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The supply price of capital, industrial production and employment generation in Nigeria

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This study focused on the effects of supply price of capital on industrial production and the capacity of the economy to generate employment in Nigeria. The paper set out a Simultaneous Regression Model with Multivariate Autoregressive- moving average to test for the significance of cost of capital, investment and employment rate on industrial contribution to the Gross Domestic Product as well as the significance of industrial contribution to Gross Domestic Product on Employment rate. The trend analysis shows that the $IGDP_t$ has been on a decline and has not helped in achieving a meaningful employment generation. In the long run, the Two Stages Least Square Estimates (2SLSE) shows that real interest rate has a negative influence on growth of the industrial production in the country as well as employment generation. The estimated industrial contribution to Gross Domestic Product has a significant relationship with Employment rate but lagged employment rate has no significant effect. The Economics of this is that industrial capacity is not capable of generating increase employment in the presence of high lending rate. It is imperative therefore, that for the industrial sector to be able to generate employment, the supply price of capital must fall to one digit.

Keywords: Supply price of capital, Industrial production and employment.

INTRODUCTION

The need to avert the negative effects of unemployment has made the tackling of unemployment problems to feature very prominently in the development objectives of many developing countries. Incidentally, most of the economies of these countries are also characterized by low productivity. Obadan et al (2001) asserts that productivity and employment are issues that are central to the social and economic life of every country. The extant literature refers to productivity and employment as constituting a vicious circle that explains the endemic nature of poverty in developing countries. He argued that continuous improvement in productivity is the surest way to breaking this vicious circle. All things being equal, growth in productivity through industrialization provides a significant basis for adequate supply of goods and services thereby improving the welfare of the people and enhancing social progress.

Industrialization is generally believed to propel economic growth and quicken the achievement of structural transformation and diversification of economies. It empowers a country to fully utilize its factor endowments and thereby reduce dependence on the external sector for its growth and sustenance. With industrialization, an economy gains the versatility and resilience that enable it to raise the standard of living of its people and cope better with internal stress and strains. Thus, industrialization has been an integral part of development strategies in Nigeria through the post-independence era (Egwaikhide et al, 2001).

History has shown that prior to the attainment of political independence, the level of industrialization in Nigeria was low and this was associated with the institutional obstacles of British colonial economic structures (Vent for Surplus paradigm), targeted at increasing the flow of raw materials only to her Majesty's industries abroad (Usman and Ibrahim, 2010; Olusoji, 1998). As such, there were no serious industrial planning objectives during the period. At independent,

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through the import substitution policy, resources were mobilized to encourage shift from commerce into processing and manufacturing industries because of its attendant benefits on national income and foreign exchange earnings and by extension employment generation. The achievement of these benefits was however contingent upon the ability of the economy to free the binding constraints, most of which revolves around the flow financial resources and its institutions.

Statement of the Problem

It is a fact that unemployment has become a global phenomenon as well as a big threat not only to developing countries but also to the advanced capitalist economies (Afolayan 2005). In Nigeria, employment problems transcend beyond mere mismatch between available jobs and the scale or scope of prospective job seeker to cut across all known frontiers and sectors (the skilled, the unskilled and Semi-skilled). In spite of the fact that the industrial policies of government has severally metamorphosed from import substitution to export promotion and a host of other interventions, too numerous to mention, leading to the emergence of new concepts in economic management and a number of programmes and projects, industrial production has been on a monotonic decline with it attendants effects on employment.

Study by Adenikinju (2005) has shown that the Nigeria's economic growth has been driven primarily by factor accumulation. Between 1962 and 2000, Nigeria's real GDP grew by a mean of 2.43 percent. A disaggregation of this growth rate shows that the growth in output was driven primarily by capital deepening. Capital intensity rose by a mean of 4.80 percent over the period while labour productivity grew by a marginal rate of 0.05 percent, while over the same period productivity decelerated by a mean of -2.85 percent.

Secondly, an analysis of the trends in Nigeria's productivity growth shows that technical inefficiency was mainly responsible for the poor productivity performance. Technical efficiency declined by -1.29 percent per annum (or 56 percent of the decline in productivity growth) between 1962 and 2000, while technical change declined by -1.01 percent per annum (or 44 percent of the decline in total productivity growth) over the same period. This is evident from the trends of manufacturing sector value-added to GDP as shown on table 1 below.

From the table 1 below, the manufacturing sector value-added to GDP stood at 17.3 as at 1970. The value-added experienced increase of 27.2 and 35.6 in 1975 and 1980 respectively but declined to 33.7 in 1985 got to an all time high of 54.9 in 1990, but experienced monotonic decline between 1995 through 2005.

According to Anyanwu (1999), effective investmentsmake for growth and productivity. Capital investments are needed to acquire modern machinery and equipment and appropriate technology; as well as upgrade the quality of the labour force and the environment. This will require many funds, which is difficult to source from the banking system. He opined that Lack of funds has made it difficult for firms to make investments in modern machines, information technology and human resources development, which are critical in reducing production costs, raising productivity and improving competitiveness. Low investments have been traced largely to banks unwillingness to make credits available to manufacturers, owing partly to the mis-match between the short-term nature of banks funds and the medium to long-term nature of funds needed by industries. In addition, banks perceive manufacturing as a high-risk venture in the Nigerian environment, hence they prefer to lend to low-risk ventures, such as commerce, in which the returns are also very high. Even when credit is available, high lending rates, which were over 40 per cent at a time, made it unattractive; more so when returns on investments in the sub-sector has been below 10 per cent on the average.

Commercial Banks in Nigeria are liquid but there appears to be that lending to the manufacturing sub-sector is very risky and increasing credit to the sector is not justified in terms of risk and cost. The high risk arises from difficulties in obtaining information on a firm's true financial condition and performance coupled with weak and inefficient institutions makes it difficult for banks to enforce contracts. Consequently, banks charge high interest rates, demand high levels of collateral and make few loans of more than a year in term (World Bank, 2002).

According to Akiri and Adofu (2007), the existence of externalities and imperfection in the financial markets of most developing economies has often called for intervention by the government through its appropriate agent (the Central Bank of Nigeria in the case of Nigeria) to encourage investment and to re-channel credit to those economic units with high social rate of returns but low commercial rate of returns. Under the deregulated interest rate system, the market forces of demand and supply plays a very prominent role in the determination of interest i.e. banks and their customers are free to negotiate to arrive at a suitable interest rate on both deposit and loans. This has made it difficult to determine the actual lending rate since banks and their customers are free to negotiate.

In view of the above, it is unclear the extent of the high cost of capital on the ability of the manufacturing sector to generate employment in the face of falling industrial productivity. This has served as the motivation for this study.

Table 1. Trends of Manufacturing Sector Value-Added to GDP

Years	Capacity Utilization	Value-Added	GDPGR
1970	N.A	17.3	5.7
1975	76.6	27.2	11.0
1980	70.1	35.6	2.9
1985	38.3	33.7	9.4
1990	40.3	54.9	12.8
1995	29.3	30.8	-0.31
2000	36.1	29.6	5.3
2005	54.8	28.3	5.4
2010	28.0	N.A	8.7

Source: *1. National Bureau of Statistics (NBS)*,

2. International Monetary Fund (IMF)

Diagram 1.
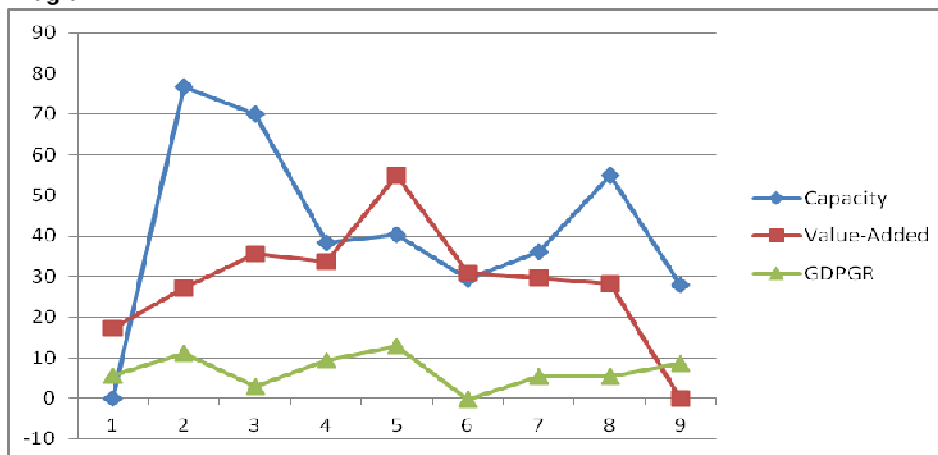
Objectives of the study

The general objective of this study is to investigate the effects cost of capital on industrial production and the ability to generate employment. The specific objectives are:
i.   To examine the relationship between cost of capital and industrial production;
ii.   To evaluate the impact of industrial production on employment generation;
iii.   To make policy recommendations that enhances employment generation in Nigeria.

RELATED LITERATURE

Theoretical Literature

Keynesian theory explains the determination of output or productivity and employment in terms of aggregate demand. This approach sees demand for labour as a derived demand. Productivity growth should increase the demand for labour thereby reducing unemployment. The Keynesian framework, as examined by Thirlwall (1979), Grill and Zanalda (1995) and Hussain and Nadol (1997), postulates that increases in employment, capital stock and technological change are largely endogenous. Thus, the growth of employment is demand determined and that the fundamental determinants of long-term growth of output influence the growth of employment.

Keynesians have traditionally favored the theory of investment, which emphasizes the relationship between the capital stock and then flow of output, while disregarding the role of factor costs. Investment theories that followed the tradition of the Harod- Domar growth models emerged in the 1950s and 1960s. This was the precursor to the familiar accelerator theory. This theory posits investment as a linear function of changes in output derived from a fixed proportion of production technology. Thus, given an incremental capital-output

ratio, it is easy to compute the investment requirements needed to achieve a given output growth target. In his model, profitability expectations and cost of capital considerations are ignored in the determination of investment.

The gross investment in the economy during any given time period t will be equal to the product of incremental GDP and capital-output ratio (k/Q) plus the capital consumption allowance (Depreciation) in the process of production. Designating the capital-output ratio or capital coefficient by v, the aggregate income of time periods t and t-1 by y_1 and y_{1-1} respectively and the replacement investment by R, the gross investment $(I_g)_t$ in any given time period t will be

$$(I_g)_t = v\,(y_{t-} \, y_{t-1}) + R_t \quad = v\triangle y + R_t \text{ --- - } \quad \mathbf{-1}$$

The Neo Classical Approach to investment was next in line. Mainly spurred by the desire to obviate the shortcomings of the Harod-- Domar formulation, particularly in its simplistic assumptions, this approach introduces factor substitution in the derivation of the demand for capital from the firm's cost minimization problems. Consequently, the desired capital stock is shown to depend on the rental cost of capital (which, in turn, depends on the price of capital goods, the real interest rate and the depreciation rate) and the level of output. This approach too has been attacked because of inconsistency of the assumptions of perfect competition and exogenous output, the inappropriateness of static expectations and the introduction of delivery lags in an ad hoc manner.

Tobin's "Q" theory of investment of 1969 is an alternate formulation of the investment function. The theory postulates that the ratio of the market value of the existing stock of capital to its replacement cost (otherwise termed Q ratio) is the force driving investment. Tobin devised a way of relating investment demand to financial variables, which is amenable to empirical treatment. Investment is hypothesized to depend positively on the q ratio, where

$$Q = \frac{\text{rate of return on investment}}{\text{Cost of capital}}$$

Hence, q is alternatively called the 'valuation ratio' since it is the ratio of the market value of the firm to the replacement cost of its real assets. A q in excess of 1.0 means that the financial wealth-holders on the stock market are prepared to pay more for claim to a unit of real capital than it costs the firm to buy and install it. Firms therefore have an incentive to invest and so investment is expected to be higher the larger is q. Tobin, subsequently elaborated two reasons why Q may differ from unity which include delivery lags and increasing marginal costs of investment.

Review of Empirical Literature

The empirical works by Mackinnon (1994) and Fry (1995) have shown evidence to supports the hypothesis that interest rate determine investment. Many studies have investigated these transmission mechanisms, which tallies with interest rate policy regimes articulated in Nigeria prior to and after the 1986 deregulation.

Khat and Bathia (1993) used non-parametric method in his study of the relationship between interest rates and other macro-economic variables, including savings and investment. The study identified Sixty-Four (64) developing countries including Nigeria and categorized them into three, on the bases of real interest rate.

The study further computed economic rate among which, were gross savings, income and investment for countries. Applying the Mann - Whitny test, he found that the impact of real interest was not significant for the three groups. However, Balassa (1999) criticized that a relationship has been established by the use of regression analysis.

Agu (1988) reviewed the determinants and structure of real interest rates in Nigeria between 1970 -1985. He demonstrated the negative effect of low real interest rate on savings and investment using the usual Makinnon financial repression diagram. His main conclusion was that the relationship between real interest rates, savings and investment is inconclusive.

Ani (1988) opined that, the central Bank is two eager in its objective to accelerate the attainment of the objectives of the on-going structural adjustment which among other recommended the deregulation of the economy. He believes that the central bank is trying to deregulate the interest rate aim at strangulating a lot of industries particularly the small and medium scale industries because interest rate deregulation will lead to a very high lending rate which in his own opinion, the medium scale industries could not afford because of their limited capital and production base.

Adofu et al (2001), further stressed that high cost of borrowing will slow down investment, as borrowing will be greatly reduced. Hence, investment in new business will reduce while existing ones may not be able to compete favorably for scarce finance due to high cost of borrowing.This study is very important because past studies focused more on effect of interest rate on investment, while this is beyond, as it tries to see the effect of interest rate on Industrial production. In addition is the importance of interest rate on employment rate. Moreover, the study attempts to examine the effects of both supply price of capital and industrial production on employment rates in Nigeria.

Table 2: Unit Root Test Results for Stationerity (at various levels)

Variables	DF	ADF (Test Critical value)	t-Statistic	p- value	Order of interpretation
ΔIGDP	1%	-4.4167*			
	5%	-3.6219**	-5.314729		I (1)
	10%	-3.2474***			
ΔER	1%	-4.4167*			
	5%	-3.6219**	-4.782647		I (1)
	10%	-3.2474***			
ΔRLR	1%	-4.4167*			
	5%	-3.6219**	-4.506645		I (1)
	10%	-3.2474***			
INV	1%	-4.3738*			
	5%	-3.6027**	-4.947550		I (0)
	10%	-3.2367***			
ΔER$_{t-1}$	1%	-4.4415*			
	5%	-3.6330**	-4.650053		I (1)
	10%	-3.2535***			
ΔIGDP$_{t-1}$	1%	-4.4415*			
	5%	-3.6330**	-5.075299		I (1)
	10%	-3.2535***			

METHODOLOGY

Model Specification

The paper set out a Simultaneous Regression Model with Multivariate Autoregressive- moving average (because there is a two-way flow of influence between both industrial production output and employment) to test for the significance of lending rate on Industrial production and employment rate (ER$_t$). According to Gujarati (2009) there are situation where there is a two- way flow of influence among economic variables; that is, one economic variable affects another economic variable(s) and is in turn affected by it (them). Therefore, the simultaneous equation is employed. This study proxied the industrial production with industrial contribution to GDP, Supply price of capital by Real lending rate and employment generation by employment rate.

$IGDP_t = f(ER_t, RLR_t, INV_t, IGDP_{t-1})$

$ER_t = f(IGDP_t, ER_{t-1})$

$IGDP_t = \alpha_o + \alpha_1 ER_t + \alpha_2 RLR_t + \alpha_3 INV_t + \alpha4 IGDP_{t-1} + U_{1t}$ -----------EQ1

$ER_t = \beta_0 + \beta_1 IGDP_t + \beta_2 ER_{t-1} + U_{2t}$ ---------------EQ2

Where: IGDP$_t$ (Industrial contribution to gross domestic product), ER$_t$ (Employment rate), RLR$_t$ (Real lending rate), INV$_t$ (Investment), IGDP$_{t-1}$ (Lagged gross domestic product), ER$_{t-1}$ (Lagged employment rate), $\alpha_o > 0$, $\alpha_1 > 0$, $\alpha_2 < 0$, $\alpha_3 > 0$, $\alpha4 > 0$, $\beta_o > 0$, $\beta_1 > 0$, $\beta_2 > 0$. From the equations above, the variables IGDP$_t$ and ER$_t$ are both stochastic. Sequel to that, we have a reduced form equation below:

$IGDP_t = \pi_o + \pi_1 RLR_t + \pi_2 INV_t + \pi_3 IGDP_{t-1} + \pi_4 ER_{t-1} + V_t$ -------EQ3

$ER_t = \pi_5 + \pi_6 RLR_t + \pi_7 INV_t + \pi_8 IGDP_{t-1} + \pi_9 ER_{t-1} + W_t$ -------EQ4

Estimation Techniques

In order to avoid spurious regression results, stationerity of variables will be tested using the Augmented Dickey Fuller (ADF) test. This study will also employ Hausman Simultaneity Test (HST) to see if the dependent variables are mutually dependent (i.e. to test whether an endogenous regressor is correlated with the error term).

Table 3: Reduced Form Simultaneous Equation

Equation	Variables	Coefficient	Std. Error	t-Statistic	Prob	R^2	F-Statistic	Durbin Watson
Eq. I	*C*	5.817540	18.337243	0.317462	0.3396			
ΔIGDP	*ΔRLR*	-0.252269	0.233499	-3.76544	0.0013			
	INV	0.833375	0.240407	2.030641	0.0565	0.47794	4.34861	1.796707
	ΔERt-1	0.338376	0.228091	0.916846	0.3707			
	ΔIGDPt-1	0.079797	0.339139	0.656012	0.5197			
Eq. II	*C*	67.816575	16.628261	4.077513	0.0013			
ΔER	*ΔRLR*	-0.554794	0.306922	-1.80577	0.0866			
	INV	0.495418	0.217037	2.277413	0.0352	0.510229	4.948418	2.371480
	ΔERt-1	0.689056	0.258213	2.668561	0.0152			
	ΔIGDPt-1	0.217042	0.140151	1.548627	0.1380			

Table 3: Hausman Test

Variables	Coefficient	Std. Error	t-Statistic	Prob	R^2	F-Statistic	Durbin Watson
C	45.644	14.206	3.213	0.0094			
ΔIGDP	0.823	0.252	3.264	0.0364			
ΔER_{t-1}	0.154	0.196	0.786	0.3114	0.668	7.619	1.975
V_t	-0.845	0.320	-2.643	0.0290			

The results obtained will determine the method of estimation for our simultaneous equation. The presence of simultaneity will warrant the use of 2 stages least square but Ordinary Least Square in the case of absence of simultaneity.

ANALYSIS OF REGRESSION RESULTS

Source

Authors Calculation
Key: *Significant at 1%
**Significant at 5%
***Significant at 10%
Tests for the stationary of the variables are presented in Table 2 above. For the ADF Statistics, the null of non-stationerity is accepted if the reported statistic is greater than (One Tail Test) the critical values. From the table, the results of the stationerity (unit root) test indicate that $IGDP_t$, ER_t, RLR_t, ER_{t-1} and IGDP are stationary at Order I, while INV is stationary at order 0.
The regression results for the simultaneous equation model are also presented in table 3 as shown above.

Source

Author's Calculation
The results obtained in equation I shows that a change in

real lending rate (ΔRLR) has a negative impact on a change in Industrial contribution to GDP (ΔIGDP), which is in conformity with a priori expectation. It shows that 1 percent changes in ΔRLR will cause ΔIGDP to change by -0.25%. Investment (INV), Lagged of employment rate (ΔERt-1), and lagged of Industrial contribution to GDP (ΔIGDPt-1) show a positive impact on a change in IGDP (ΔIGDP). That is, 1 percent changes in INV, ΔERt-1 and ΔIGDPt-1 will cause ΔIGDP to change by 0.83%, 0.33% and 0.079% respectively. Real lending rate (ΔRLR) and investment (INV) are statistically significant while lagged of employment rate (ΔERt-1) and lagged of Industrial contribution to GDP (ΔIGDPt-1) are not statistically significant at 5% level of significance. However, equation II shows that a change in real lending rate (ΔRLR) has a negative effect on a change in employment rate (ΔER) as 1% changes in ΔRLR will cause ΔER to change by -0.55%. The results also show that Investment (INV), Lagged of employment rate (ΔERt-1), and lagged of Industrial contribution to GDP (ΔIGDPt-1) have a positive effect on a change in employment rate (ΔER). It was revealed at 5% level of significance that ΔRLR, INV, and ΔERt-1 are statistically significant while ΔIGDPt-1 is not.

Source

Author's Calculation
To find out if Change in Industrial contribution to GDP

Table 4: 2 Stages Least Square Results

Equation/ Dependent	Variables	Coefficient	Std. Error	t- Statistic	Prob	R^2	F- Statistic	Durbin Watson
1	C	13.703	32.304	0.4242	0.910			
	$e\Delta ER$	0.0967	0.0378	2.5575	0.023			
	ΔRLR	-0.672	0.263	-2.555	0.004			
	INV	0.105	0.0036	29.166	0.019	0.7633	5.6444	1.6399
	$\Delta IGDPt\text{-}1$	0.227	0.159	1.430	0.168			
2	C	45.644	14.206	3.213	0.0094			
	$e\Delta IGDP$	0.823	0.252	3.265	0.0364	0.648	7.618	1.973
	$\Delta ERt\text{-}1$	0.154	0.786	0.196	0.3114			

(ΔIGDP) and change in employment rate (ΔER) are mutually dependent, Hausman simultaneity test was conducted and the results are presented in table 4 above. Since the t value of v_t is statistically significant (the p value is 0.0290), we cannot reject the hypothesis of simultaneity between change in Industrial contribution to GDP (ΔIGDP) and change in employment rate (ΔER). The simultaneity between the two dependent variables shows that OLS is not appropriate. Therefore, 2 stages least square was employed and the results are shown above in table 4:

Source

Author's Calculation

The simultaneous equation results above show that in equation (I), estimated change in employment rate (eΔER), investment and change in lagged industrial contribution to GDP (ΔIGDPt-1) have a positive impact on Industrial contribution to GDP (ΔIGDP). As 1% changes in estimated change in employment rate (eΔER), investment (INV) and change in lagged industrial contribution to GDP (ΔIGDPt-1) will cause the Industrial contribution to GDP (ΔIGDP) to change by 0.09%, 0.11% and 0.22% respectively. Change in real lending rate (ΔRLR) influences the change in the Industrial contribution to GDP (ΔIGDP) negatively. That is, 1% changes in real lending rate (ΔRLR) will affect the Industrial contribution to GDP (ΔIGDP) by -0.67%. The equation also reveals that eΔER, ΔRLR and INV are statistically significant at 5% level of significance while ΔIGDPt-1 is not significant. The F-statistic (5.644) shows an overall significance at 5% level of significance. The R^2 shows that 76% changes in ΔIGDP can be explained by eΔER, ΔRLR, INV and ΔIGDPt-1.

However, equation (II) shows that estimated change in Industrial contribution to GDP (eΔIGDP) and change in lagged employment rate (ΔERt-1) have a positive influence on change in employment rate (ΔER). The results reveal that a 1% changes in eΔIGDP will affect ΔER by 0.82% and 1% changes in ΔERt-1 will influence ΔER by 0.15%. The estimated change in Industrial contribution to GDP (eΔIGDP) is statistically significant while change in lagged employment rate (ΔERt-1) is not statistically significant at 5% level of significance. The F-statistic (7.618) however shows that there is an overall significance of variables, while R2 shows that 65% changes in employment rate can be explained by the explanatory variables (eΔIGDP and ΔERt-1).

CONCLUSION

Specifically, this study investigates the effects of the Supply price of capital on industrial production and the ability to generate employment in Nigeria. From the 2stages least square results, it is revealed that real interest rate has a negative influence on growth of the industrial production in the country as well as employment generation. The implication is that, since the supply price of capital is high, investment will be low and this will amount to low industrial production because of low capacity utilization arising from low financial and human resources. The estimated change in Industrial contribution to GDP (eΔIGDP) has a great influence on the employment rate. Which means for a country like Nigeria to increase her employment rate, the industrial sector must be strengthened but high lending rate resulted from banks activities has made it difficult for the industrial sector to attain a meaningful achievement.

RECOMMENDATION

Having gone through the literature, trend and statistical analysis of this study, the following policy recommendations will be made:
i.   A single digit lending rate should be given to the industrial sector in order to reduce her cost of production and investment;
ii.   A special task force should monitor the activities of

the financial sector in order to curb the excesses of the sector in terms of loan and lending rate administration;
iii. A 49% and above growth rate should be pursued in the industrial sector because it has the tendency of translating to a 95% employment; and
iv. Proper financial and administrative records should be kept in the industrial sector, so that the financial sector can assess the status of the sector.

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