Manufacturing Value Added and Employment in Nigeria: A Subsectoral Diagnosis

Owan Jacob Ogar, Ph.D.
Department of Economics, University of Calabar, Calabar.

Owan, John Odey, Ph.D.
Department of Economics, Ebonyi State University, Abakaliki.

Ebehung, Noel Ph.D.
Department of Economics, University of Calabar, Calabar.

Etukudoh, Michael John Ph.D.
Department of Economics, University of Calabar, Calabar.

Agbor, Rachel Ichere
Department of Agriculture Extension, University of Calabar, Calabar.

DOI: 10.56201/ijefm.v9.no3.2024.pg133.149

Abstract
The study examined a sub-sectoral diagnosis of the impact of manufacturing value-added on manufacturing employment in Nigeria from 1986 to 2022, applying the bound test technique to establish the long run relationship among the variables. It was revealed that long run relationship exists among the variables in the estimated model. The results of the Error Correction Mechanism (ECM) within the framework of the ARDL shows that the value addition in manufacturing sector has spurred employment over the years. The study recommends among others that; there should be development of policy on cement manufacturing which will emphasize creating opportunities for more players to enter into cement manufacturing; the government should prioritize improving infrastructure and transportation networks to facilitate the distribution of cement products across the country, as this will increase demand and ultimately lead to job creation in the industry; strong policy on incentives for textile, apparel and footwear manufacturers as well as investment in research and development of textile, apparel and footwear production methods should be pursued; and efforts should be made to ensure that the benefits of this subsector are distributed equitably across different regions and socioeconomic groups.

Key Words: *Manufacturing value-added, Employment, Sub-sectoral diagnosis, ARDL, Nigeria.*

Introduction

The manufacturing value chain involved both backward and forward linkages, and it is asserted to be the pilot of economic growth and development. It is also critical to develop an economy capable of producing finished goods and products for domestic and international markets (Kalpakjian &Schmid, 2005). Primary and tertiary sectors can be properly oiled in manufacturing, generating tremendous investment and employment opportunities. The primary sector can benefit from increased efficiency due to technological advances, while the tertiary sector can enjoy higher levels of consumer demand due to rising disposable incomes.

For instance, the primary sector, or the raw material supplying sector, will be boosted as it will have consistent and uninterrupted demands for raw materials from manufacturing firms. As a result, the demand for raw materials from manufacturing firms will cause growth in the primary sector, leading to increased employment and investment opportunities (Anyaehie & Areji, 2015; Freudenburg, 1992; Peneder *et al.*, 2003). Meanwhile, the increased disposable incomes of consumers in the tertiary sector will cause an increased demand for services and products, creating greater competition in the sector (Cheng, 2013; Forni *et al.*, 2010). On the other hand, the tertiary sector, which provides auxiliary services to the manufacturing sector, will also grow because of the demands for their services from the manufacturing sector, and this will also make it to create job opportunities also from the value chain process (Meckstroth, 2016; Fakiyesi, 2005; Owan *et al.*, 2024).

Out of the thirteen subsectors in the Nigerian manufacturing sector, only four (food & beverage, cement, textile, and wood) accounted for about 80 per cent of total manufacturing output, and out of the four subsectors that dominate manufacturing output, food, beverages, and tobacco accounted for more than 50 per cent. For instance, from 1981 to 1985, food, beverage, and tobacco contributed 64.22 per cent of total manufacturing output, followed by cement at 10.84 per cent; textile, apparel, and footwear at 9.85 per cent; and wood and wood paper at 3.45 per cent. However, from 1986 to 1990, food, beverage, and tobacco contributed 59.67 per cent of total manufacturing output, showing a decline, followed by cement at 17.32 per cent, showing a significant increment; and textile, apparel, and footwear stood at 9.15 per cent, indicating a marginal decline; and wood and wood paper at 3.20 per cent, also witnessing a marginal decline (NBS, 2021; CBN, 2021).

From 1991 to 1995, food, beverage, and tobacco contributed 61.53 per cent of total manufacturing output, showing a return to growth; followed by cement at 14.33 per cent, showing a decline; and textile, apparel, and footwear stood at 9.44 per cent, showing a marginal increment; and wood and wood paper at 3.30 per cent, also witnessing a marginal increment. From 1996 to 2000, food, beverage, and tobacco contributed 64.91 per cent of total manufacturing output, which continued showing growth, followed by textile, apparel, and footwear at 9.96 per cent, which overtook the cement subsector as the second largest manufacturing subsector; and cement stood at 9.30 per cent, showing a significant decline; and wood and wood paper at 3.48 per cent, also witnessing a marginal increment. From 2001 to 2005, food, beverage, and tobacco contributed 64.51 per cent of total manufacturing output, showing a marginal decline; followed by textile, apparel, and footwear at 9.89 per cent, showing a marginal decline; and cement stood at 5.62 per cent, continuing its significant decline; and wood and wood paper at 3.46percent, also witnessing a marginal decline. From 2006 to 2010, food, beverage, and tobacco contributed 64.43 per cent of total manufacturing output, showing a marginal decline; followed by textile, apparel, and footwear at 9.88 per cent, showing a marginal decline but still second largest; and cement stood at 5.88 per cent, showing a marginal increment; and wood and wood paper at 3.46 per cent, also witnessing a marginal decline (NBS, 2021; CBN, 2021).

From 2011 to 2015, food, beverage, and tobacco contributed 50.98 per cent of total manufacturing output, showing a decline; followed by textile, apparel, and footwear at 18.51 per cent, showing a significant improvement; and cement stood at 6.82 per cent, returning to growth path but still third largest; and wood and wood paper at 3.06 per cent, witnessing a marginal decline. From 2016 to 2020, food, beverage, and tobacco contributed 44.61 per cent of total manufacturing output, showing a continued decline in terms of share of manufacturing GDP, followed by textile, apparel, and footwear at 22.7 per cent, showing continued improvement; and cement stood at 8.90 per cent, showing a continued increment; and wood and wood paper at 3.14 per cent, also witnessing a marginal increment (NBS, 2021; CBN, 2021).

The analysis of the four subsectors shows that there is an improvement mostly in the contribution of textile, apparel, and footwear especially and that the dominance of food, beverage, and tobacco, though still conspicuous but is being trimmed by the contributions of other subsectors. Hence, the main objective of the study was to examine the impact of manufacturing value-added on employment in Nigeria.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The concept of manufacturing value-added

An economy's manufacturing value added (MVA) is the full measure of all resident manufacturing activity units' net output, which is found by adding up outputs and subtracting intermediate consumption. For MVA to be measured correctly, the type of business activity and the area where the activity takes place must be clearly defined. Regarding area, UNIDO Statistics uses the idea of resident units from the national account. This is because data are assembled for a business, not for a country within its borders. Regarding governmental and administrative control, many territories have economies and sometimes use a different currency than the country they are part of. Therefore, manufacturing value added is a way to measure how much manufacturing contributes to an economy's gross domestic product (GDP), and it uses national accounts ideas to do so (Baldwin & Ito, 2018; United Nations, 2000).

The value added to manufacturing industries is an idea used in surveys. It refers to the net output of a given industry, which is the difference between its gross output and its intermediate consumption. In economic accounting, the value added is calculated without considering the consumption of fixed assets, shown by depreciation. Depending on the survey method used, the value added by manufacturing businesses may often refer to the census value added, which does not consider the difference between what is paid for non-industrial services and what is received for them. In this way, survey data may not consider the work of small and home-based factories, often left out of the normal industrial survey programme. As a result, different estimates are made for these kinds of units when making national accounts. Because of this, manufacturing sectors' value added is used to measure growth and structure, but not level (Mattyssens &Vandenbempt, 2008; Oti *et al*. 2016).

Review of the manufacturing output and the selected manufacturing subsectors in Nigeria

Table 2.1 shows the trend of the manufacturing variables taking by five-year average. The value GDP on a five-year average show that from 1981 to 1985, it stood at N14, 565.2 billion on the average. From 1986 to 1990, the value of GDP stood at N16,663.5 billion; the value of GDP from 1991 to 1995 stood at N19,815.9 billion; the value of GDP stood at an five year average of N22,287.5 billion from 1996 through 2000; the period from 2001 to 2000 witnessed a five year average the value of GDP peaking at N31,686 billion; it stood at N46,679.8 billion on the average from 2006 to 2010 and from 2011 to 2015, value of GDP stood at N63,367.3 billion showing a significant improvement from the previous and from 2016 to 2020, the value of GDP stood at N68,798.3 billion, an increase from previous period. This trend analysis of a five-year period shows that the value of GDP has steadily increased over four decades in Nigeria.

The value of manufacturing output on a five-year average show that from 1981 to 1985, it stood at N1, 385.43 billion on the average. From 1986 to 1990, the value of manufacturing output stood at N1,545.17 billion; the manufacturing output of GDP from 1991 to 1995 stood at N1,711.57 billion; the value of manufacturing output stood at an five year average of N1,517.38 billion from 1996 through 2000, a significant decline from last five year period; the period from 2001 to 2000 witnessed a five year average the manufacturing output of GDP rising to N1,978.57 billion; it stood at N3,075.78billion on the average from 2006 to 2010 and from 2011 to 2015, manufacturing output of GDP stood at N5,619.41 billion showing a significant improvement from the previous and from 2016 to 2020, the value of manufacturing output stood at N6,339.57 billion, also an increase from previous period. This trend analysis of a five-year period shows that the value of manufacturing output has steadily increased over four decades in Nigeria.

The total share of manufacturing to GDP on a five-year average show that from 1981 to 1985, it stood at 9.46 per cent of GDP. From 1986 to 1990, the total share of manufacturing to GDP marginally declined to 9.29 per cent; Share of manufacturing GDP decline continued from 1991 to 1995 as it stood at 8.65 per cent; Share of manufacturing GDP declined and stood at an average of 6.82 per cent from 1996 through 2000; the period from 2001 to 2000 witnessed an average manufacturing share of GDP of about 6.26 per cent, a decline from the previous five-period average; the manufacturing share of GDP slightly improved and stood at 6.59 per cent average from 2006 to 2010 and from 2011 to 2015; the percentage share of manufacturing to GDP stood at 8.81 per cent showing a significant improvement from the previous and from 2016 to 2020, the share of manufacturing GDP stood at 9.21 per cent, an increase from previous period. This trend analysis of a five-year period shows that the manufacturing share of GDP has stayed below the 10 percent mark indicating a low contribution of manufacturing to GDP for over four decades in Nigeria.

In term of the percent of the four-subsector s to total manufacturing as show in table 4.1 from 1981 to 1985, food, beverage and tobacco contributed 64.22 per cent of total manufacturing output, followed by cement at 10.84 per cent; textile, apparel, and footwear at 9.85 per cent; and wood and wood paper at 3.45 per cent. However, from 1986 to 1990, food, beverage, and tobacco contributed 59.67 per cent of total manufacturing output, showing a decline, followed by cement at 17.32 per cent, showing a significant increment; and textile, apparel, and footwear stood at 9.15 per cent, showing a marginal decline; and wood and wood paper at 3.20 per cent, also witnessing a marginal decline (CBN, 2021).

TABLE 2.1

Year	**GDP**	**MAN**	**MANGDP**	**CEM**	**CEM/MAN**	**FBT**	**FBT/MAN**	**TAF**	**TAF/MAN**	**WWP**	**WWP/MAN**	**MANEMP**
1981-1985	14565.2	1385.43	9.45894	158.637	10.8416	883.811	64.2242	135.557	9.85061	47.4427	3.44754	13.372
1986-1990	16663.5	1545.17	9.28717	266.672	17.3231	922.449	59.673	141.484	9.15255	49.5168	3.20323	13.374
1991-1995	19815.9	1711.57	8.64849	245.035	14.3323	1053.47	61.5334	161.579	9.4379	56.5499	3.3031	13.276
1996-2000	22287.5	1517.38	6.82456	142.374	9.20073	982.917	64.9114	150.758	9.95601	52.7627	3.48443	12.704
2001-2005	31686	1978.57	6.26041	110.862	5.62341	1277.16	64.5099	195.888	9.89443	68.5574	3.46287	11.908
2006-2010	46679.8	3075.78	6.58505	181.472	5.87652	1981.18	64.4295	303.87	9.88209	106.349	3.45856	10.664
2011-2015	63367.3	5619.41	8.80513	393.889	6.82369	2814.9	50.982	1068.98	18.5094	171.44	3.06462	11.348
2016-2020	68798.3	6339.57	9.21492	564.205	8.89939	2828.25	44.6103	1424.25	22.466	198.873	3.13702	12.022

A five average period of the GDP value, manufacturing output and other variables, 1981-2020.
Source: Author's computation 2023, data sources, CBN, WDI.
Note: CEM/MAN = share of cement in manufacturing output; FBT/MAN = share of food, beverage and tobacco in manufacturing output; TAF/MAN = share of textiles, apparel and footwears in manufacturing output; WWP/MAN = share of wood and wood products in manufacturing output.

From 1991 to 1995, food, beverage, and tobacco contributed 61.53 per cent of total manufacturing output, showing a return to growth; followed by cement at 14.33 per cent, showing a decline; and textile, apparel, and footwear stood at 9.44 per cent, showing a marginal increment; and wood and wood paper at 3.30 per cent, also witnessing a marginal increment. From 1996 to 2000, food, beverage, and tobacco contributed 64.91 per cent of total manufacturing output, which continued showing growth, followed by textile, apparel, and footwear at 9.96 per cent, which overtook the cement subsector as the second largest manufacturing subsector; and cement stood at 9.30 per cent, showing a significant decline; and wood and wood paper at 3.48 per cent, also witnessing a marginal increment. From 2001 to 2005, food, beverage, and tobacco contributed 64.51 per cent of total manufacturing output, showing a marginal decline; followed by textile, apparel, and footwear at 9.89 per cent, showing a marginal decline; and cement stood at 5.62 per cent, continuing its significant decline; and wood and wood paper at 3.46percent, also witnessing a marginal decline. From 2006 to 2010, food, beverage, and tobacco contributed 64.43 per cent of total manufacturing output, showing a marginal decline; followed by textile, apparel, and footwear at 9.88 per cent, showing a marginal decline but still second largest; and cement stood at 5.88 per cent, showing a marginal increment; and wood and wood paper at 3.46 per cent, also witnessing a marginal decline (CBN, 2021).

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TABLE 4.2
Percentage change in the variables over a five-year period, 1981-2020.

Year	GDP	MANPUT	CEM	FBT	TAF	WWP	MANEMP
1986-1990	14.40643	11.52947	68.10182	4.37181	4.37181	4.37181	0.014957
1991-1995	18.91794	10.76928	-8.11367	14.20337	14.20337	14.20337	-0.73276

1996-2000	12.47281	-11.3458	-41.8965	-6.697	-6.697	-6.697	-4.30853
2001-2005	42.16946	30.39367	-22.133	29.9353	29.9353	29.9353	-6.26574
2006-2010	47.31964	55.45504	63.69081	55.12428	55.12428	55.12428	-10.4468
2011-2015	35.74893	82.69847	117.0528	42.08195	251.7872	61.20469	6.414104
2016-2020	8.570663	12.81567	43.23954	0.474148	33.23469	16.00167	5.939374

Source: Author's computation 2023, data sources, CBN, WDI

Table 2.2 shows the percentage change in GDP, MANPUT, CEM, FBT, TAF, WWP AND MANEMP on a five-year average. From 1986 to 1990, GDP recorded a positive change of 14.41 per cent; MANPUT recorded an increase of 11.52 per cent, CEM recorded a positive change of 68.10 per cent, FBT recorded a positive change of 4.37 per cent; TAF recorded a change increase of 4.37 per cent, WWP recorded a positive change of 4.37 per cent while MANEMP recorded a marginal increase of 0.015 per cent.

From 1991 to 1995, GDP recorded an increase of 18.92 per cent; MANPUT recorded an increase of 10.77 per cent, CEM recorded decrease of 8.11 per cent, FBT recorded an increase of 14.20 per cent; TAF recorded an increase of 14.20 per cent, WWP recorded an increase of 14.20 per cent while MANEMP recorded decrease of 0.73 per cent from previous five years period.

From 1996 to 2000, GDP recorded an increase of 12.47 per cent; MANPUT recorded a decrease of 11.35 per cent, CEM recorded decrease of 41.90 per cent, continuing it decline from previous period in terms of percent change, FBT recorded a decrease of 6.70 per cent; TAF recorded a decrease of 6.70 per cent, WWP recorded a decrease of 6.70 per cent while MANEMP recorded decrease of 4.31 per cent from previous five years period.

From 2001 to 2005, GDP recorded a positive change of 42.17 per cent; MANPUT recorded an increase of 30.39 per cent, CEM recorded a negative change of 22.13 per cent, FBT recorded a positive change of 29.94 per cent; TAF recorded a change increase of 29.94 per cent, WWP recorded a positive change of 29.94 per cent while MANEMP recorded a large decrease of 6.27 per cent from previous five years period.

From 2006 to 2010, GDP recorded a positive change of 47.32 per cent; MANPUT recorded an increase of 55.46 per cent, CEM recorded a positive change of 63.69 per cent, FBT recorded a positive change of 55.12 per cent; TAF recorded a change increase of 55.12 per cent, WWP recorded a positive change of 55.12 per cent while MANEMP recorded a large decrease of 10.45 per cent from previous five years period.

From 2011 to 2015, GDP recorded a positive change of 35.75 per cent; MANPUT recorded an increase of 82.70 per cent, CEM recorded a positive change of 117.05 per cent, FBT recorded a positive change of 42.08 per cent; TAF recorded a change increase of 251.79 per cent, WWP recorded a positive change of 61.20 per cent while MANEMP recorded an increase of 6.41 per cent from previous period.

From 2016 to 2020, GDP recorded a positive change of 8.57 per cent; MANPUT recorded an increase of 12.82 per cent, CEM recorded a positive change of 43.24 per cent, FBT recorded a positive change of 0.47 per cent; TAF recorded a change increase of 32.23 per cent, WWP recorded a positive change of 16.00 per cent while MANEMP recorded an increase of 5.94 per cent from previous period.

Theoretical underpinnings

The marginal productivity theory was developed at the end of the 19th century by several writers, including John Bates Clark and Philip Henry Wicksteed. The marginal productivity theory holds that employers will tend to hire workers of a particular type until the contribution that the last (marginal) worker makes to the total value of the product is equal to the extra cost incurred by hiring one more worker. The marginal productivity theory of employment is based on certain assumptions (Leonard, 2003; Pullen, 2009). The theory assumes that employers will tend to hire workers of a particular type until the contribution that the last (marginal) worker makes to the total value of the product is equal to the extra cost incurred by the hiring of one more worker. Second, the theory assumes that labour is the only variable factor of production and that it is possible to increase only one factor. Third, the theory assumes that markets are in perfect competition and that the value attached to a worker's productivity is not influenced by other factors, such as the power to bargain over the wage. Fourth, the theory assumes that labour productivity is directly proportional to the wage rate and that workers are motivated solely to earn higher wages. Fourth, the theory assumes that there is perfect labour mobility and that workers can move freely from one job to another. Fourth, the theory assumes that there is perfect market knowledge and that workers have complete information about the wages paid in different industries. Finally, the theory assumes a stationary state, perfect competition, homogeneous labour, and constant technology (Hicks, 1932; Robinson, 1967).

The theory has been criticized for resting on unrealistic assumptions, such as the existence of homogeneous groups of workers whose knowledge of the market is perfect, and for not considering factors such as bargaining power and discrimination. The marginal productivity theory is also known as marginal physical productivity or pricing theory. Second, the theory assumes that labour is the only variable factor of production and that it is possible to increase only one factor, which is not true. Third, the theory assumes that full employment exists, which is not true. Fourth, the theory does not consider factors such as bargaining power, discrimination, and social tradition, which can affect labour productivity. Fourth, the theory does not explain the profits an entrepreneur can earn, and it ignores the power structure of the market. Finally, the theory has been criticized for focusing too much on labour and wages and needing more on capital and the return to capital (Harcourt, 2015).

Empirical studies

Sasahara (2019) used a worldwide input-output approach to estimate and disentangle the effect of export prospects on employment in three major economies: the United States, China, and Japan. The more these countries export, the more jobs they create at home. First, we provide evidence that the rate at which exports generate new jobs varies widely by country of final destination. We find that natural resource, textile, and service exports have a stronger employment effect than other types of exports because of the higher domestic value-added components. Therefore, the differences in employment effects between destination nations can be largely explained by differences in the sectoral makeup of exports. Alterations in the labour-to-output ratio, input-output linkages, and export sectoral compositions cause shifts in the employment effect of exports over time. According to the findings, the employment impact was mitigated through the first channel in all three nations, whereas the second and third channels had opposite effects.

Lawrence (2017) has two widely held views: trade performance has been the main reason for the declining share of manufacturing employment in the US and other industrial economies, and recent manufacturing productivity growth has been rapid but not accurately measured. The research illustrates that quicker productivity growth and unresponsive demand have driven the decline in manufacturing jobs in the US and other industrial economies for decades. However, since 2010, slower manufacturing productivity growth has been correlated with stronger manufacturing employment. These differences reflect a compromise between manufacturing's potential to boost productivity and create jobs. While some blame measurement errors for the recent slowdown in manufacturing productivity growth, spending patterns in the US and elsewhere suggest that the productivity slowdown is real and that fears about robots and other technological advances in manufacturing displacing large numbers of jobs appear unfounded.

South Korean manufacturing agglomerations, productivity, and strong employment growth were analyzed by Choi and Choi (2017). The study found that agglomeration, productivity, and rapid manufacturing employment development in this nation are mutually beneficial. High-growth enterprises are more productive and more likely to grow jobs. Localization, which increases productivity and employment growth, amplifies these beneficial associations.

Using a wide sample of developed, developing, and transition economies, Shiferaw and Hailu (2016) looked at how the manufacturing sector responded to globalization regarding employment. Our research shows that developing nations require exceptionally high rates of value-added growth (about 10%) to significantly boost manufacturing employment (around 4-5%). Even in "comparative advantage" industries of emerging countries, the employment gains of export orientation are minimal. However, expanding the range of goods exported can help boost employment, especially in the high- and medium-tech sectors. While import competition has been shown to displace workers in the same sectors in OECD and transition economies, it has not impacted employment growth in low-tech industries in developing countries. Jobs in developing countries are most at risk in medium-technology sectors because of their greater reliance on capital. The OECD has found that high-tech jobs are less affected by imports than other types of jobs. Developing countries that have yet to industrialize can benefit from investment since it helps them create jobs in their low-technology sector.

Herman (2020) investigated the labour productivity-wages nexus in the Romanian manufacturing industry from 2008 to 2016, motivated by the need to improve labour productivity and wages to raise workers' living standards. Our findings show that Romania's manufacturing sector boosts non-financial business value added and employment. In 2008–2016, Romanian manufacturing wages were favourably influenced by worker productivity, according to correlation and regression research. Our findings also imply that worker productivity explains the high wages in some manufacturing subsectors. However, results also show persistent and increasing gaps between labour productivity and wages in the manufacturing sector from 2008 to 2016, as well as high gaps in some subsectors, which can lower labour shares and increase social inequality.

Fu *et al.* (2021) used labour market evidence from a cross-country panel dataset of 74 nations between 2004 and 2016 to examine the effect of industrial robot deployment on inclusive growth. Compared to developing economies, developed economies see large increases in labour productivity and total employment after adopting industrial robots. In developing economies, where robot adoption is higher, the labour proportion of GDP is lower than in industrialized economies. There is little evidence of technological unemployment, but there is a correlation between the greater adoption of robots and a considerable increase in economic inequality in both developed and developing economies. Furthermore, industrial robot adoption in industrialized economies positively correlates with male and female employment, with a minor advantage over women. However, in underdeveloped countries, the spread of robots primarily benefits people with a middling to the high level of education.

METHODOLOGY

Research design

The study investigated manufacturing sector development and employment in Nigeria. Therefore, an ex post facto (after the fact) research design was adopted to achieve the study's objectives. This type of research design enables the study to evaluate the impact of the independent variables on the corresponding dependent variable by collecting relevant data on the variables (secondary data) and determining the cause-and-effect relationships among the relevant variables.

In particular, the study adopted both descriptive and econometric tools in its analysis and estimation. The descriptive analysis employed descriptive tools such as simple tables, graphs, percentages, averages, etcetera, to analyze the trend performance of the variables, while econometric techniques, on the other hand, the ARDL estimation techniques in estimating the relevant equations under the framework of multiple regression modelling and estimation.

Model specification

This model is anchored on the marginal productivity theory. The marginal productivity theory holds that employers will tend to hire workers of a particular type until the contribution that the last (marginal) worker makes to the total value of the product is equal to the extra cost incurred by hiring one more worker. Manufacturing subsectors-employment equation is thus specified as:

$$MANEMP = f(\mathrm{FBT}, \mathrm{TAF}, \mathrm{CEM}, \mathrm{WWP}, INV, RGDPGR, HUC, CPS, INFRA) \qquad 3.1$$

Equation (3.1) is structurally specified as follows:

$$MANEMP = \beta_0 + \beta_1 FBT + \beta_2 TAF + \beta_3 CEM + \beta_4 WWP + \beta_5 INV + \beta_6 RGDPGR + \beta_7 HUC + \beta_8 CPS + \beta_9 INFRA + U_{t2} \qquad 3.2$$

$$\beta_0 \textit{ is the constant term}$$

$$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5\ \beta_6, \beta_7, \beta_8 and \beta_9 > 0$$

Where;

MANEMP = manufacturing employment rate measures in percentage, FBT= total output of the food, beverage and tobacco manufacturing subsector, measures in naira, TAF= total output of the textile, apparel and footwear manufacturing subsector, measures in naira, CEM = total output of the cement manufacturing subsector, measures in naira, WWP = total output of the wood and wood product manufacturing subsector, measures in naira, INV= total investment which is the total sum of foreign direct investment and domestic investment, measures in naira, RGDPGR = real GDP growth rate, proxy for economic growth rate, measures in percentage, HUC = human capital, measure in percent of skilled labour force to total labour force, is also a proxy of technology, CPS = credit to private sector in measures naira, and INFRA = infrastructure, proxy by electricity consumption per kilowatt.

Estimation procedures

Several procedures were used to estimate the study's specified equation. The procedures included unit root test, cointegration test, Granger causality test, and the estimation of an Autoregressive Distributed Lag (ARDL) model. The Augmented Dickey–Fuller (ADF) unit root test was employed to determine the stationarity conditions of the variables. The co-integration test was conducted for the presence or absence of co-integration between series of the same order of integration. Co-integration between variables implies that equilibrium or a long-run relationship exists between a set of time-series variables, provided that the series are integrated in the same sequence. A lack of co-integration indicates that these variables have no long-run relationship. The VAR causality/Block Exogeneity Wald test was employed to investigate the long-run equilibrium relationship among the selected macroeconomic variables in the model. The study adopted the autoregressive distributed lag (ARDL) modelling technique as its main technique of estimation. This estimation technique was chosen because the time series properties of the variables met the requirements for its adoption, which is that variables must not be stationary after the second difference but be of mixed stationarity at the level and after the first difference.

The procedure for estimating an ARDL model involves first testing for the stationarity of the variables. If they have mixed stationery at the level, the optimum lag selection is done. Then the model is tested to ensure that it is dynamically stable and has no serial correlation. Then a bounds test is done to determine if there is an existence of the long-run relationship among the variables in the model. Then the long-run coefficients and short-run coefficients are extracted along with the error correction term.

RESULTS AND DISCUSSION OF FINDINGS

Presentation and analysis of econometric results

Unit root test results

The unit root result is presented in Table 4.1. The table shows both the ADF and PP unit root test results for all the variables, and it shows that some of the variables were stationary at level while others were stationary after first difference. The Kwiatkowski-Philip-Schmidt-Shin (KPSS) (Confirmatory test) test was used on the variable that ADF and PP test results were conflicting. Basically, as shown in table 4.1, the unit root test result shows that log (INFRA) and RGDPGR variables were stationary at level using both ADF and PP unit root test methods. The unit root test result shows that log (CEM), log (FBT) log (HUC), log (INV), log (MVA), log (TAF), log (WWP), log (CPS) variables were not stationary at level but became stationary after first difference using both ADF and PP unit root test methods. MANEMP variable unit root test result using ADF and PP unit root test methods was conflicting, and so to settle the conflicting results, the KPSS unit root test method was introduced, and the results shows that the MANEMP variable was stationary at level. The order of integration of the variables in table 4.1 using ADF and PP unit root test showed a mixed stationarity and this justified the use of the ARDL estimation techniques in this study.

TABLE 4.1
Unit root test results: ADF and PP

Variable	At level		After first difference		Remark
	ADF	PP	ADF	PP	
Log(CEM)	-2.1958 (0.4792)	-2.1170 (0.5213)	-6.3954 (0.0001)	-6.6027 (0.0001)	I(1)
Log(FBT)	-1.9333 (0.6177)	-2.3838 (0.3821)	-5.5483 (0.0003)	-5.6761 (0.0002)	I(1)
Log(HUC)	-1.8614 (0.6560)	-2.0049 (0.5814)	-6.2085 (0.0001)	-6.2085 (0.0001)	I(1)
Log(INFRA)	-3.7580 (0.0294)	-4.0223 (0.0156)	NE	NE	I(0)
Log(INV)	-1.1984 (0.8976)	-1.6755 (0.7440)	-4.4236 (0.0057)	-4.23447 (0.0070)	I(1)
Log(MVA)	-3.0788 (0.1251)	-2.1126 (0.5237)	-4.4487 (0.0054)	-4.0898 (0.0134)	I(1)
Log(TAF)	-2.4767 (0.3373)	-1.8772 (0.6481)	-4.0219 (0.0158)	-4.2098 (0.0099)	I(1)
Log(WWP)	-2.1609 (0.4955)	-2.3091 (0.4199)	-5.5807 (0.0002)	-5.7538 (0.0001)	I(1)
MAMEMP	-2.1163 (0.5205)	-1.2356 (0.8895)	-3.6776 (0.0360)	-3.0001 (0.1445)	I(0) After KPSS confirmatory test
RGDPGR	-3.7406 (0.0312)	-4.1496 (0.0113)	NE	NE	I(0)
Log(CPS)	0.0664 (0.9994)	0.0328 (0.9954)	-4.0554 (0.0145)	-4.0006 (0.0166)	I(1)

Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test (confirmatory test)

	At level	After first difference	Remark
MANEMP	0.1217(0.146000)	N/E	I(0)

Figures in brackets are corresponding probability values of ADF and PP statistics.

NE stands for "not estimated", this is for variables whose series was stationary at level and there was no need to go further.

Source: computation by Author, 2023, with the assistance of E-view 9.

VAR Optimal lag selection

This study used VAR lag order selection criteria to determine the lag length. The result is shown in Table 4.2, and using the Akaike Information Criteria (AIC), the result showed that the optimal lag selection for the manufacturing value added -employment equation is two (2).

TABLE 4.2

Optimal lag selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	261.7349	NA	1.62e-18	-12.5867	-12.1645	-12.4341
1	645.2689	556.1243	1.30e-24	-26.7634	-22.119	-25.0842
2	845.3930	190.1179*	2.42e-26*	-31.76965*	-22.90303*	-28.56376*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: computation by Author, 2023, with the assistance of E-view 9.

The Bounds test (co-integration) results

Table 4.3 shows the results of the Bounds test result for the manufacturing subsectors-employment equation. The F-statistics value of 4.79 is greater than the critical value of 3.3 at the 5 per cent level of the upper bounds. This means that the null hypothesis of no long-run relationship in the manufacturing subsectors-employment equation is rejected, and the alternative hypothesis of the existence of a long-run relationship in the variables of the manufacturing subsectors-employment equation is accepted. This means that at a 5 per cent level of significance, there is a cointegration or long-run relationship in the manufacturing subsectors -employment equation.

TABLE 4.3

Bounds test results

Null Hypothesis: No long-run relationships exist			
Test Statistic		Value	k
F-statistic		4.790220	9
	Critical Value Bounds		
Significance		I0 Bound	I1 Bound
	10%	1.88	2.99
	5%	2.14	3.3
	2.50%	2.37	3.6
	1%	2.65	3.97

Source: computation by Author, 2023, with the assistance of E-view 9.

ARDL error correction and short run parsimonious results

The manufacturing subsectors -employment equation short-run dynamics result is shown in Table 4.4. The short-run coefficient result of the current period of log (FBT) is 0.1204, with its corresponding probability value of 0.9785. In the short run, this shows a positive relationship between log (FBT) and MANEMP. However, it is highly not statistically significant, given that the corresponding probability value is greater than a five percent level of significance. This result implies that a one percent increase in FBT will lead to a 0.0012 percent increase in the MANEMP in the short run, all other things being equal, and judging from the probability value, this impact is not statistically significant at a five per cent level of significance. The short-run coefficient result of the lag one value of log (FBT (-1)) is -9.4324 with its corresponding probability value of 0.0001. This shows a negative but not statistically significant impact of lag one period value of log (FBT) on MANEMP at a five per cent level of significance in the short-run. This means that a one percent increase in lag one period of FBT will lead to about a 0.094 percent decrease in the current MANEMP in the short run, all other things being equal. Again, this impact is not statistically significant because the probability value is greater than a five percent significance level.

TABLE 4.4

ARDL error correction and short run parsimonious results

Dependent Variable: MANEMP				
Variable	**Coefficient**	**Standard Error**	**t-Statistic**	**Probability**
D(MANEMP(-1))	0.3563	0.2050	1.7382	0.0975
Dlog(FBT)	0.1204	4.4012	0.0273	0.9785
Dlog(FBT(-1))	-9.4324	1.1126	-8.4781	0.0001
Dlog(CEM)	0.2495	0.1235	2.0203	0.0570
Dlog(TAF)	1.4339	0.5629	2.5472	0.0192
Dlog(TAF(-1))	8.6171	0.8769	9.8264	0.0001
Dlog(WWP)	-2.7196	4.3689	-0.6225	0.5407
Dlog(CPS)	0.4500	0.1593	2.8251	0.0105
Dlog(HUC)	1.5284	0.7932	1.9269	0.0683
Dlog(HUC(-1))	1.1942	0.7309	1.6339	0.1179
Dlog(INFRA)	0.3051	0.3413	0.8940	0.3820
Dlog(INV)	0.0255	0.1937	0.1314	0.8968
D(RGDPGR)	0.0024	0.0048	0.4870	0.6316
ECT(-1)	-0.2302	0.0849	-2.7108	0.0148

Diagnostic test results			
Adjusted R-squared	0.9955	Breusch-Godfrey Serial Correlation LM test observed R-Squared	5.1282
F-statistic	456.84	Prob. Chi-Square	(0.2001)
Prob(F-statistic)	(0.0001)	Heteroskedasticity Test: Breusch-Pagan-Godfrey observed R-Squared	22.4253
Durbin-Watson Statistic	(1.9923)	Prob. Chi-Square	(0.2636)

ARDL long run results

Table 4.5 shows the long-run equation of the manufacturing value added-employment equation. The result of the long run coefficient of log (FBT) is -68.1937 with a corresponding probability value of 0.1302. This shows a negative impact of log (FBT) on MANEMP, but the result is not statistically significant because the corresponding probability value is greater than a 5 percent level of significance. This means that a one percent increase in FBT will lead to an about 0.68 percent decrease in MANEMP in Nigeria in the long run, all other things being equal.

The result of the long-run coefficient of log (CEM) is 1.9159, with a corresponding probability value of 0.0487. This shows a positive impact of log (CEM) on MANEMP and is statistically significant because the corresponding probability value is less than a 5 percent level of significance. This means that a one percent increase in CEM will lead to about a 0.19 percent increase in MANEMP in Nigeria in the long run, all other things being equal.

The result of the long-run coefficient of log (TAF) is -16.4538, with a corresponding probability value of 0.2300. This shows a negative impact of log (TAF) on MANEMP. However, the result is not statistically significant because the corresponding probability value exceeds a 5 percent significance level. This means that a one percent increase in TAF will lead to about a 0.16 percent decrease in MANEMP in Nigeria in the long run, all other things being equal.

TABLE 4.5

ARDL long run results

Variable	Coefficient	Standard error	t-Statistic	Probability
LOGFBT	-68.1937	43.2086	-1.5782	0.1302
LOGCEM	1.9159	0.9127	2.0992	0.0487
LOGTAF	-16.4538	13.2903	-1.2380	0.2300
LOGWWP	85.1386	58.6092	1.4526	0.1618
LOGCPS	3.4554	1.7075	2.0237	0.0566
LOGHUC	14.9451	11.5175	1.2976	0.2092
LOGINFRA	-2.3428	2.8188	-0.8311	0.4157
LOGINV	0.1955	1.5727	0.1243	0.9023
RGDPGR	0.0643	0.0641	1.0020	0.3283
Constant	15.9507	61.4353	0.2596	0.7978

Source: computation by Author, 2023, with the assistance of E-view 9.

The result of the long-run coefficient of log (WWP) is 85.1386, with a corresponding probability value of 0.1618. This shows a positive impact of log (WWP) on MANEMP but is not statistically significant because the corresponding probability value is greater than a 5 percent level of significance. This means that a one percent increase in WWP will lead to an about 0.95 percent increase in MANEMP in Nigeria in the long run, all other things being equal.

The long-run coefficient of the log (CPS) result is 3.4554 with a corresponding probability value of 0.0566. This shows a positive impact of log (CPS) on MANEMP. However, the result is not statistically significant because the corresponding probability value exceeds a 5 percent significance level. This means that a one percent increase in CPS will lead to about a 0.035 percent increase in MANEMP in Nigeria in the long run.

The result of the long-run coefficient of log (HUC) is 14.9451 with a corresponding probability value of 0.2092. This shows a positive impact of log (HUC) on MANEMP; the result is statistically insignificant because the corresponding probability value is greater than the 5 per cent significance level. This means that a one percent increase in HUC will lead to about a 0.15 percent increase in MANEMP in Nigeria in the long run.

The result of the long run coefficient of log (INFRA) is -2.3428 with a corresponding probability value of 0.4157. This shows a negative impact of log (INFRA) on MANEMP. However, the result is not statistically significant because the corresponding probability value exceeds the 5 per cent significance level. This means that a one percent increase in INFRA will lead to an about 0.023 percent decrease in MANEMP in Nigeria in the long run, all other things being equal.

The result of the long-run coefficient of log (INV) is 0.1955, with a corresponding probability value of 0.9023. This shows a positive impact of log (INV) on MANEMP, but the result is not statistically significant because the corresponding probability value is greater than a 5 percent level of significance. This means that a one percent increase in INV will lead to about a 0.02 percent increase in MANEMP in Nigeria in the long run, all other things being equal.

The result of the long-run coefficient of RGDPGR is 0.0643, with a corresponding probability value of 0.3283. This shows a positive impact of RGDPGR on MANEMP, but the result is not statistically significant because the corresponding probability value is greater than a 5 percent level of significance. This means that a one percent increase in RGDPGR will lead to about a 0.064 percent increase in MANEMP in Nigeria in the long run, all other things being equal.

Stability test

The stability test using the cumulative sum (CUSUM) in figure 1 reveals that the variables in the equation remained consistent throughout the study period. The swing of the trend within the CUSUM limit at a 5% significant level bound portrays this assertion. This implies, on the other hand, that the parameters of the model do not suffer from any structural instability over the study period, which means that all the model coefficients are stable.

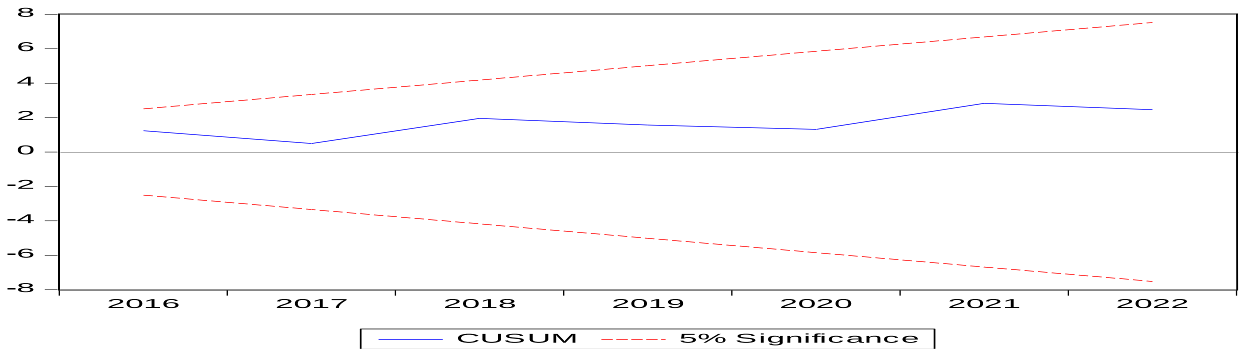

FIG 1: Cumulative sum for test of stability

Discussion of Findings

The study found a positive impact of FBT on MANEMP in the short-run, but the impact was highly not statistically significant at a five percent level of significance. This means that an increase in FBT will lead to an increase in employment in the short run in Nigeria which is in line with theoretical expectations. However, it needs to be statistically significant to ensure that the FBT manufacturing subsector provides few employment opportunities for Nigerians in the short run. The positive and insignificant impact of FBT in the short turn negative but still insignificant in the long run, and even the lag effect of FBT on MANEMP produces a negative impact which is grossly in line with theoretical expectation. The study found a positive impact of CEM on MANEMP in the short run, but it is not statistically significant at a five percent significance level. In comparison, the study found a positive and statistically significant impact of CEM on MANEMP at a 5 per cent significance level in the long run. Therefore, the positive impact of CEM on MANEMP means that an increase in CEM will lead to an increase in MANEMP. However, it was not significant in the short run means that an increase in CEM is one of the main drivers of MANEMP. However, in the long run, an increase in CEM is one of the key drivers of MANEMP. Therefore, developing the cement manufacturing subsectors can be a key instrument of employment creation in the long run for Nigerians.

The study found a positive and statistically significant impact of TAF and lag one period of TAF, respectively, on MANEMP in the short run at a five percent significance level. This means that an increase in TAF will lead to an increase in MANEMP in the short run. This aligns with theoretical expectations as an increase in manufacturing is expected to create employment opportunities for Nigeria. The increase in TAF has an immediate impact on employment generation. This finding also agrees with Turukmane and Gulhane (2017), whose study found that the textile and garment business directly employs roughly 51 million people and 68 million indirectly. However, in the long run, the study found a negative impact of TAF on MANEMP, but the result was not statistically significant at a 5 per cent significance level. This is not in line with theoretical expectations and indicates the replacement of labour-intensive production techniques with the capital-intensive mood in the TAF manufacturing subsector, which may be responsible for its negative impact on employment in the long run in Nigeria. This is different from

Turukmane and Gulhane (2017), whose study on the textile and garment business found that it employed roughly 51 million people directly and 68 million indirectly and that manufacturing growth could benefit rural and semi-urban enterprises and reduce regional inequities by employing unskilled labour.

The study found a negative impact of WWP on MANEMP in the short run, but the impact was not statistically significant at a five percent level of significance. This is against theoretical expectation and speaks to the problem of the method of production in this industry, which requires little labour to more capital, that is, machines and equipment. In the long run, the study found a positive impact of WWP on MANEMP but not a statistically significant 5 per cent significance level. This means an increase in WWP will lead to an increase in MANEMP, which is theoretically expected. However, it is not one of the main drivers of manufacturing employment in Nigeria in the long run as it is not statistically significant.

There is a positive relationship between log (CPS) and MANEMP in the short run, and it is statistically significant at a five percent level of significance. In comparison, log (CPS) has a positive impact on MANEMP, but the result is not statistically significant at a 5 percent level of significance in the long run. This means that in the short run when CPS increases, it leads to an increase in manufacturing sector output which leads to an increase in manufacturing employment. This result shows an immediate impact of CPS on job creation in the manufacturing sector of Nigeria. However, the impact reduces in the long run as CPS does not sustain job creation in the long run judging from the insignificant impact of the result in the long run. This means manufacturers must find alternative means of getting capital besides relying on bank credit.

There is a negative but not statistically significant impact of the lag two-period value of log (CPS) on MANEMP at a five per cent level of significance in the short-run. Likewise, there is a negative but not statistically significant impact of the lag three-period value of log (CPS) on MANEMP at a five per cent significance level in the short run. This means that the lag effect of CPS on manufacturing output is negative, which may be due to interest payment on CPS by manufacturers.

There is a negative relationship between log (HUC) and MANEMP, which is statistically significant at a one per cent significance level both in the short-run and long-run periods. This differs from theoretical expectations and indicates that the Nigerian manufacturing sector largely employs more unskilled and semi-skilled labour, and highly trained and skilled Nigerians do not find a job easily in the manufacturing sectors due to skill mismatch.

There is a positive relationship between log (INFRA) and MANEMP in the short run, but this is not statistically significant at a five percent level of significance. There is a positive but not the statistically significant impact of lag one period value of log (INFRA) on MANEMP at a five per cent significance level. There is a positive and statistically significant impact of the lag two-period value of log (INFRA) on MANEMP at a five per cent significance level. There is a positive relationship between log (INFRA) and MANEMP in the short run, but this is not statistically significant at a five percent level of significance. There is a positive but not statistically significant impact of lag one period value of log (INFRA) on MANEMP at a five per cent level of significance in the short-run. This means that an increase in INFRA will immediately impact MANEMP in the short run in Nigeria. Also, there is a positive lag effect of infrastructure on manufacturing employment.

There is a negative impact of log (INFRA) on MANEMP, and the result is statistically significant at a 5 percent level of significance in the long run. This result is different from theoretical expectations as infrastructure is supposed to aid manufacturing and, by extension, cause an increase in manufacturing employment. This is an indication that Nigerian infrastructure is not designed specifically to provide a low-cost operation environment for manufacturing; it is also an indication that most infrastructure in Nigeria is designed and constructed to serve political rather than economic purposes.

There is a positive and statistically significant impact of the lag three-period value of log (INV) on MANEMP at a five per cent level of significance in the short run. This means that investment has a positive lag effect on manufacturing employment, which implies that investment done in the manufacturing sector today can generate employment in the manufacturing sector in three years. This is in line with relevant economic theories that assert that investment will lead to increased production. To sustain the new production level, more factor inputs will be demanded, and one of these factors input is labour; that is, investment creates employment opportunities. There is a positive relationship between log (INV) and MANEMP in the short run, but this is not statistically significant at a five percent significance level. There is a positive but not statistically significant impact of lag one period value of log (INV) on MANEMP at a five per cent level of significance in the short-run. Log (INV) has a positive impact on MANEMP, but the result is not statistically significant at a 5 percent level of significance. There is a positive relationship between log (INV) and MANEMP in the short run, but this is not statistically significant at a five percent significance level. Log (INV) positively impacts MANEMP, but the result is not statistically significant at a 5 per cent significance level in the long run. This is in line with theoretical expectations, but it is not statistically significant, meaning that investment does not immediately impact employment in Nigeria.

There is a positive and statistically significant impact of the lag one period value of RGDPGR on MANEMP at a five per cent significance level in the short run. This means that the growth rate has a positive lag effect on manufacturing employment, implying that the last growth period can generate employment in the manufacturing sector in three years. This is in line with relevant economic theories that assert that growth will lead to an increase in production and, to the new production level, will lead to demand in more labour units which is an increase in employment opportunities. There is a positive relationship between RGDPGR and MANEMP, but this is not statistically significant at a five percent significance level in both the short-run and long-run periods. This is in line with theoretical expectation, but it is not statistically significant means that the current growth rate does not have an immediate impact on manufacturing employment and that, in the long run, the economic growth rate is not one of the main drivers of manufacturing employment.

Conclusion and Recommendations

The study was undertaken to examine effect of manufacturing value added on employment in Nigeria. The study focuses on manufacturing value-added in the four selected manufacturing subsectors and their impact on manufacturing employment. The positive and statistically significant impact of CEM on MANEMP at a five per cent level of significance in the long run calls for the development of policy on cement manufacturing which will emphasize creating opportunities for more players to enter into cement manufacturing especially medium-scale producers with the help of a special cement development fund to provide access to capital for investors who want to venture into cement manufacturing; also tax waivers should be given to cement manufacturers on their imported raw materials in order to minimize the final cost of inputs and increase profitability potentials; tax incentive should be given to any cement manufacturers that can show evidence of employing up to 100 workers in any accounting years. Furthermore, the government should prioritize improving infrastructure and transportation networks to facilitate the distribution of cement products across the country, as this will increase demand and ultimately lead to job creation in the industry. Additionally, the industry needs continuous monitoring and evaluation of the industry to ensure compliance with environmental regulations and standards. TAF's positive and statistically significant impact on MANEMP in the short run at a five percent level of significance calls for a national policy on developing the TAF manufacturing subsector. This policy could include incentives for TAF manufacturers, investment in research and development of TAF production methods, and collaboration between government agencies and private sector stakeholders to promote the growth of the TAF industry. Additionally, efforts should be made to ensure that the benefits of this subsector are distributed equitably across different regions and socioeconomic groups.

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