Manufacturing-Led Growth: A Case Study of Mauritania, 1985–2025

Elhadj Sabeima

Abstract

This study measures the manufacturing sector's impact on economic growth in Mauritania, using annual data from 1985–2025 from the World Bank and the International Labour Organisation databases. We apply three models: Kaldor's first law, a shift-share decomposition of labour productivity, and a Cobb–Douglas production function with capital, labour, and manufacturing value added. Manufacturing growth is positively related to GDP growth, but the relationship is not significant. Productivity gains in manufacturing and non-manufacturing sectors account for 99.70% of the rise in output per worker, while worker movement between sectors accounts for only 0.30%. In the production function, the large manufacturing elasticity found in levels is spurious because the series are not cointegrated; in growth form, it is small and insignificant. Overall, the study concludes that manufacturing does not lead growth in Mauritania.

Keywords: Manufacturing, Economic growth, Structural change, Mauritania

1. Introduction

Can a country grow richer by building factories? Since Kaldor (1966), many economists have answered yes. In his view, manufacturing is the "engine" of growth. It is more productive than activities such as farming or fishing; as it expands, it produces more cheaply and creates demand for the rest of the economy (Bairam, 1991). When manufacturing grows fast, the rest of the economy is expected to grow faster too. Yet the evidence is mixed, especially for developing countries that depend on natural resources and have little industry.

Mauritania is a useful test case. Its economy has long relied on agriculture, fishing, and mining, while manufacturing has remained small. Total output has grown over the last four decades, but it is unclear whether manufacturing drove that growth or whether worker movement into or out of manufacturing raised productivity across the economy.

The second question matters because output per worker can rise in two ways. It can rise because workers become more productive inside their own sector, or because workers move from low-productivity to high-productivity sectors (McMillan & Rodrik, 2011). Moving workers does not always help. It raises aggregate productivity only if they move to a more productive sector.

There is also a measurement problem. GDP includes manufacturing, so GDP growth and manufacturing growth are partly the same thing. Bairam (1991) made this point in his study of

Turkey. Because manufacturing output is a share of GDP, regressing GDP growth on manufacturing growth can simply reflect that share, even if manufacturing plays no special role. He therefore tested the effect of industrial growth on agriculture and services instead. We take the same concern seriously. Among other checks, we repeat the Kaldor test with non-manufacturing growth as the dependent variable.

This study measures the impact of the manufacturing sector on economic growth in Mauritania between 1985 and 2025. It does so by applying three models. First, we test Kaldor's First Law by relating manufacturing value-added growth to GDP growth, and we check the results in several ways (Sections 4.3 and 4.6). Second, a shift-share decomposition separates productivity gains inside sectors from gains due to the movement of workers (Section 4.4). Third, a Cobb–Douglas production function with capital, labour, and manufacturing value added is estimated to measure the effect of manufacturing on output and the returns to scale (Section 4.5). The data come from the World Bank and ILO.

The study makes three contributions. It gives a long-run, country-level test of manufacturing-led growth for a resource-dependent economy. It shows how much of the rise in output per worker came from within sectors and how much from worker reallocation. And it shows how conclusions about manufacturing-led growth depend on how the data are treated: non-stationary series, outliers, and the overlap between manufacturing and total output. Section 2 gives the background, Section 3 reviews the literature, Section 4 describes the data and methods, Section 5 reports the results, and Section 6 concludes.

2. Background: manufacturing, employment and GDP

Mauritania's economy has historically depended on agriculture, fishing and mining, while manufacturing has remained small. Between 1985 and 2025, GDP grew alongside mining, services and other activities, but employment stayed concentrated outside manufacturing. This raises two questions: did manufacturing growth contribute to overall growth, and did worker mobility raise output per worker?

Table 1 shows the trends. Average GDP rose from US$1.60 billion in 1985–1994 to US$8.34 billion in 2015–2024, and manufacturing value added rose from US$0.137 billion to US$0.531 billion. Manufacturing employment rose from about 25.7 thousand to 61.1 thousand workers. However, manufacturing did not grow faster than the economy. Its share of GDP fell from 8.6% to 6.4% between the first and the fourth period, and to 4.6% in 2025. Its share of employment stayed close to 6.5–7%. Economic expansion therefore did not bring a rise in manufacturing's weight.

Table 1. Manufacturing value added, employment and GDP in Mauritania (1985–2025)

Variable	1985–1994	1995–2004	2005–2014	2015–2024	2025
GDP (US$ billion)	1.600	2.003	5.409	8.338	11.680

Variable	1985–1994	1995–2004	2005–2014	2015–2024	2025
Manufacturing value added (US$ billion)	0.137	0.191	0.378	0.531	0.541
Manufacturing employment (thousands)	25.66	34.28	45.78	61.09	72.07
Total employment (thousands)	364.76	499.96	685.26	938.61	1,119.71
Manufacturing share of GDP (%)	8.6	9.5	7.0	6.4	4.6
Manufacturing share of employment (%)	7.0	6.9	6.7	6.5	6.4

Note: Period columns report averages; the last column reports 2025. The two share rows are calculated from the rows above them (ratio of the period averages). Source: World Bank (n.d.), ILO (n.d.) and author's calculations.

Figure 1 shows manufacturing value added in current US dollars from 1985 to 2025. It rose from US$105.7 million in 1985 to a peak of US$695.1 million in 2023, despite several falls (for example in 2007–2008, 2015–2016 and 2024). Figure 2 shows manufacturing employment over the same period. It rose steadily from 22.5 thousand workers in 1985 to 72.1 thousand in 2025, but the series is estimated from a log-linear trend for 1985–2016 (Section 4.2), so its smooth path reflects the estimation method and not observed year-to-year changes.

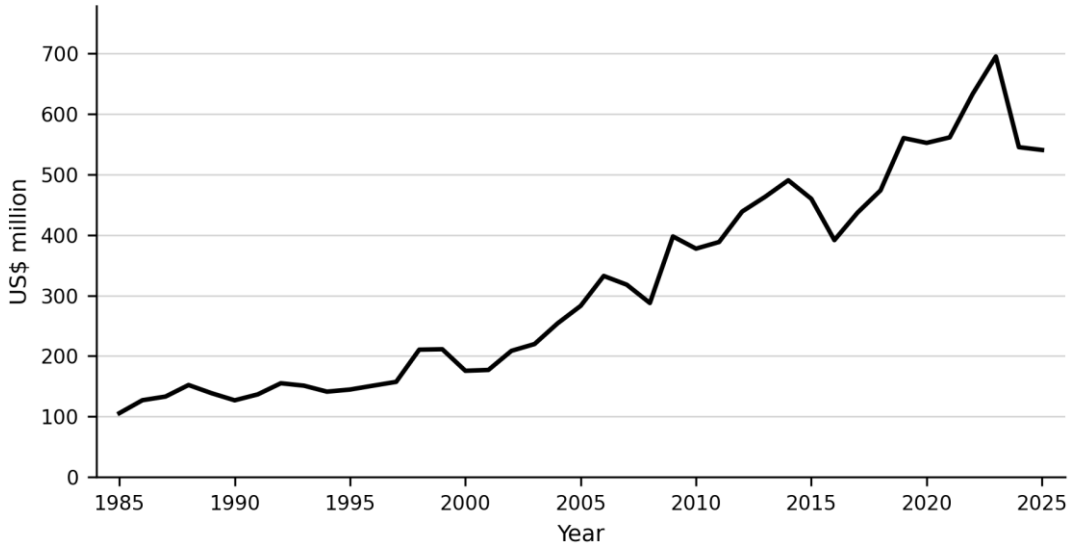


Figure 1. Manufacturing value added, 1985–2025 (US$ million, current prices)
Source: World Bank (n.d.) and author's calculations.

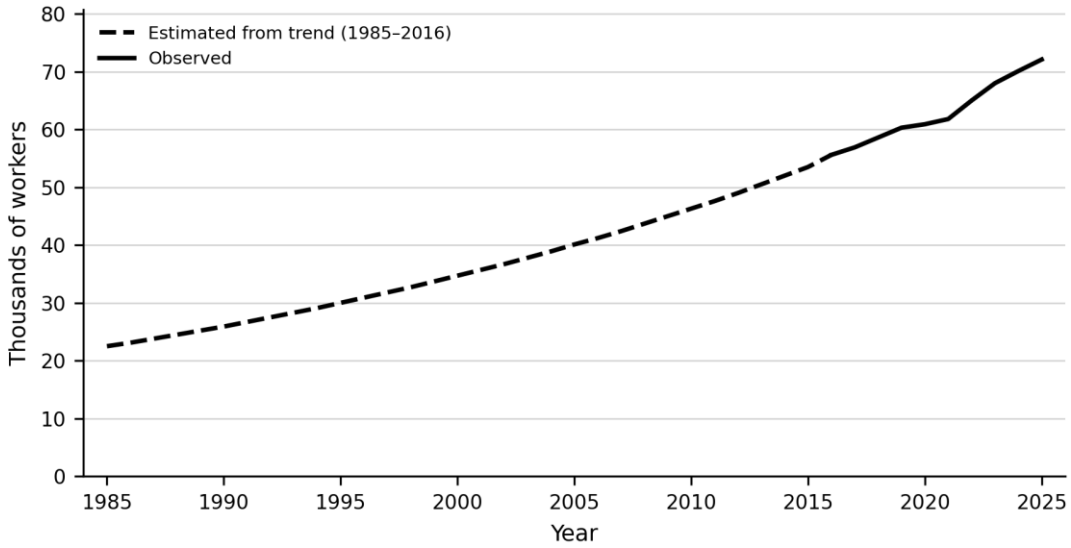


Figure 2. Manufacturing employment, 1985–2025 (thousands of workers)
Source: ILO (n.d.) and author's calculations. Values for 1985–2016 are estimated (Section 4.2).

3. Literature review

Kaldor's law and its tests. Kaldor's First Law (Kaldor, 1966) argues that faster manufacturing growth is associated with faster overall growth because manufacturing generates increasing returns, productivity gains, and broader links with the rest of the economy. Bairam (1991) tested the idea for Turkey over 1925–1978. He argued that regressing GDP growth on industrial growth can be misleading because the two overlap, so he used agriculture and services growth as dependent variables instead. His results supported the hypothesis in every specification. Wells and Thirlwall (2003) later tested Kaldor's growth laws across African countries, and Pacheco-López and Thirlwall (2014) offered a new interpretation of the First Law for open developing economies.

Is manufacturing still the engine? Other work asks whether manufacturing remains a leading sector today. Szirmai and Verspagen (2015) examined manufacturing and growth in developing countries from 1950 to 2005. Cantore et al. (2017) examined the factors that make manufacturing a growth engine, and Lavopa and Riccio (2024) revisited the question. Hallward-Driemeier and Nayyar (2018) and Hauge (2023) discuss how technological change, globalisation, and institutions shape manufacturing-led development. Together, these studies suggest that manufacturing's role depends on the conditions under which it develops.

Structural change and productivity. Herrendorf et al. (2014) review how economic activity shifts across sectors as economies grow. McMillan and Rodrik (2011) show how to split output-per-worker growth into a within-sector part and a part due to worker movement between sectors. The second part can be positive or negative, depending on the direction of the

movement. Kucera and Roncolato (2016) add that researchers should study manufacturing alongside services, not in isolation, which is especially relevant when manufacturing is small.

Production functions. The Cobb–Douglas function (Cobb & Douglas, 1928) links output to inputs through constant elasticities, and the sum of the elasticities gives the returns to scale. Since Kaldor stresses increasing returns in manufacturing, adding manufacturing value added to the function lets us measure its effect and the returns to scale directly. When the series are non-stationary, regressions in levels can be spurious unless the series are cointegrated (Engle & Granger, 1987), so this has to be tested.

This study combines the three approaches for one country, Mauritania, over 1985–2025. In line with Bairam's concern about overlap, it also tests whether the Kaldor result holds when manufacturing and GDP are separated.

4. Data and methodology

The study uses annual data for Mauritania for 1985–2025 from two sources: the World Bank's World Development Indicators (WDI; World Bank, n.d.), which provide GDP, manufacturing value added and gross fixed capital formation; and the International Labour Organisation's ILOSTAT database (ILO, n.d.), which provides employment. The Kaldor test follows Lavopa and Riccio (2024), the decomposition follows McMillan and Rodrik (2011), and the production function follows Cobb and Douglas (1928).

4.1. Variables

Table 2 lists the variables. Non-manufacturing employment is total employment minus manufacturing employment. Non-manufacturing output is GDP minus manufacturing value added. Capital is measured by gross fixed capital formation (GFCF), as no capital stock series is available. Labour productivity is output divided by employment, and an employment share is sector employment divided by total employment. Growth rates are annual percentage changes, and logarithmic growth rates are 100 times the first difference of natural logarithms.

Table 2. Variables and data sources (1985–2025)

Variable	Source	Measurement
GDP (Y)	WDI	Current US$
Manufacturing value added (M)	WDI	Current US$
Manufacturing employment	ILO	Thousands of workers
Total employment (L)	ILO	Thousands of workers
Gross fixed capital formation (K)	World Bank (WDI)	Constant 2015 US$
Non-manufacturing employment (L_N)	Author's calculation	Total − Manufacturing
Non-manufacturing output (Y_N)	Author's calculation	GDP − Manufacturing VA

Variable	Source	Measurement
Labour productivity	Author's calculation	Output / Employment
Employment share	Author's calculation	Sector employment / Total employment
GDP growth (g_{GDP})	Author's calculation	Annual growth (%)
Manufacturing growth (g_{MVA})	Author's calculation	Annual growth (%)
Non-manufacturing growth (g_{NM})	Author's calculation	Annual growth (%)
Log variables (ln *Y*, ln *K*, ln *L*, ln *M*)	Author's calculation	Natural logarithm

Note: VA = value added; WDI = World Development Indicators; ILO = International Labour Organisation; GFCF = gross fixed capital formation. GDP and value added are in current US dollars, so their growth rates are nominal; GFCF is in constant 2015 US dollars.

4.2. Estimating missing employment values

Observed employment data are missing for part of the period, so manufacturing employment and total employment for 1985–2016 are estimated with a log-linear trend (Hyndman & Athanasopoulos, 2021):

$$\ln E_t = \beta_0 + \beta_1 T_t + \varepsilon_t \tag{1}$$

where E_t is employment (manufacturing or total) in year t, $T_t = \text{Year} - 2016$ is a time trend, and ε_t is the error term. After estimating the equation by OLS, employment is taken as the exponential of the fitted trend. The estimated equations, in thousands of workers, are:

$$\hat{E}^{M}_t = \exp(4.008462 + 0.0289366\ T_t) \tag{2}$$

$$\hat{E}^{T}_t = \exp(6.730640 + 0.0315282\ T_t) \tag{3}$$

4.3. Kaldor's First Law

Following Lavopa and Riccio (2024), Kaldor's First Law is tested with a simple regression of GDP growth on manufacturing growth:

$$g_{GDP,t} = \beta_0 + \beta_1 g_{MVA,t} + \varepsilon_t \tag{4}$$

where both growth rates are computed from the current US$ series in Table 2. In words: if manufacturing is an engine of growth, β_1 should be positive and statistically significant. The hypotheses are tested on β_1 with the OLS t-test (one-sided for H_1):

H_0: Manufacturing growth does not affect GDP growth ($\beta_1 = 0$).

H_1: Manufacturing growth has a positive effect on GDP growth ($\beta_1 > 0$).

4.4. Shift-share decomposition

McMillan and Rodrik (2011) decomposed the change in output per worker into a within-sector component, capturing productivity gains within each sector, and a structural-change component, capturing the gain or loss from workers moving across sectors:

$$\Delta Y_t = \Sigma_{i=1}^{n} \theta_{i,t-k} \Delta y_{i,t} + \Sigma_{i=1}^{n} y_{i,t} \Delta \theta_{i,t} \tag{5}$$

where Y_t is aggregate labour productivity, $y_{i,t}$ is labour productivity in sector i, $\theta_{i,t}$ is the employment share of sector i, $n = 2$ (manufacturing and non-manufacturing), and Δ is the

change between the base year $t - k$ and year t. The first term is the within-sector effect and the second is the structural-change effect. Because the decomposition is an accounting identity, the hypotheses are judged from the sign and relative size of the structural-change effect, not from a statistical test:

H_0: The movement of workers makes no substantial positive contribution to labour productivity growth.

H_1: The movement of workers makes a substantial positive contribution to labour productivity growth.

4.5. Cobb–Douglas production function

The contribution of manufacturing to total output is measured with a Cobb–Douglas production function that includes capital, labour, and manufacturing value added, written in logarithms:

$$\ln Y_t = \ln A + \alpha \ln K_t + \beta \ln L_t + \gamma \ln M_t + \varepsilon_t \quad (6)$$

where Y_t is GDP, K_t is capital, L_t is total employment, M_t is manufacturing value added, A is total factor productivity, α is the output elasticity of capital, β is the output elasticity of labour, γ is the output elasticity of manufacturing, and ε_t is the error term. In words, γ tells us by how much GDP rises when manufacturing value added rises by 1%, with capital and labour held constant. No capital stock series is available, so capital is measured by gross fixed capital formation (GFCF), which covers the whole economy. The sum $\alpha + \beta + \gamma$ shows the returns to scale of the included inputs and is checked with a Wald test. The hypotheses concern γ:

H_0: Manufacturing value added does not affect GDP ($\gamma = 0$).

H_1: Manufacturing value added has a positive effect on GDP ($\gamma > 0$).

Because the logarithms of the variables are likely to be non-stationary, the model is also estimated in first differences of logarithms, which approximate annual growth rates:

$$\Delta \ln Y_t = \lambda + \alpha \Delta \ln K_t + \beta \Delta \ln L_t + \gamma \Delta \ln M_t + u_t \quad (7)$$

Eq. (7) is the production-function version of Kaldor's First Law with capital and employment growth added. To remove the overlap between GDP and manufacturing, it is estimated again with non-manufacturing output as the dependent variable and non-manufacturing employment as the labour input:

$$\Delta \ln Y^{N}_t = \lambda + \alpha \Delta \ln K_t + \beta \Delta \ln L^{N}_t + \gamma \Delta \ln M_t + u_t \quad (8)$$

Stationarity is checked with augmented Dickey–Fuller (ADF) tests (Dickey & Fuller, 1979), with the lag length chosen by the Akaike criterion. Cointegration is checked with the Engle–Granger test (Engle & Granger, 1987), using the critical values of MacKinnon (1996). All production-function regressions use Newey–West standard errors with three lags (Newey & West, 1987), which allow for changing variance and for correlation of errors over time.

4.6. Robustness checks for Kaldor's First Law

Seven checks are applied to Eq. (4) to see whether the Kaldor result depends on the specification, the estimator or the sample. The result is judged robust if the sign and significance of β1 do not change across the checks.

(1) The baseline model is tested for non-constant variance (Breusch–Pagan), serial correlation (Breusch–Godfrey), non-normal residuals (Jarque–Bera) and wrong functional form (Ramsey RESET), and *p*-values are recomputed with Newey–West standard errors. (2) Growth rates are replaced by logarithmic growth rates. (3) Years in which either growth rate is more than two standard deviations from its mean are dropped; alternatively, both series are winsorised at the 5th and 95th percentiles. (4) The model is estimated separately for 1986–2005 and 2006–2025, and a Chow test checks for a break in 2005. (5) Non-manufacturing growth replaces GDP growth as the dependent variable, which removes the overlap between manufacturing and GDP. (6) Manufacturing growth is lagged one year, and a Granger-type regression is estimated:

$$g_{GDP,t} = \delta_0 + \delta_1 g_{GDP,t-1} + \delta_2 g_{MVA,t-1} + \varepsilon_t \quad (9)$$

where δ_2 shows whether last year's manufacturing growth helps to predict this year's GDP growth. The reverse regression, with manufacturing growth as the dependent variable, is also estimated to see in which direction the relationship runs. (7) The alternative form of Kaldor's law, in which GDP growth depends on the gap between manufacturing and non-manufacturing growth, is estimated:

$$g_{GDP,t} = \beta_0 + \beta_1 (g_{MVA,t} - g_{NM,t}) + \varepsilon_t \quad (10)$$

where $g_{NM,t}$ is the growth rate of non-manufacturing output.

5. Results

A note on reading the results: a *p*-value is the probability of finding such a result if the true effect were zero. A *p*-value above 0.05 means the effect is not statistically significant.

5.1. Kaldor's First Law

Table 3 reports the OLS estimates of Eq. (4). Manufacturing growth has a positive but statistically insignificant association with GDP growth ($\beta_1 = 0.0835$; $p = 0.578$). The one-sided *p*-value for H_1 is 0.289. We therefore cannot reject H_0: there is not enough evidence to support Kaldor's First Law for Mauritania.

Table 3. Kaldor's First Law: OLS results (1985–2025)

Statistic	Result
Constant (β_0)	6.4767
Manufacturing growth (β_1)	0.0835
p-value	0.5782
R^2	0.0082
Observations	40

Note: Dependent variable is GDP growth—source: Author's calculations.

The diagnostic tests do not show non-constant variance (Breusch–Pagan $p = 0.327$) or first-order serial correlation (Breusch–Godfrey $p = 0.218$; Durbin–Watson = 1.61). Non-normality of the residuals (Jarque–Bera $p = 0.067$) and wrong functional form (RESET $p = 0.058$) are rejected only marginally. The 95% confidence interval for β_1 runs from −0.22 to 0.38. It includes zero, as well as moderately large positive values, so the result is better described as inconclusive than as proof that manufacturing growth has no effect.

5.2. Shift-share decomposition

Table 4 reports the decomposition of Eq. (5). Productivity gains inside sectors account for 99.70% of the rise in output per worker, and the movement of workers for only 0.30%. Manufacturing has a negative structural-change effect (−US$51.52 per worker) and non-manufacturing a positive one (+US$73.04 per worker). The total structural-change effect is positive but negligible, so H_0 is not rejected. The movement of workers between manufacturing and other sectors played a limited role, and within-sector productivity gains were the main source of growth in output per worker during 1985–2025.

Table 4. Shift-share decomposition for Mauritania (1985–2025)

Component	Manufacturing	Non-manufacturing	Total (US$/worker)	Contribution (%)
Within-sector effect	199.07	7,007.35	7,206.42	99.70
Structural-change effect	−51.52	73.04	21.51	0.30
Total contribution	147.55	7,080.39	7,227.94	100

Note: Values are in US$ per worker. Source: Author's calculations.

5.3. Cobb–Douglas production function

Table 5 reports the ADF tests. The logarithms of GDP, total employment, manufacturing value added, capital, non-manufacturing output and non-manufacturing employment cannot be shown to be stationary in levels, but all are stationary in first differences, and the growth rates are stationary in levels. The series are therefore integrated of order one. Employment in logarithms looks trend-stationary only because the employment series are estimated from a deterministic trend (Section 4.2).

Table 5. Augmented Dickey–Fuller unit-root tests (1985–2025)

Variable	Level (constant)	Level (constant and trend)	First difference (constant)
ln Y (GDP)	−0.54	−2.13	−4.88 (1%)
ln L (total employment)	−0.09	−6.22 (1%)	−6.55 (1%)
ln M (manufacturing value added)	−0.57	−3.20 (10%)	−6.08 (1%)
ln K (capital, GFCF)	−0.79	−2.93	−6.63 (1%)
ln Y_N (non-manufacturing output)	−0.54	−2.09	−4.98 (1%)
ln L_N (non-manufacturing employment)	−0.07	−6.25 (1%)	−6.55 (1%)
GDP growth (%)	−4.93 (1%)	−4.85 (1%)	—
Manufacturing growth (%)	−6.09 (1%)	−6.00 (1%)	—

Variable	Level (constant)	Level (constant and trend)	First difference (constant)
Capital growth (%)	−6.63 (1%)	−6.55 (1%)	—

Source: Author's calculations.

Note: ADF *t*-statistics; lag length chosen by the Akaike criterion (maximum four lags). Approximate 5% critical values are −2.94 (constant) and −3.52 (constant and trend). (1%), (5%) and (10%) show the level at which a unit root is rejected.
Source: Author's calculations.

Table 6 reports the Cobb–Douglas estimates. In levels (column 1), the elasticities are 0.90 for labour and 0.81 for manufacturing value added, while the elasticity of capital is negative and insignificant (−0.14; p = 0.230). The three elasticities sum to 1.58, which would suggest strongly increasing returns. However, the Engle–Granger statistic (−2.66) does not reject the absence of cointegration (the 5% critical value is about −4.10), and the Durbin–Watson statistic is only 0.65. The levels regression is therefore likely to be spurious. Replacing labour with a time trend (column 2) gives almost the same manufacturing elasticity (0.81), because the logarithm of employment is almost perfectly correlated with time (correlation = 0.9999), and the residuals are again non-stationary. Capital and manufacturing value added are also strongly correlated in levels (correlation = 0.90), so their separate effects are imprecisely estimated.

The growth-form estimates in column 3 are valid for inference. The elasticity of manufacturing is small and insignificant (γ = 0.102; p = 0.575), so H_0 is not rejected. The coefficients on capital (α = −0.008; p = 0.660) and labour (β = 0.040; p = 0.944) are also insignificant. The labour coefficient is poorly identified: employment growth is almost constant, taking the same value in 75% of the years, because the series is estimated from a trend. GFCF is also a weak proxy for capital (Section 6). The sum $\alpha + \beta + \gamma$ is 0.134 (standard error 0.714). Constant returns are not rejected (Wald p = 0.225), and the test of increasing returns gives p = 0.884. The result is the same when only the non-manufacturing sector is used (column 4; γ = 0.031; p = 0.875), which removes the overlap between GDP and manufacturing. The production-function evidence thus agrees with the Kaldor regression: once the non-stationarity of the data is taken into account, adding capital does not change the result, and there is no statistically significant effect of manufacturing on output.

Table 6. Cobb–Douglas production function estimates (1985–2025)

	(1) Levels	(2) Levels with trend	(3) Growth form	(4) Non-manufacturing growth form
Dependent variable	ln Y	ln Y	Δln Y	Δln Y_N
Constant	−3.394 (3.165) [0.290]	1.785 (0.762) [0.025]	0.056 (0.033) [0.101]	0.060 (0.036) [0.109]
Capital (α)	−0.138 (0.113) [0.230]	−0.136 (0.113) [0.234]	−0.008 (0.019) [0.660]	−0.009 (0.021) [0.655]
Labour (β)	0.900 (0.423) [0.040]	—	0.040 (0.568) [0.944]	0.063 (0.644) [0.923]
Manufacturing value added (γ)	0.814 (0.375) [0.036]	0.813 (0.383) [0.040]	0.102 (0.180) [0.575]	0.031 (0.194) [0.875]

	(1) Levels	(2) Levels with trend	(3) Growth form	(4) Non-manufacturing growth form
Time trend	—	0.028 (0.014) [0.046]	—	—
$\alpha + \beta + \gamma$	1.577 (0.127)	—	0.134 (0.714)	0.084 (0.799)
Wald p-value, $\alpha + \beta + \gamma = 1$	<0.001	—	0.225	0.252
R^2	0.946	0.946	0.014	0.002
Durbin–Watson	0.65	0.65	1.60	1.58
Engle–Granger ADF	−2.66	−2.65	—	—
Observations	41	41	40	40

Note: Newey–West standard errors (three lags) in parentheses and p-values in brackets. *Y*, *M* and non-manufacturing output are in current US$ billion, *K* is in constant 2015 US$ billion, and *L* is in thousands of workers. In columns 1 and 2 the Engle–Granger 5% critical values are about −4.10 and −3.74, so cointegration is not found. Source: Author's calculations.

5.4. Robustness of Kaldor's First Law

Table 7 summarizes the robustness checks. Using Newey–West standard errors raises the *p*-value of the baseline coefficient from 0.578 to 0.646. The coefficient on manufacturing growth stays statistically insignificant in all eight same-form alternatives: log growth rates, exclusion of outliers (1991, 1998, 2006, 2009, 2024), winsorising, the two sub-samples, non-manufacturing growth as the dependent variable, lagged manufacturing growth, and the Granger-type regression. The point estimates range from −0.09 to 0.32. The Chow test does not reject stability of the parameters at 2005 ($F = 1.04$; $p = 0.363$). The Kaldor result is therefore robust: H_0 is not rejected in any of these specifications.

Table 7. Robustness checks for Kaldor's First Law

Specification	β_1	Std. error	*p*-value	*p*-value (HAC)	R^2	*n*
Baseline OLS (Eq. 4)	0.0835	0.1488	0.578	0.646	0.0082	40
Log growth rates (100×Δln)	0.1000	0.1422	0.486	0.564	0.0129	40
Excluding outliers (|z| > 2)	0.2205	0.1601	0.178	0.160	0.0544	35
Winsorised at 5% and 95%	0.1449	0.1485	0.335	0.420	0.0245	40
Sub-sample 1986–2005	0.3185	0.2404	0.202	0.114	0.0889	20
Sub-sample 2006–2025	−0.0942	0.1839	0.615	0.713	0.0144	20
Dependent variable: non-manufacturing growth	0.0143	0.1612	0.930	0.941	0.0002	40
Lagged manufacturing growth ($t - 1$)	0.0708	0.1497	0.639	0.642	0.0060	39
Granger-type (Eq. 9): lagged manufacturing growth	0.0528	0.1488	0.725	0.749	0.0524	39
Alternative Kaldor form (Eq. 10)	−0.4232	0.0818	<0.001	<0.001	0.4136	40

Note: Dependent variable is GDP growth unless stated. In the Granger-type row the coefficient is δ_2 of Eq. (9); in the alternative form it is the coefficient on the gap between manufacturing and non-manufacturing growth in Eq. (10). HAC = Newey–West standard errors. Source: Author's calculations.

Two results need comment. First, the coefficient in the alternative Kaldor form (Eq. 10) is negative and significant (−0.42; $p < 0.001$). This is a mechanical effect of the part–whole

overlap, not evidence against the law. Non-manufacturing growth makes up about nine-tenths of GDP growth and appears on both sides of the equation, so the regressor is negatively correlated with the dependent variable by construction. Second, GDP growth in the previous year predicts manufacturing growth (coefficient 0.36; $p = 0.041$, HAC $p = 0.002$), whereas lagged manufacturing growth does not predict GDP growth. This is more consistent with manufacturing following aggregate growth than leading it, although one test on 39 observations cannot settle the direction of causality.

5.5. Discussion

Three results point the same way. Manufacturing growth has no significant link with GDP growth, workers moving between sectors explain almost none of the rise in output per worker, and manufacturing has no significant effect on output in the production function. There are several possible reasons, none of which is tested here. Manufacturing is small in Mauritania (4.6–9.5% of GDP in Table 1), so even fast manufacturing growth can move total GDP only a little. GDP growth may be driven mainly by other activities, such as mining and services, which this study cannot separate from the rest of non-manufacturing output. And the timing results suggest that manufacturing responds to the rest of the economy rather than leading it. These points fit the idea in the literature that the role of manufacturing depends on the conditions in which it develops (Hallward-Driemeier & Nayyar, 2018; Hauge, 2023). The conclusion is also very different from Bairam's (1991) result for Turkey, where industrial growth was strongly linked with growth in agriculture and services, and where industry was a bigger part of the economy.

A caution is needed for the shift-share result. Because employment is estimated from a trend for most of the period, the employment shares of manufacturing and non-manufacturing change very slowly by construction (Table 1). A very small structural-change effect is therefore partly built into the data, and the 0.30% figure should be read as indicative, not as a precise measure.

6. Conclusion

This study measured the impact of the manufacturing sector on economic growth in Mauritania over 1985–2025. It applied three models: Kaldor's First Law, a shift-share decomposition and a Cobb–Douglas production function, with annual data from the World Bank and ILO. The main findings are as follows.

Kaldor's First Law. Manufacturing growth has a positive but insignificant association with GDP growth. This holds with robust standard errors, log growth rates, outlier treatment, sub-samples, lagged regressors, and a non-manufacturing dependent variable.

Shift-share decomposition. Productivity gains inside sectors account for 99.70% of the rise in output per worker, and the movement of workers for 0.30%. Manufacturing has a negative structural-change effect and non-manufacturing a positive one.

Cobb–Douglas function. With capital (GFCF) and labour included, the levels regression suggests a large manufacturing elasticity, but the variables are not cointegrated, and the result is likely spurious. In growth form, the elasticity is small and insignificant, and increasing returns are not supported.

Taken together, the evidence does not support a statistically significant growth-leading role for manufacturing in Mauritania during this period. The results suggest that gains in output per worker came mainly from within sectors, not from the movement of workers into manufacturing. Strengthening manufacturing, raising productivity and diversifying the economy may still be important goals for Mauritania, but the evidence does not show that manufacturing causes growth.

Several limits should be kept, GDP and value added are in current US dollars, so their growth rates are nominal and affected by prices and exchange rates. Employment is estimated from a trend for much of the period, which carries little information, makes the labour elasticity poorly identified, and limits the shift-share result. Capital is measured by gross fixed capital formation, which is a yearly investment flow for the whole economy, not a stock of manufacturing capital, and it is measured in constant prices while GDP and value added are in current prices. Finally, with 40 annual observations, the confidence intervals are wide, so insignificant coefficients should not be read as proof that there is no effect. Future research could use constant-price data, observed employment, and capital stock series by sector.

References

Bairam, E. (1991). Economic growth and Kaldor's law: the case of Turkey, 1925–78. *Applied Economics, 23*(8), 1277–1280. https://doi.org/10.1080/00036849100000048

Cantore, N., Clara, M., Lavopa, A., & Soare, C. (2017). Manufacturing as an engine of growth: which is the best fuel? *Structural Change and Economic Dynamics, 42*, 56–66. https://doi.org/10.1016/j.strueco.2017.04.004

Cobb, C.W., & Douglas, P.H. (1928). A theory of production. *American Economic Review, 18*(1, Supplement), 139–165.

Dickey, D.A., & Fuller, W.A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*(366), 427–431.

Engle, R.F., & Granger, C.W.J. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica, 55*(2), 251–276.

Hallward-Driemeier, M., & Nayyar, G. (2018). *Trouble in the Making? The Future of Manufacturing-Led Development*. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-1174-6

Hauge, J. (2023). Manufacturing-led development in the digital age: how power trumps technology. *Third World Quarterly, 44*(9), 1960–1980. https://doi.org/10.1080/01436597.2021.2009739

Herrendorf, B., Rogerson, R., & Valentinyi, Á. (2014). Growth and structural transformation. In P. Aghion & S.N. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 2, pp. 855–941). Amsterdam: Elsevier. https://doi.org/10.1016/B978-0-444-53540-5.00006-9

Hyndman, R.J., & Athanasopoulos, G. (2021). *Forecasting: Principles and Practice* (3rd ed.). Melbourne: OTexts. https://otexts.com/fpp3/

ILO. (n.d.). *ILOSTAT database*. International Labour Organization. https://ilostat.ilo.org/data/

Kaldor, N. (1966). *Causes of the Slow Rate of Economic Growth of the United Kingdom*. Cambridge: Cambridge University Press.

Kucera, D., & Roncolato, L. (2016). The manufacturing–services dynamic in economic development. *International Labour Review, 155*(2), 171. https://doi.org/10.1111/j.1564-913X.2015.00052.x

Lavopa, A., & Riccio, F. (2024). *Manufacturing-led growth: driving and sustaining economies* (Insights on Industrial Development Policy Brief No. 15). Vienna: United Nations Industrial Development Organization. https://unido.org/sites/default/files/unido-publications/2024-11/IID%20Policy%20Brief%2015%20-%20Manufacturing-led%20growth.pdf

MacKinnon, J.G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics, 11*(6), 601–618.

McMillan, M.S., & Rodrik, D. (2011). *Globalization, structural change and productivity growth* (NBER Working Paper No. 17143). Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w17143

Newey, W.K., & West, K.D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica, 55*(3), 703–708.

Pacheco-López, P., & Thirlwall, A.P. (2014). A new interpretation of Kaldor's first growth law for open developing economies. *Review of Keynesian Economics, 2*(3), 384–398.

Szirmai, A., & Verspagen, B. (2015). Manufacturing and economic growth in developing countries, 1950–2005. *Structural Change and Economic Dynamics, 34*, 46–59. https://doi.org/10.1016/j.strueco.2015.06.002

Wells, H., & Thirlwall, A.P. (2003). Testing Kaldor's growth laws across the countries of Africa. *African Development Review, 15*(2–3), 89–105. https://doi.org/10.1111/j.1467-8268.2003.00066.x

World Bank. (n.d.). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators

Appendix A. Annual data used

Table A.1 lists the main annual series. Employment before 2016 is trend-based (Section 4.2). Growth rates start in 1986.

Table A.1. Main annual series, Mauritania, 1985–2025

Year	GDP (US$ billion)	Manuf. VA (US$ million)	GFCF (constant 2015 US$ billion)	gGDP (%)	gMVA (%)	Manuf. employment (thousands)	Total employment (thousands)
1985	1.010	105.7	0.697	—	—	22.5	315.2
1986	1.187	127.1	0.734	17.5	20.3	23.1	325.3
1987	1.345	133.1	0.720	13.3	4.7	23.8	335.7
1988	1.415	152.2	0.698	5.2	14.3	24.5	346.5
1989	1.451	138.6	0.479	2.5	−8.9	25.2	357.6
1990	1.507	126.9	0.505	3.9	−8.5	25.9	369.0
1991	2.134	136.7	0.491	41.6	7.8	26.7	380.9
1992	2.164	155.1	0.478	1.4	13.4	27.5	393.1
1993	1.847	151.1	0.780	−14.6	−2.6	28.3	405.7
1994	1.945	141.2	0.185	5.3	−6.5	29.1	418.6
1995	2.092	144.7	0.978	7.6	2.5	30.0	432.1
1996	2.132	151.1	0.883	1.9	4.5	30.9	445.9
1997	2.072	157.4	0.978	−2.8	4.1	31.8	460.2
1998	2.032	210.6	0.782	−1.9	33.8	32.7	474.9
1999	1.986	211.3	0.792	−2.3	0.3	33.7	490.1
2000	1.780	175.7	0.896	−10.4	−16.8	34.7	505.8
2001	1.746	177.1	0.923	−1.9	0.8	35.7	522.0
2002	1.777	208.7	1.266	1.8	17.9	36.7	538.7
2003	2.051	219.9	1.566	15.4	5.4	37.8	556.0
2004	2.362	254.1	1.523	15.2	15.6	38.9	573.8
2005	2.936	283.0	1.655	24.3	11.4	40.1	592.2
2006	3.920	332.4	1.843	33.5	17.5	41.2	611.2
2007	4.346	317.9	2.130	10.9	−4.4	42.4	630.7
2008	5.206	287.7	1.842	19.8	−9.5	43.7	650.9
2009	4.715	397.7	1.827	−9.4	38.2	45.0	671.8
2010	5.629	377.5	1.901	19.4	−5.1	46.3	693.3
2011	6.765	388.5	1.965	20.2	2.9	47.6	715.5
2012	6.728	438.8	2.195	−0.5	12.9	49.0	738.4
2013	7.231	463.3	2.268	7.5	5.6	50.5	762.1
2014	6.615	490.5	2.330	−8.5	5.9	52.0	786.5
2015	6.182	459.9	2.121	−6.5	−6.2	53.5	811.7
2016	6.408	391.6	1.993	3.6	−14.8	55.6	850.1
2017	6.812	436.9	2.249	6.3	11.6	56.9	865.9
2018	7.475	473.8	2.671	9.7	8.4	58.6	892.2
2019	7.895	560.3	2.750	5.6	18.3	60.3	920.2
2020	8.261	552.3	2.282	4.6	−1.4	60.9	932.2
2021	9.221	561.4	2.558	11.6	1.7	61.8	965.7
2022	9.562	633.5	2.658	3.7	12.8	65.0	1011.7
2023	10.688	695.1	2.346	11.8	9.7	68.0	1049.5
2024	10.879	545.2	2.744	1.8	−21.6	70.1	1086.9
2025	11.680	540.6	2.954	7.4	−0.8	72.1	1119.7

Source: World Bank (n.d.), ILO (n.d.) and author's calculations. gGDP and gMVA are growth rates in current US$; GFCF is gross fixed capital formation, used as the proxy for capital.