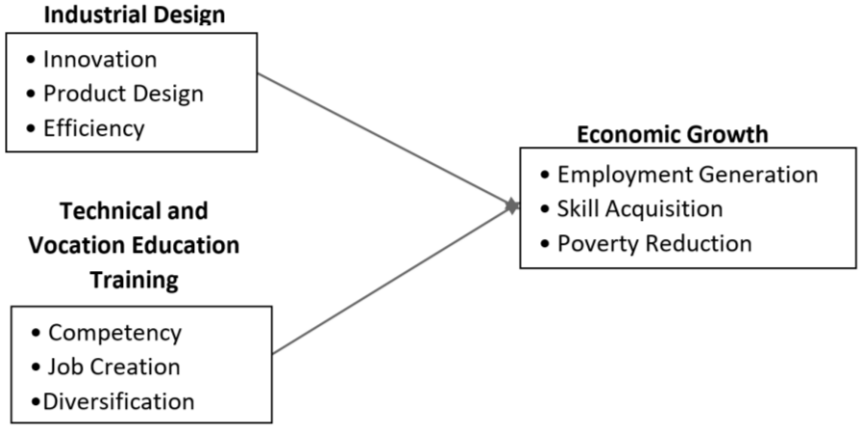


Figure 1: ID AND TVET Conceptual Model.
Source: Researchers' Conceptualization, 2025.

The model in Figure 1 is envisaged for further research works by exploring the various identified variables of ID and TVET in chapter 2 of this study. The outcome(s) may give clearer insights in to the contributions of ID and TVET on the economic growth of Nigeria using quantitative, qualitative or mixed-methods methodologies.

Conclusion

Industrial design and technical and vocational education training for economic growth are both vital instruments for national industrialization and economic development. This study therefore concluded that, ID and TVET are essential for innovation of new products and development of skilled manpower**.** ID and TVET are essential for economic growth as they:

1. 1, Enhance Productivity and Efficiency of workforce: Workers that are equipped with relevant technical and vocational skills are more efficient and productive. This improved productivity is a fundamental catalyst for overall economic growth.
2. Lead to Innovation and Competitiveness: This leads to product marketability by improving functionality, aesthetics, and overall quality, which in turn increases the competitiveness of enterprises (SMEs) capable of adopting and implementing new technologies and designs, fostering local innovation.
3. Job Creation and Self-Reliance: By equipping individuals with the entrepreneurial skills to be self-reliant leading to entrepreneurial activities of new venture creations and poverty reduction.
4. Lead to Value Addition: Industrial design generates significant added value for products by incorporating new technology, design concepts, and improved appearance, leading to increased profits for TVET beneficiaries and hence contributing to economic growth in Nigeria.

Recommendations

Drawing from the conclusions made, the following recommendations among others are hereby presented:

1. Implement Curriculum Reforms and Integration: Incorporate industrial design principles—such as problem-solving, creativity, and an understanding of materials and processes—into all TVET programs to foster innovation and productivity;
2. Foster Entrepreneurship: Integrate entrepreneurship training into the core curriculum to encourage self-reliance and job creation among TVET participants which focuses on mastering practical, job-relevant skills;
3. Ensure Sustainable Funding and Resource Allocation: Governments should increase their percentage of total education expenditure allocated specifically to TVET programs to ensure adequate infrastructure, modern laboratories, and sufficient teaching materials are available,
4. Provide Financial Incentives: Offer grants, sponsorships, and loans to attract more trainees to technical fields and provide incentives, such as tax breaks and subsidies, to private industries that invest in TVET.

5. Leverage Technology and Innovation: Incorporate digital learning, virtual reality (VR), and augmented reality (AR) to make training more engaging, accessible, and aligned with modern industry practices leading to economic growth in Nigeria.

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