
UNLOCKING POTENTIAL: HOW GENDER DEVELOPMENT DRIVES LABOUR PRODUCTIVITY IN NIGERIA.

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Article Received: 18 January 2026, Article Revised: 07 February 2026, Published on: 27 February 2026

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DOI: <https://doi-doi.org/101555/ijarp.3699>

ABSTRACT

This study investigates the impact of gender development on labour productivity in Nigeria. Investigating the effect of gender development on productivity is vital for formulating policies that foster sustainable economic growth, social equity, and long-term prosperity. Data for this analysis were collected from both the UNDP HDR report (2025) and the World Bank's world development indicators database (2025). The data are from the period of 2008 to 2024. Vector Autoregression (VAR) variance decomposition analysis is used to analyze the data collected. The findings reveals that the impact of gender development on productivity is not linear but varies over time, hence it exhibited sharp fluctuations over the study period. initially exerts a positive influence on labor productivity, indicating early benefits of gender equality initiatives. The study further reveals that improvements in gender development in Nigeria may lead to increase in productivity during certain periods. The fluctuations may reflect external obstacles such as cultural factors or economic shocks that temporarily hinder the positive effect. This is true given the level of uncertainty including intermitted insecurity security issues. These findings underscore the complex and dynamic nature of gender-related policies and their effects on productivity and economic performance. The results also highlight the importance of nuanced policy design to sustain long-term productivity growth in the context of gender development. It is recommended that Nigeria policy makers should implement policies that stabilize or promote healthy gender development growth, as fluctuations could have unpredictable effects on national productivity.

KEYWORDS: Gender development, Productivity, Cultural factors, Economic shocks, and Social equality.

INTRODUCTION

In the global race for economic competitiveness, growth and development, no nation can afford to underutilize half of its talent pool, this is because most nations in the world record the female gender to have majority of its citizens (Obomeghie and Bello, 2017). Gender development acts as a bridge between latent human potential and tangible economic output. By addressing systemic inequalities in professional opportunities and household labor distribution, societies can unlock significant gains in labour productivity.

Gender issues initially centered on addressing inequalities rooted in societal norms, such as disparities in education, healthcare, political participation, and domestic responsibilities (Kabeer, 1999). This framing was critical for advancing social justice, highlighting the need to challenge discriminatory practices and promote gender equality for moral and ethical reasons (World Bank, 2012). The social issue approach aimed to rectify historical injustices and empower marginalized groups, with policy interventions focusing on legal reforms, awareness campaigns, and social services. Over time, scholars and policymakers began to recognize that gender inequalities also have profound economic implications. The World Bank (2012) emphasized that gender gaps in education, employment, and entrepreneurship hinder overall economic growth. Equally, the World Economic Forum (2020) highlighted that, economies lose significant potential due to underutilization of female talent. This realization fostered a shift toward framing gender issues as critical to economic development. The conceptual shift gained momentum with empirical evidence demonstrating that gender-inclusive policies lead to higher productivity, innovation, and economic resilience. McKinsey Global Institute (2015), reported that advancing women's equality could add \$12 trillion, or 11%, to global GDP by 2025. Similarly, other studies have shown that diverse workforces outperform homogeneous ones, with gender diversity correlating positively with firm performance (Catalyst, 2013). These evidences underscores that gender equality is not merely a moral goal but an economic strategy to enhance competitiveness, growth and development. Recognizing gender as an economic necessity has prompted the integration of gender considerations into macroeconomic planning, labor policies, and corporate strategies. Governments are increasingly adopting gender-responsive budgeting, workplace diversity initiatives, and measures to eliminate occupational segregation. The Sustainable Development Goals (SDGs), particularly Goal 5 (Gender Equality), explicitly link gender

empowerment to economic prosperity (Li, 2020). The transformation of gender from a social issue to an economic necessity reflects an evolving understanding of the interconnectedness between social justice and economic development. This shift emphasizes that promoting gender equality is not only a moral imperative but also a strategic economic choice that can unlock substantial growth and innovation potential.

Gender development has emerged as a critical factor influencing national economic performance and overall productivity. Despite significant progress in gender equality initiatives worldwide, disparities in access to education, healthcare, employment opportunities, and leadership roles persist across many nations (World Bank, 2020). These disparities result in the underutilization of a substantial segment of human capital, thereby impeding the full potential of national economies. Research indicates that gender gaps in labor force participation, skill acquisition, and decision-making power negatively affect productivity levels (Klasen & Lamanna, 2009).

Despite the findings above by various scholars and organization, there remains limited understanding of how specific aspects of gender development such as, gender equality in education, health, and political participation directly influence national productivity metrics. Furthermore, the mechanisms through which gender development translates into economic gains are not fully elucidated. This knowledge gap hampers policymakers' ability to design targeted interventions that effectively leverage gender development as a driver of economic growth. Therefore, the problem this study is to determine how gender development influence national productivity, and what are the underlying mechanisms through which gender equality initiatives contribute to economic performance because exploring this relationship is essential for informing policies that promote inclusive growth and for harnessing the full potential of human capital in sustainable development agenda (Ganguly & Nikolova, 2023).

Research questions

The research questions this study intends to quantitatively resolve are: firstly, how does gender equality influence labour productivity levels? This question explores the link between educational attainment, employment opportunities, leadership roles among women, and overall productivity. Gender equality in education and training is recognized as a fundamental component of social development and economic growth. Equal access to quality education and training for females and males enhances human capital, fosters innovation, and promotes inclusive economic participation (Poed, 2020).

The second research question of the study is, what is the relationship between female labor force participation and productivity growth. The relationship between female labor force participation and national productivity growth has been a subject of interest among economists and policymakers. Research suggests that increased participation of women in the workforce can have a significant impact on economic growth and productivity (Bhat, 2023). The conceptual framework linking female labor force participation to national productivity growth is based on some key theories such as; human capital theory which posits that education and skills enhance human capital, leading to increased productivity (Becker, 2010). Next is the neoclassical growth theory which states that economic growth is driven by technological progress, human capital accumulation, and institutional factors (Masoud, 2014). The mechanisms through which female labor force participation influences labour productivity growth include: Women's education and skills contribute to the development of human capital, leading to increased productivity (Easterly & Levine, 2001). Women's participation in the workforce is associated with improved health outcomes, leading to increased productivity and economic growth (Obomeghie & Bello, 2017). In summary, the relationship between female labor force participation and labour productivity growth is complex and multifaceted.

Rationale and significance of the study

Understanding the link between gender development and productivity is of paramount importance in contemporary economic and social policy discourse. Gender development encompasses factors such as gender equality, access to education, health, and economic opportunities, which collectively influence not only individual well-being but also broader macroeconomic outcomes. Investigating this relationship offers valuable insights into how fostering gender equality can serve as a catalyst for enhancing productivity, economic growth, and sustainable development. This underscores the importance of gender development as a driver of economic productivity.

Equally, diverse workforces are shown to foster innovation and improve organizational performance. McKinsey & Company's report, (2015), demonstrates that companies with diverse leadership are more likely to outperform less diverse peers. Extending this logic to national levels, gender-inclusive policies can enhance overall productivity by leveraging a broader range of skills, perspectives, and ideas (Emeka, & Asongu, 2025). In addition, the United Nations Sustainable Development Goals (SDGs), particularly Goal 5 (Gender Equality) and Goal 8 (Decent Work and Economic Growth), recognize the critical role of

gender equality in fostering economic development. The World Bank report (2012) emphasizes that gender equality is not only a matter of social justice but also a key driver of economic progress, as empowering women contributes to poverty reduction and improved health and education outcomes, which in turn bolster productivity.

Finally, in many countries facing aging populations and declining birth rates, increasing female participation in the workforce can mitigate demographic challenges and sustain economic growth. Research by Klasen & Lamanna (2009) finds that gender gaps in employment significantly impact economic growth, especially in developing countries. Understanding how gender development influences productivity informs policymakers on effective intervention points. Evidence-based policies can promote gender equality in education, employment, and leadership, thereby maximizing economic returns and fostering inclusive growth (World Bank, 2012).

Literature review

Concept of gender development

Gender development refers to the process of promoting equitable access to resources, opportunities, and rights for all genders, with a particular focus on addressing disparities faced by women and girls. It encompasses the transformation of social, economic, and political structures to ensure that gender inequalities are minimized, and individuals can realize their full potential regardless of gender identity (UNDP, 2021). At its core, gender development emphasizes not only gender equality, where men and women have equal rights and opportunities but also gender empowerment, which involves enhancing women's and marginalized groups' capacity to participate actively in decision-making processes (Kabeer, 1999). It recognizes that gender disparities are rooted in social norms, cultural practices, and institutional biases that perpetuate unequal power relations.

Relevance of gender development to labour productivity.

The relevance of gender development is multifaceted including;

Economic growth: Gender equality is linked to higher productivity and economic growth. The McKinsey Global Institute (2015).

Social justice and human rights: Ensuring gender equity aligns with fundamental human rights principles, promoting dignity, autonomy, and social justice (UN Women, 2020).

Sustainable development: Gender development is integral to achieving Sustainable Development Goals (SDGs), notably SDG 5 (Gender Equality) and SDG 8 (Decent Work and Economic Growth).

Health and well-being: Gender-sensitive policies improve health outcomes, reduce poverty, and foster social cohesion (Niolu, et al,2024).

Measuring gender development involves assessing disparities and progress across various dimensions such as education, health, economic participation, and political empowerment. Several indices and indicators have been developed including; i) Gender Development Index (GDI), the GDI compares human development achievements between men and women, considering income, education, and life expectancy (UNDP, 2021). A higher GDI indicates less gender disparity. ii) Gender Inequality Index (GII): The GII measures reproductive health, empowerment, and labor market participation to capture gender-based disadvantages. It reflects how gender disparities impact development outcomes (UNDP, 2021). iii) Gender Gap Index: This index assesses gaps in economic participation, education, health, and political empowerment across countries (WEF, 2021). iv) Composite Indicators and Surveys: Recent approaches include analyzing nationally representative household surveys, labor force data, and qualitative assessments to capture nuanced aspects of gender development (Klasen et al., 2021).

Conceptual review on labor productivity

Labor productivity refers to the efficiency with which labor input is transformed into economic output. It is a key indicator of economic performance, reflecting how effectively a country, industry, or firm utilizes its labor force to generate goods and services. Formally, labor productivity is defined as the ratio of total output (often measured as Gross Domestic Product, GDP) to the total hours worked or the number of employees. According to the Organisation for Economic Co-operation and Development (OECD, 2020), labor productivity measures "the amount of economic value added per hour worked." It encapsulates not only the efficiency of workers but also the impact of technological progress, capital investment, and organizational improvements on output.

Labour productivity is of critical importance for several reasons: i) Increases in labor productivity are fundamental drivers of sustainable economic growth. As productivity rises, economies can produce more with the same or fewer inputs, leading to higher income levels and improved living standards (OECD, 2020). ii) Higher productivity enhances a country's competitiveness in global markets by enabling goods and services to be produced at lower

costs (Akintoye & Oluwabunmi, 2019). iii) Productivity growth often correlates with wage increases, assuming productivity gains are shared with workers (ILO, 2021). iv) Understanding productivity trends informs policies aimed at innovation, workforce development, and technological adoption.

Recent studies emphasize the importance of measuring labour productivity in the context of technological change, digital transformation, and the COVID-19 pandemic's impact. For instance, OECD (2020) highlights that productivity growth has slowed in many advanced economies, partly due to declining investment in innovation and skills gaps. The ILO (2021) reports that the pandemic-induced disruptions have led to significant fluctuations in productivity, with some sectors experiencing declines due to underemployment and reduced work hours. Data sources for measuring labour productivity include national statistical agencies, the OECD, the World Bank, and the ILO. For example, the OECD's Productivity database provides annual data for member countries, facilitating cross-country comparisons.

Conceptual review on Female Labour Force Participation (FLFP).

Female labour force participation refers to the proportion of women within the working-age population who are either employed or actively seeking employment. It is a critical indicator of gender equality and economic development, reflecting women's engagement in economic activities and their integration into the labor market (ILO, 2020). The labour force includes all persons aged 15 and above who are either employed (working for pay or profit) or unemployed (not working but available and seeking work). Therefore, FLFP specifically measures the participation rate of women in this labour force, providing insights into gender disparities in employment opportunities and societal norms influencing women's economic roles.

Female labour force Participation is relevant to every economy because; in the first instance, higher FLFP is associated with increased household incomes, consumption, and overall economic productivity. The ILO (2020) estimates that closing gender gaps in employment could significantly boost global GDP. Secondly, women's employment contributes directly to household income, which is vital for reducing poverty and improving social outcomes such as health and education. Thirdly, FLFP serves as an indicator of societal progress toward gender equality, reflecting the extent to which women have access to economic opportunities and are empowered socially and politically. Finally, in aging societies, increased female participation can mitigate workforce shortages and sustain economic growth (Klasen & Lamanna, 2009).

The International Labour Organization provides standardized data on FLFP through its ILOSTAT database, which compiles national surveys and censuses (ILO, 2020). Household surveys and Labour Force Surveys (LFS) are the primary tools used globally to collect data on employment, unemployment, and activity status. However, recent data from ILO (2020) indicate that globally, female labour force participation remains below that of males, with significant disparities across regions. For instance, during the COVID-19 pandemic, FLFP declined notably in many countries due to increased caregiving responsibilities and economic downturns, especially affecting women in low-income nations. The factors influencing FLFP include cultural norms, educational attainment, access to childcare, labor market policies, and legal frameworks. Addressing barriers to female participation is essential for economic resilience and inclusive growth.

Theories of Gender Development

Social Learning Theory of Gender Development (SLT)

Social learning theory primarily developed by Albert Bandura (1977) cited in Rumjaun, & Narod, (2025), posits that gender development occurs through observation, imitation, reinforcement, and modeling within a social context. It emphasizes that children learn gender roles and behaviors by watching others and receiving feedback from their environment, rather than solely through innate biological factors. The core principles of social learning theory include; i) Children observe the behaviors of significant others (parents, peers, media figures) and imitate those behaviors, especially when they see them rewarded. ii) Behavior is shaped by the consequences it receives. Rewards for gender-appropriate behaviors increase their likelihood, while punishments for gender-inappropriate behaviors discourage them. iii) Children learn from observing the outcomes of others' behaviors. If a peer or role model is rewarded for gender-conforming behavior, the child is more likely to imitate that behavior. iv) Children are more likely to imitate models they identify with, such as same-sex parents or peers, reinforcing gender-specific behaviors. v) Mass media and popular culture serve as powerful models, shaping perceptions of gender roles through portrayals of gender-typical behaviors.

Application of social learning theory in gender development

According to Grusec (1992), the following are modes of applying the social learning theory in gender development;

-Parents serve as primary models; for example, mothers might emphasize nurturing roles, while fathers model assertiveness or independence.

-Peers reinforce gender norms through social approval or rejection, influencing children to conform to group expectations.

-Television, movies, advertising, and social media portray gender stereotypes, which children observe and imitate.

-Teachers may unconsciously reinforce gender biases through differential interactions or expectations.

However, the theory does not fully account for innate biological factors like hormones or brain differences that also shape gender. Also, the theory may neglect internal cognitive processes, such as children's active interpretation and understanding of gender concepts. As well, it tends to perpetuate stereotypical gender roles, sometimes ignoring individual differences and gender non-conformity. Finally, the theory does not explicitly address how children develop internal gender schemas or identities, which are crucial in gender development (Christine, & Ronald, 2006). In summary, social learning theory provides a comprehensive framework for understanding how children acquire gender roles through socialization processes involving observation, imitation, and reinforcement. Its emphasis on environmental influence and modeling aligns with observable behaviors and societal norms.

Cognitive Developmental Theory of Gender Development

The cognitive developmental theory of gender development, primarily is associated with psychologist Jean Piaget and later expanded by Lawrence Kohlberg and others (Klein, 2023). They emphasize that children actively construct their understanding of gender as part of their overall cognitive development. Unlike social learning theories that focus on external reinforcement, this approach posits that children go through specific stages of cognitive growth that influence how they comprehend and internalize gender roles. The core concepts of this theory are; i) Children are active learners who seek to organize their understanding of the world, including gender identities, through interaction with their environment. ii) Children progress through sequential stages, each characterized by increasing cognitive sophistication related to gender concepts. iii) The key developmental milestone, where children recognize that gender remains stable over time and despite superficial changes. According to Pakpahan & Saragih, (2022), the theory noted three developmental stages of gender understanding.

i. Gender identity (around age 2-3). Children can correctly identify their own gender and often label others as male or female. This recognition is based on superficial cues like clothing, hairstyle, or assigned gender roles. Children are aware of their own gender but do not yet understand that gender is fixed or unchangeable.

ii. Gender stability (around age 4-5). Children understand that gender is stable over time (e.g., boys grow up to be men, girls grow up to be women). They may still believe that superficial changes (clothing, hairstyle) can alter gender, reflecting incomplete understanding.

iii. Gender constancy (around age 6-7). Children grasp that gender is consistent across situations and superficial changes. This understanding leads to more gender-appropriate behaviors and attitudes, as children recognize that gender is an enduring aspect of identity.

The implications of the theory are that; Children actively seek out information about gender and organize their knowledge based on their cognitive stage. Equally, once children attain gender constancy, they tend to conform more strictly to gender roles to maintain consistency with their understanding. Finally, development of logical thinking and classification skills underpins the progression through stages.

The major criticisms of this theory are; i) The theory emphasizes cognitive maturation but downplays the influence of socialization, media, and cultural norms. ii) Not all children reach gender constancy at the same age; individual differences are not fully acknowledged. iii) the theory overlooks emotional, identity, and social aspects of gender development. iv) the theory primarily describes understanding of gender rather than deep-seated gender identity or roles.

While the theory was groundbreaking in emphasizing cognitive stages, modern research integrates it with social and cultural perspectives to provide a more comprehensive understanding of gender development.

Feminist and Critical Theories of Gender Development.

Feminist and critical theories of gender development challenged the traditional, biological, and social learning perspectives by emphasizing gender as a social construct rooted in power relations, cultural norms, and societal institutions. These perspectives aim to deconstruct how gender roles and identities are shaped, maintained, and challenged within societal frameworks, highlighting issues of inequality, oppression, and social justice (Katsiampoura, 2024). The core principles and assumptions of the theory include; firstly, gender is not innate or biologically determined but is constructed through social processes, cultural norms, and institutional practices. That is, gender identities are fluid and context-dependent rather than fixed categories. Secondly, gender development is linked to power dynamics, where

dominant groups (often males) maintain authority through social, political, and economic structures. The patriarchy and other systems of dominance influence individuals' experiences and identities. Finally, gender intersects with other social categories such as race, class, sexuality, and disability, shaping unique experiences of oppression and privilege (Crenshaw, 1991).

Some theoretical perspectives of the feminist and critical theories were given by the following scholars;

Judith Butler's queer theory and performativity. This theory posits that gender is performative, meaning it is enacted through repeated behaviors, speech, and practices that conform to societal norms. The implication is that gender is not a stable identity but a series of performances that can be subverted or challenged.

The feminist standpoint theory (Harding, 2016). The key concept of this theory is that, knowledge is situated; women's experiences provide unique insights into social reality that are often marginalized. The implication is that, feminist perspectives can challenge dominant narratives and promote epistemic justice.

The theories above advocate for empowering marginalized genders and promoting social justice. They aim to deconstruct stereotypes and societal expectations that restrict individual freedom. They inform policies promoting gender equality and inclusive education that recognizes gender diversity. Finally, it addresses multiple axes of oppression, leading to more nuanced understandings of gender experiences.

The Feminist and critical theories was criticized and challenged on the following premise; i) The theories' abstract nature can make practical application challenging. ii) Emphasis on fluidity may undermine efforts to establish universal gender rights. iii) Deeply ingrained societal norms pose resistance to change driven by these theories. iv) Fully integrating intersecting identities remains complex and context-specific.

Theories of productivity.

The classical theory of labour productivity

The classical theory of labour productivity emerged during the late 18th and early 19th centuries, primarily through the works of classical economists such as Adam Smith, David Ricardo, and John Stuart Mill. It laid the foundational framework for understanding economic growth, emphasizing the roles of capital accumulation, technological progress, and division of labor in enhancing productivity. (Tsoulfidis, 2024). The core principles of classical theory include; first, the concept of division of labor which states that, increasing specialization

allows workers to become more efficient at specific tasks. Adam Smith in his book “The Wealth of Nations”, illustrated how division of labor leads to significant productivity gains by reducing time and effort per task (Cheng, 2012). Secondly, is the concept of capital accumulation which posits that investment in capital goods (machinery, tools, infrastructure) enhances workers' ability to produce more. The implication is that growth in capital stock directly correlates with increased labor productivity. Thirdly, is the concept of technological progress which states that, innovation and technological improvements enable more efficient production processes. The concept view technological change as a vital driver of productivity growth. Finally, is the law of diminishing returns which states that, beyond a certain point, adding more capital or labor results in smaller incremental gains in output. The implication is that continuous technological progress is necessary for sustained productivity growth.

While the original classical framework laid the groundwork, modern economics recognizes limitations, such as underestimating human capital and organizational factors. Nevertheless, the principles of capital investment and technological progress remain central to contemporary growth theories.

Modern growth theories, such as endogenous growth models, build upon classical ideas, integrating human capital, innovation, and knowledge spillovers. Policy implications remain relevant: promoting R&D, infrastructure, and education can foster productivity growth.

Human Capital Theory of labour Productivity

The human capital theory posits that investments in human beings such as education, training, health, and skills are analogous to investments in physical capital, and they play a crucial role in enhancing labor productivity. This theory emphasizes that a more educated, skilled, and healthy workforce produces more output per worker, thereby driving economic growth and development (Abdelgany, & Saleh, 2023). The core concepts of human capital theory include; i) Human capital refers to the accumulated knowledge, skills, competencies, health, and other attributes that enable individuals to perform labor so as to produce economic value (Lassibille, & Navarro Gómez, 2023). ii) Investment in human capital such as; Education (Formal schooling, vocational training). Health (Medical care, nutrition, wellness programs). Skills development (On-the-job training, lifelong learning). The implication is that these investments increase an individual's productivity and earnings potential. iii) Impact on labor productivity; Better-educated and healthier workers tend to be more efficient, adaptable, and innovative. Human capital enhances the quality and quantity of labor, leading to higher output.

The Implications of human capital theory clearly resonates on the following aspect of the economy;

Economic growth: Human capital accumulation is a key driver of long-term economic growth (Lucas, 1988). Countries investing in education and health tend to experience higher productivity and income levels.

Policy implications; Enhancing human capital reduces poverty and inequality and promotes sustainable development. Governments are encouraged to prioritize investments in education, health, and skills training.

Workforce development; Human capital development contributes to innovation and competitive advantage. Continuous learning and upskilling are vital in adapting to technological changes.

The critiques and limitations of the theory rest on the following; firstly; quantifying human capital and its direct impact on productivity is complex. Secondly, it assumes individuals always invest optimally, neglecting behavioral and institutional factors. Thirdly, is the unequal access to education and health services can exacerbate disparities. Finally, it underestimates informal skills and social capital.

Total Factor Productivity (TFP) Theory of labour Productivity

Total factor productivity also known as multifactor productivity, is a key concept in understanding economic growth and productivity beyond the contributions of traditional inputs like labor and capital. TFP measures the efficiency with which all inputs are used to produce output, capturing the effects of technological innovation, organizational improvements, and other factors that influence productivity growth. TFP is defined as the portion of output not explained by the number of inputs used in production. (Haider et al, 2021). It reflects technological progress, innovation, efficiency, and other factors that improve the productivity of all inputs collectively. In a simplified cobb-douglas production function the TFP can be expressed mathematically as follows;

$$Y=A \cdot K^{\alpha} \cdot L^{1-\alpha}$$

where:

Y is the total output,

A is the TFP (a measure of technological progress),

K is the capital input,

L is the labor input,

α is the output elasticity of capital (a parameter between 0 and 1).

The significance of the TFP to productivity theory includes; TFP captures technological innovations and efficiency gains that enable more output without proportionate increases in inputs. Since capital and labor have diminishing returns, sustained economic growth largely depends on improvements in TFP. Enhancing TFP involves investing in R&D, innovation, education, and improving institutions and organizational efficiency. According to Haider, et al, (2021), the factors influencing TFP includes; Technological innovation (Adoption of new technologies improves efficiency). Organizational improvements (Better management practices and institutions). Education and human capital (Skilled workforce enhance productivity). Research and Development (R&D) (Investment in R&D spurs innovation). Infrastructure and institutions (Effective infrastructure and governance facilitate efficient production).

The limitations of the TFP are based on the following; i) TFP is a catch-all measure that includes technological progress but also encompasses measurement errors and other unobserved factors. ii) It is difficult to disentangle whether TFP growth causes economic growth or vice versa. iii) TFP does not account for income distribution or social equity.

Empirical studies relating gender development on productivity.

Numerous empirical studies have investigated how advancing gender equality impacts labour productivity, economic growth, and organizational performance. According to World Bank (2012), reducing gender gaps in labor force participation, education, and access to finance can significantly boost economic growth. Specifically, closing gaps in employment and wages can contribute up to 20% of GDP growth in some regions.

Equally, Klasen & Lamanna, (2009) noted that, higher female education levels are associated with increased labour productivity and economic output. Countries with better gender parity in education tend to have higher total factor productivity (TFP). Consequently, investing in girls' and women's education enhances human capital and productivity. Also, Catalyst (2013) found that, organizations with higher gender diversity, especially in leadership roles, tend to outperform their less diverse counterparts in profitability and productivity measures. The implication is that, gender inclusion in workplaces improves decision-making, innovation, and efficiency.

Again, Kabeer (1999) noted that increased female labor participation correlates with higher productivity levels and better utilization of available human resources. The implication is that policies that promote gender equality in employment can lead to higher national productivity. Finally, Doss (2018) found that empowering women farmers through access to land, credit,

and extension services increases agricultural productivity, which is crucial in developing countries. This means that gender-sensitive interventions enhance productivity in key sectors like agriculture.

Empirical findings on the impact of labor force participation on productivity

According to Benhabib, & Spiegel (1994) found that, higher labor force participation, as a component of human capital accumulation, significantly boosts productivity. Hence, countries with higher participation rates in labor markets experience faster growth in productivity. This means that, engaging more of the workforce contributes to technological progress and productivity growth. As well, Mulugeta (2021), noted that, higher labor force participation among women and marginalized groups is associated with poverty reduction and increased productivity. Policies that facilitate participation can lead to broad-based productivity improvements. The implication is that inclusive labor markets enhance overall productivity and economic resilience.

Equally, Klasen & Lamanna (2009), higher female labor force participation correlates positively with higher economic growth and productivity across countries. Hence, closing gender gaps in employment can significantly enhance total factor productivity (TFP). This means that increased labor participation improves resource utilization and overall productivity. A similar report by the International Labour Organization (2021), found that countries with higher employment-to-population ratios tend to have higher productivity levels. The report emphasizes that increasing labor market participation, especially among women and youth, can lead to productivity gains at the macroeconomic level. The implication is that labor participation policies are crucial for economic development.

In similar vein, Thaddeus et al. (2022), in their study found that increased labor force participation, especially among women, is linked to higher productivity growth in transition economies. Consequently, structural reforms that reduce barriers to participation can have significant productivity payoffs. That means, removing participation barriers boosts economic efficiency. Finally, the World Economic Forum's (2020) global gender gap report highlights that countries with narrower gender gaps in education tend to perform better economically, with higher GDP per capita and productivity metrics (WEF, 2020). Finally, the World Bank's World Development Report emphasizes that gender parity in education accelerates economic growth by maximizing human capital efficiency (World Bank, 2012). In conclusion, empirical evidence suggests that higher labor force participation, especially when inclusive and accompanied by skills development, significantly enhances productivity.

Methodology

Method of data analysis and the model

The VAR model is formulated and utilized for the analysis. All the variables used in the analysis are treated as both endogenous variable and a function of all variables in lags. The model can be represented as follows:

$$Y = \begin{pmatrix} LP_t \\ GDI_t \\ FPR_t \end{pmatrix} \quad \text{eqn 1}$$

$$Y_t = C + \sum_{i=1}^p \alpha_i Y_{t-1} + e_t \quad \text{eqn 2}$$

$$LP_t = \alpha_0 + [\sum_{t=1}^p \alpha_{11}^{ij} LP_{t-1} + \sum_{t=1}^p \alpha_{12}^{ij} GDI_{t-1} + \sum_{t=1}^p \alpha_{13}^{ij} FPR_{t-1}] + e_t$$

$$GDI_t = \alpha_0 + [\sum_{t=1}^p \alpha_{21}^{ij} LP_{t-1} + \sum_{t=1}^p \alpha_{22}^{ij} GDI_{t-1} + \sum_{t=1}^p \alpha_{23}^{ij} FPR_{t-1}] + e_t$$

$$FPR_t = \alpha_0 + [\sum_{t=1}^p \alpha_{31}^{ij} LP_{t-1} + \sum_{t=1}^p \alpha_{32}^{ij} GDI_{t-1} + \sum_{t=1}^p \alpha_{33}^{ij} FPR_{t-1}] + e_t \quad \text{eqn 3}$$

Definition of Variables.

Labour productivity (LP); Labour productivity is a measure of the efficiency of labor in the production process. It is typically defined as the amount of output produced per unit of labor input, such as per worker or per hour worked. Labour Productivity = $\frac{\text{Total Output}}{\text{Total Labour Input}}$

Where: Total output is often measured in terms of gross domestic product (GDP), units produced, or sales.

Total labour input is measured in terms of the number of workers, total hours worked, or both.

Gender development (GD); refers to the process of improving and promoting equality between genders in various aspects of life, including education, health, employment, political participation, and social rights. It emphasizes ensuring that both women and men have equal opportunities, rights, and access to resources necessary for personal and collective growth. In this work gender development index is used to capture gender development.

Female labour force participation rate: is a measure that indicates the percentage of women of working-age who are either employed or actively seeking employment. It is calculated as:

$$FLPR = \frac{(\text{Number of employed women} + \text{number of women actively seeking work})}{\text{Total female population aged 15-64}} \times 100$$

Method of data collection and sources.

Time series data is used for the study; the data were collected from both the UNDP HDR report (2025) and the World Bank's World Development Indicators database (2025). The data were from 2008 to 2024.

Justifications for using VAR analysis in this work

VAR analysis is justified for this study because our goal is to explore the dynamic interdependencies among multiple variables without imposing restrictive structural assumptions. Specifically, our goal is to captures the dynamic interrelationships. Equally, it is flexible and simple because it does not require the specification of a theoretical model beforehand, making them flexible tools for exploratory analysis of multiple variables. As well, VAR models are effective for short-term forecasting of multiple interrelated time series due to their ability to incorporate lagged values. Finally, it is suitable for analyzing stationary time series data, making it widely applicable in macroeconomic and financial studies. (Wu, & Zhou, 2015).

Analysis and interpretation

Table 1. Stationarity test.

Variable	Order	ADF	Prob	Conclusion
LP	I (0)	-3.053554	0.0488	Stationary
D(GDI)	I (1)	-4.468694	0.0029	Stationary
FRP	I (0)	-3.182135	0.0404	Stationary

Source; Authors compilation

From table 1, it can be observed that all the variables used in the analysis are stationary at levels except GD which is stationary at first difference. If values are stationary, it means that they do not change or fluctuate over time, this implies a stable, predictable environment where past data can reliably inform future expectations, simplifying analysis and decision-making.

Table 2 VAR Lag Order Selection Criteria.

VAR Lag Order Selection Criteria						
Endogenous variables: LP GDI FPR						
Lag	LogL	LR	FPE	AIC	SC	HQ
1	55.14729	NA	6.36e-07	-5.768412	-.333830*	-5.746157
2	61.00173	7.318053	1.04e-06	-5.375217	-4.506054	-5.330709
3	79.23806	15.95679	4.57e-07*	-6.529758*	-5.226014	-6.462995*

Source; Authors compilation

The selected lag of our VAR analysis is lag three because both the FPE, AIC and HQ converged at lag three. The selection of the optimal lag length is critical in capturing the autocorrelation and cross-correlation between the variables. It also helps to determine the number of lags, the order of the autoregressive (AR) and moving average (MA) components,

and the inclusion of exogenous variables. Finally, the selection criteria help prevent overfitting and underfitting (Obomeghie, 2025).

Table 3 Vector Autoregression Estimates.

	LP	GDI	FPR
LP(-1)	0.666201 (0.27938) [2.38460]	0.004020 (0.01854) [0.21685]	0.227533 (0.25552) [0.89046]
LP(-2)	0.229201 (0.47464) [0.48289]	-0.037003 (0.03149) [-1.17501]	-1.826597 (0.43411) [-4.20766]
LP(-3)	-0.780549 (0.39028) [-1.99995]	0.070352 (0.02589) [2.71684]	1.244385 (0.35696) [3.48608]
GDI(-1)	5.983244 (4.24027) [1.41105]	-0.163736 (0.28134) [-0.58199]	5.387274 (3.87820) [1.38912]
GDI(-2)	2.135771 (4.02852) [0.53016]	-0.498177 (0.26729) [-1.86383]	3.713600 (3.68453) [1.00789]
GDI(-3)	5.719901 (3.58024) [1.59763]	-0.011068 (0.23754) [-0.04659]	12.64187 (3.27453) [3.86066]
FPR(-1)	-0.050401 (0.13397) [-0.37620]	0.003232 (0.00889) [0.36360]	-0.193275 (0.12254) [-1.57731]
FPR(-2)	-2.768957 (1.32096) [-2.09617]	0.114626 (0.08764) [1.30785]	9.626217 (1.20817) [7.96761]
FPR(-3)	4.170198 (1.53646) [2.71415]	-0.253650 (0.10194) [-2.48816]	-11.18517 (1.40527) [-7.95946]
C	-70.29518 (25.4955) [-2.75717]	7.625186 (1.69159) [4.50770]	113.7632 (23.3184) [4.87868]
R-squared	0.891725	0.915576	0.974931
Adj. R-squared	0.729312	0.788940	0.937328
Sum sq. resids	0.091037	0.000401	0.076154
S.E. equation	0.123178	0.008173	0.112660
F-statistic	5.490483	7.229993	25.92676

Source; Authors compilation

Table 3 above shows the VAR estimates which indicates that the estimates are adequate for the analysis with the adjusted R^2 values of 72%, 78% and 93% respectively, as well as, the F-Statistics values of 5.490, 7.230 and 25.927 respectively. Labour productivity (LP) with

0.7293 clearly indicates that about 72.93% of its variation is explained by its past values, suggesting a good fit. With respect to gender development (GDI) with 0.7889, it shows that approximately 78.89% of its variation is explained, also indicating a strong fit. Finally, female labour force participation rate (FPR) with 0.9373, indicates that about 93.73% of its variation is explained, indicating an excellent fit and that the model captures most of the dynamics for this variable. For the F-statistic values (5.49, 7.23, 25.93) for LP, GDI and FPR respectively, the overall significance of the regressors is moderate with respect to LP. It has slightly stronger evidence that the lagged regressors are jointly significant with respect to GDI. Finally, FPR has a very high adjusted R², indicating strong joint significance of the regressors for this variable. Overall, all three variables are reasonably well explained by their lagged values. The model is quite effective, implying strong temporal dependencies and interactions captured by the model.

Table 5 Normality test.

Component	Skewness	Chi-sq	Df	Prob.*
1	-0.215394	0.108254	1	0.7421
2	0.103069	0.024788	1	0.8749
3	0.817695	1.560125	1	0.2116
Joint		1.693166	3	0.6385
Component	Kurtosis	Chi-sq	Df	Prob.
1	3.153145	0.013681	1	0.9069
2	1.967356	0.622040	1	0.4303
3	3.612533	0.218865	1	0.6399
Joint		0.854586	3	0.8364
Component	Jarque-Bera	df	Prob.	
1	0.121935	2	0.9409	
2	0.646827	2	0.7237	
3	1.778990	2	0.4109	
Joint	2.547752	6	0.8631	

*Approximate p-values do not account for coefficient estimation

Source; Authors compilation

Table 4 above shows that the values used for the analysis are normally distributed with the Jarque-Bera probabilities 0.9409, 0.7237, and 0.4109 respectively and a joint probability of 0.8631 which are all more than the significance levels. (5% and 1%). Overall, the results suggest that the residuals of all three variables are approximately normally distributed, which is a desirable property in VAR modeling, especially when applying inference procedures that assume normality.

Table 5. VAR Residual Serial Correlation LM Tests.

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	5.669693	9	0.7725	0.441981	(9, 2.6)	0.8459
2	10.01042	9	0.3496	1.200985	(9, 2.6)	0.5066
3	15.43539	9	0.0796	3.342553	(9, 2.6)	0.2015
Null hypothesis: No serial correlation at lags 1 to h						
Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	5.669693	9	0.7725	0.441981	(9, 2.6)	0.8459
2	136.1887	18	0.0000	NA	(18, NA)	NA
3	NA	27	NA	NA	(27, NA)	NA

Source; Authors compilation

From table 5 above, it can be seen that there is no problem of serial correlation in the analysis with the serial correlation LM test probability of 0.8459, 0.5066 and 0.2015 which are higher than the 5% rejection value. The Rao LM statistics are relatively low, consistent with the p-values indicating no serial correlation. This suggests that the model has adequately captured the dynamics of the data, and the residuals are essentially "white noise" with respect to serial dependence at these lags. In summary, there is no evidence of serial correlation in the residuals based on these tests, supporting the adequacy of our VAR model in terms of residual independence.

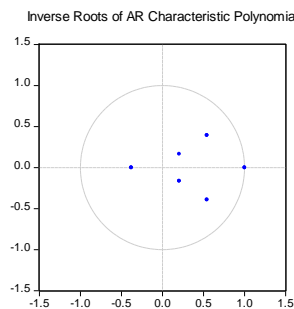


Fig 1. Stability Test.

Source; Authors compilation

From fig 1 above which represents the stability test, it can be seen that all the inverse roots are within the unit circle. This indicates that, the VAR process is stable (stationary). The model's impulse responses will decay over time, and the system will not exhibit explosive behavior. The time series generated by the VAR will revert to its mean over time, ensuring meaningful long-term relationships.

Table 6 Variance decomposition estimates

Variance Decomposition of LP:				
Period	S.E.	LP	GDI	FPR
1	0.171706	100.0000	0.000000	0.000000
2	0.239362	98.80424	0.956721	0.239036
3	0.478604	50.92841	24.75061	24.32098
4	0.625003	48.79045	36.94588	14.26367
5	2.674796	30.29173	35.54648	34.16179
6	3.584678	25.01043	23.91576	51.07381
7	18.33393	24.46307	29.20646	46.33047
8	34.85469	8.230015	12.49449	79.27550
9	150.4565	16.84669	22.68388	60.46944
10	395.6460	9.514629	15.20990	75.27547
Cholesky Ordering: LP GDI FPR				

Source; Authors compilation

Table 6 above shows the variance decomposition of the VAR analysis. We can observe from period one that, LP is 100% while GD and FPR are 0% respectively. This indicates that at period 1, the forecast error in LP is entirely due to own shocks since other variables haven't had time to influence it yet. But in period 2, LP is 98.8% while GDI is 0.96% and FPR is 0.23%. This shows that most of the forecast error variance of LP is still due to its own shocks, but now some influence from GDI and FPR has emerged. Finally, over time (Periods 3 to 10), the percentage of variance explained by own shocks (LP) decreases drastically, while the contributions from GDI and FPR increase over time. For example, by period 10 LP is only 9.5% while GDI and FPR are 15% and 75% respectively. This indicates that shocks due to FPR become increasingly important in explaining the variability of LP over time.

CONCLUSION

The analysis shows that gender development has a growing and significant influence on labour productivity over time. Initially, its impact was insignificant but becomes prominent after a few periods (period 4-5). The influence peaks around periods 4 and 5, with roughly 36-37% of the forecast error variance in labour productivity attributable to gender development shocks. It reduced to 22% and 15% in period 9 to 10. The influence is substantial (over 35%) by periods 4 and 5, indicating that gender development is an important driver of labour productivity variability in the medium term, although it eventually reduced to 15% in period 10. Overall, it exhibited sharp fluctuations over the period of analysis. This is similar to the findings by (Rubery, et al. 2023). This information can guide policy or

decision-making by highlighting the importance of gender development movements for labour productivity over the forecast horizon.

With respect to female labour force participation rate, the study shows that female labour force participation rate becomes a dominant contributor to the forecast error variance of labour productivity over longer horizons. This suggests that shocks to female labour force participation rate have a delayed but substantial impact on labour productivity, especially from 8-10 periods. On the short-term, female labour participation rate's influence on productivity is minimal initially. While on the long-term: female labour force participation rate explains a large portion of productivity's forecast error variance, indicating a strong and increasing influence over time. This is in line with studies such as (Thaddeus et al, 2022).

Recommendations.

Since gender development's influence on labour productivity was at its peak over the medium term, policymakers should closely monitor the country's gender development progression in order to anticipate its potential over time. Equally, they should implement policies that stabilize or promote healthy gender development growth, as fluctuations could have unpredictable effects on productivity. They should also recognize that policies aimed at influencing gender development may take some periods to manifest in the economy's productivity. Finally, One may also note the fluctuations it exhibited along the period of analysis, so patience and sustained efforts are necessary.

Based on the findings that female labour force participation rate's influence on productivity is minimal in the short term but becomes dominant over the long term, it is recommended as follows; firstly, policymakers should closely track female labour force participation rate. Since this impact manifests gradually, early actions targeting female labour force participation rate fluctuations can help mitigate their long-term effects on productivity. Finally, policy makers should design policies that are proactive rather than reactive, considering the lagged effects of female labour force participation rate shocks on productivity.

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