

An Assessment of Investment in Technology in Cocoa Processing Industry in Nigeria

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Abstract

The paper assessed the investment in technology in cocoa processing industry in Nigeria. The study was carried out in six cocoa processing organizations. Questionnaire technique supplemented with oral interview of officials of cocoa processing organisations were used for the study. The data collected were analyzed using descriptive and inferential statistics. The findings revealed that despite the substantial investment in technology by cocoa processing companies, there were low capacity utilizations in the industry due to lack of adequate working capital to stock pile cocoa beans.

Keywords: Technology, Investment, Cocoa processing, Working capital, Machinery, Funding

INTRODUCTION

Nigeria used to rank as one of the leading cocoa producing countries in West Africa and no single agricultural export commodity has earned more than cocoa. With respect to employment, the cocoa sub-sector still offers quite a sizeable number of employments both directly and indirectly. In addition, cocoa is an important source of raw materials, as well as source of revenue to governments of cocoa producing states. With the gradual increase in cocoa production, there is a need for investment in up-to-date technology for the processing of the dry cocoa bean to ensure effective value addition. Agriculture is of low benefit if there is no adequate investment in the agro processing. The real Gross Domestic Product (GDP) cannot grow if a country merely produces massive agricultural products which cannot be exploited for domestic use and exportation (Christianto and Smaranlanche, 2008). The development of cocoa processing industries is very important to the employment generation in Nigeria. A situation where the bulk of the cocoa beans produced in a country cannot be processed locally or at least have some value added, is not in the best interest of any country. Investment in technology is necessary for the growth of every sector of the economy most especially cocoa -processing which is the bedrock of the economies of some states in southwestern Nigeria. Only about 17% of Nigeria annual cocoa production of about 250,000 tonnes are processed locally, whereas Cote Di'voire, Ghana and Indonesia with annual production of about 1.38 million tonnes, 690,000 tonnes and 570,000 tonnes processed locally 34%, 46% and 33 % respectively, of their annual cocoa production (Cocoa Barometer, 2009). The objectives of this study is to assess the level of investments in technology in cocoa processing industry in Nigeria.

Materials and Methods

Technology is a set of tools both hardware (physical) and software (algorithm philosophical systems or procedures) that help us act and think better. Technology is designed to make the production of product or service more efficient (Ghosh, 2004). Therefore, organisations are supposed to make adequate provision for investment in technology either in the acquisition of technology or updating and maintenance of the existing ones. Technology changes with time, therefore an organisation that continues to make use of obsolete technology cannot guarantee efficient and effective operations and this may lead to the eventual collapse of such organisation. Hence, there is a need for constant decision making process that would ensure that the organisation position itself for the future. According to Stoner *et al.* (2005) decision making is the process of selecting a course of action to solve specific problem. Management of an organisation should consciously and continually engage in the art of decision making, most especially technology investment decisions in shaping the course of the organisation.

Currently, Nigeria is the fourth largest producer after Cote D'ivoire, Ghana and Indonesia contributing 12% of total world production (FAO, 2009). Fourteen states grow cocoa in Nigeria. They are Abia, Adamawa, Akwa Ibom, Cross River, Delta, Edo, Ekiti, Kogi, Kwara, Ogun Ondo, Osun Oyo and Taraba. The South West is regarded as the cocoa belt of the country, it accounts for 70% of Nigeria's annual cocoa production (Michael and Nzeka, 2011).

Krajewski and Ritzman (1999) define technology to be the know-how, physical things, and procedures used to produce products and services. Know-how is the knowledge and judgment of how, when, and why to employ equipment and procedures. Craftsmanship and experience are embodied in this knowledge and often can

not be written into manuals or routines. Physical things are the equipment and tools. Schonberger and Knod (1997) view technology as principles, techniques, equipment, mechanics, policies, and so forth to be employed in creating or attaining the goods or services.

Nigeria is well endowed with raw material and natural resources which with the application of appropriate technology and production process will promote linkages between raw materials and natural resources capability and industry (Matthew-Daniel, 2011). As stated by Ghosh (2004) in modern time technology is a major force for industry and business to avoid obsolescence and promote innovation, a firm must therefore be aware of technological changes that might influence the industry in which it operates. Majumdar (1995) opined that innovative activities undertaken by firms as measured by the level of investment in new technology is a positive function of micro market pressures that they face from potential competitor. A firm which is unable to cope with technological changes may not survive. Lane (1991) stated that new technologies displace older methods and lead to improvements in productivity, but the decision to invest in new technology depends on the cost and benefits of adoption of the technologies. This will not be uniform across either technology adopters or time. Investment in specific technology improves only new vintages of capital goods whereas neutral technological change affects the productivities of all production inputs (Hulten, 1992), Greenwood *et al.* 1997). Cummins and Violante (2002) argued that investment specific technological change is important in explaining the growth of an organisation. Nowadays, fast changes are taking place in the realm of technology and the agro allied industry is not left alone as per the effect of technological changes. This has culminated in various modern production methods in many areas of agro allied production.

Apart from market and societal pressures, technology pressure is a major category of business pressures. Market pressure consist of global economy and stronger competition, need for real time operation, changing nature of the workforce and powerful customers while societal pressures are social responsibility, governmental regulations, deregulations and terrorism. The technology pressures which is very fundamental to the growth of any business organisation consist of technological innovation and information overload (Bucy, 1985). Technological progress is a critical ingredient for sustained economic growth and catch-up along with institutional reform and political stability (Hu *et al.*, 2003).

According to Lomash and Mishra (2003), technology has far reaching effects on business. Technological developments are at faster rate today and are affecting businesses in many countries. Technology directly or indirectly affects all kinds of micro and macroeconomic environment. It is playing an increasing role in both manufacturing and services. New and improved technology creates or support substitutes for producers, alternative services option and superb quality, the state of the art product of today may become obsolete tomorrow, thus technology accelerate the competitive forces (Turban *et al.*, 2003). Brigham (1983) opines that operating leverage of a firm is determined to a large extent by technology. Cocoa processing business need a lot of technology investment, therefore conscious capital budgeting decision process must be put in place to ensure profitable investment decisions. The performance of organisations has been closely related to the ability to employ new technologies in production systems and in products, although it is difficult to separate the technology from other non price factors influencing economic performance, nonetheless, trends in technology activities in the industry of different countries may give some indication of future trends in industrial performance (Povit 1979).

In market economies, the ultimate goal of corporate managerial strategies is the creation of profit, which is the basic condition for the survival of the enterprise. Management invests in new technology to attain this goal, hoping that new technology will give the enterprise a competitive edge over its rival in the market. However, the concrete objectives sought by management through specific technology change vary widely. Management seeks to attain one or several of the following objectives through investment in technology: reduction of labour input in work processes either to reduce labour cost or to cope with labour shortage, greater efficiency of operations through closer management control over production process; higher quality of products or services through the greater precision of operations and speedier delivery of information that the computer makes possible; improvement of the ability to produce customers' required products in batches and to adopt production to the diverse and changing demand of clients.

Investment has been deemed to be both the engine of economic activity and the primary cause of economic malaise since the time of Adam Smith and Karl Marx, Modern theories of investment generally begin from Fisherian capital theory, which explains investment in terms of optimal decision-making over time. According to Samuels and Wilkies (1980), investment can be described as any action which brings about changes in a company's income stream. They may be in a form of plant and equipment, stock and shares, take over operation, extension of facilities, etc. Aborode (2005) opined that firm investment decisions would generally include acquisition, modernisation and replacement of long term assets. He stated further that the methods required to deal with investment decisions include the formulation of long term goals and creative search for and utilisation of new investment opportunities. Investment is an activity of spending resources

(money, labour, and time) in creating assets that can generate income over a long period of time or which enhances the returns on the existing assets (Dwived, 2002)

The study sample comprised of six cocoa processing companies in Nigeria. Purposive sampling method was used to select the six limited liability cocoa processing companies. Ten questionnaires were distributed to each of the companies selected for the study to be completed by officials of the companies who are well informed about the investment in technology in their respective companies, A total of 38 questionnaires were returned out of the 60 questionnaires distributed

Results and Discussions

A number of cocoa processing companies had been floated in the country some of these companies were only incorporated but they did not go beyond the drawing board stage while some became moribund. Nine out of the eighteen incorporated cocoa processing companies are currently in operation. The deregulation of cocoa sector and inadequate working capital couple with the lack of fund for rehabilitation of machinery had made government owned cocoa processing companies to be privatised. Most of the recently established cocoa processing companies currently operating in Nigeria are owned by cocoa marketing companies and private investors. The forward integration strategies employed by these companies had helped in sustaining them. The current installed capacity of the cocoa processing companies that are currently operating is about 300 tonnes per annum, therefore if the companies are operating at full capacity they can process almost all the cocoa beans presently being produced in Nigeria, however only about 17% of cocoa beans produced in Nigeria is currently being processed in Nigeria.

The result in Table 1 shows that the investment in processing plant and machinery were adequate for the operations with a mean rating of 4.1, but the workshop (3.5) and information and communication technology(3.3) equipment were just fairly adequate. The mean rating of lathe machine was 1.5 which indicates the availability of the machine was inadequate. Other accessory equipment such as Weigh Bridge, fork lift and spare parts were fairly adequate with mean rating of 3.9, 3.5 and 3.4 respectively.

Shareholders fund is suppose to provide a good and cheaper form of financing for the cocoa processing organisations. The study revealed that the six cocoa processing companies selected for the study were not well capitalized in term of shareholders fund for acquisition of technological assets. The processing equipment is highly capital intensive and cocoa processing also required huge working capital. Substantial amount of loan capital was used in all the companies selected for the study for the acquisition of their processing facilities. In 2007, only one of the companies had shareholders fund of one billion Naira and above but by the year 2011, five of the organizations had shareholders fund of over one billion Naira, though the shareholders fund of these companies was well above a billion Naira, it is not enough for the required investment in the processing machinery. The cocoa processing companies had up to date technologies for cocoa processing but were largely financed by long term loans. Only two cocoa processing companies had raised money from the capital market and are quoted on Nigerian Stock Exchange. The major challenge now facing the companies is inadequate investment in working capital. Working capital is required to stock pile cocoa during the cocoa main season.

Table 2 shows the adequacy of funding for technology assets, it revealed that funding for plant and machinery (3.6), and workshop equipment (3.8) was fairly adequate. For any technology investment to be worthwhile in any manufacturing organization, it must be supported by adequate investment in working capital. The working capital of the companies was inadequate given a mean rating of 2.3. Table 3 reveals the involvement of staff in technology investment decision making process. The mean ratings of staff involvement obtained were 4.66, 5.00, 4.13, 2.15, 2.21 and 1.18 for Board of Directors, Top Management, Middle Management, Lower Management, Supervisors and Junior Staff respectively. This result indicates that, Board of Directors' involvement in technology investment decisions (4.7) was high. The involvement of top management was very high. The involvement of middle management staff was moderate while that of lower management and supervisors was very low. Junior staff was rarely involved in technology investment decisions considering mean rating of 1.18

As shown in Table 4 the respondents claimed that investment in technology had positive impact on production efficiency (4.45), labour cost saving (4.18) and information management (4.08). However, they were of the opinion that investment in technology did not have any impact on administrative efficiency (3.18) on the organisations. Some of the respondents interviewed also believed that the acquisition of latest technology may not change some human factors that affect administrative efficiency.

The following factors (Table 5) were rated as very important as positively affecting investment decisions in cocoa processing, funding (4.92), power supply (4.66), technological change (4.58), company's profitability (4.58), replacement of obsolete equipment (4.39), raw materials (4.24), need for improve production process (4.18), Government policy (4.13), tax incentives (4.11), human resource (4.07), supplier bargaining power (4.05), consumer (4.03) The industry market t(3.93), market

competition (3.63) and political trend (3.34) were regarded as less important in the decision making process in cocoa processing industry. Social trend was rated not important factor. Apart from finance, power supply was a very important factor in technology investment decisions. Manufacturing companies are spending a lot of money on diesel for power generation since the supply from the national grid is very unstable. This has increased their operating cost substantially.

5.4 Recommendations

Based on the findings of the study in respect of the problem identified, the following suggestions and recommendations are made to enhance the growth of cocoa processing sector in Nigeria .

- (i) In order to ensure the sustenance of investment in technology in cocoa processing in Nigeria , there should be guided deregulation of cocoa marketing in the country so that local processors could have enough cocoa beans for processing.
- (ii) Measures should be put in place to ensure that certain percentage of cocoa produced in Nigeria is processed in the country to encourage investment in technology in cocoa processing.

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TABLES

Table 1: Adequacy of required process technology assets

	Very Adequate	Adequate	Fairly Adequate	Inadequate	Grossly Inadequate	Total Response	Weighted Score	Mean Rating
Availability of Plant Machinery	19(50%)	8(21%)	8(21%)	2(5%)	1 (3%)	38	156	4.11a
Workshop Equipment	14(37%)	12(32%)	6(16%)	2(5%)	4(10%)	38	132	3.47ab
Lathe Machine	-	-	-	17(45%)	21(55%)	38	55	1.45d
ICT Equipment	7 (18%)	9(24%)	13(34%)	7(18%)	2 (5%)	38	126	3.31c
Fork Lift	15 (39%)	3 (8%)	11(29%)	5(13%)	4(11%)	38	135	3.55c

Analysis of Variance: $F = 21.13$, $p < 0.05$, means followed by the same letter are not significantly different ($p < 0.05$)

Note: Rating

- 1 - Grossly inadequate
- 2 - Inadequate
- 3 - Fairly adequate
- 4 - Adequate
- 5 - Very adequate

Table 2: Adequacy of fund, raw material and power supply required for investment in process technology in cocoa processing industry

	Very Adequate	Adequate	Fairly Adequate	Inadequate	Grossly Inadequate	Total Response	Weighted Score	Mean Rating
Adequacy of Fund for Working Capital	2 (5%)	5 (13%)	1 (3%)	25(66%)	5(13%)	38	88	2.32b
Adequacy of Fund for Plant Machinery	10 (26%)	8 (21%)	17(45%)	2 (5%)	1 (3%)	38	138	3.63a
Adequacy of Fund for Workshop Equipment	15 (39%)	11 (29%)	6 (16%)	2 (5%)	4(10%)	38	145	3.82a
Adequacy of Raw Material	1(3%)	3(8%)	2(5%)	11(29%)	21(55%)	38	66	1.74c
Adequacy of Power Supply	-	-	3(8%)	16(42%)	19(50%)	38	60	1.58c

Analysis of Variance: $F = 38.865$, $p < 0.05$, mean followed by the same letter are not significantly different ($p < 0.05$)

Note: Rating

- 1 - Grossly inadequate
- 2 - Inadequate
- 3 - Fairly adequate
- 4 - Adequate
- 5 - Very adequate

Table 3: Involvement of staff in technology acquisition process

Category of Staff	High	Moderate	Low	Very Low	Rarely	Total Response	Weighted Score	Mean Rating
Boards of Directors	35(92%)	3(8%)	-	-	-	38	199	4.92
Top Management	38(100%)	-	-	-	-	38	190	5.00c
Middle Management	17(45%)	9(24%)	12(31%)	-	-	38	157	4.13a
Lower Management	-	11(29%)	4 (10%)	19(50%)	4(11%)	38	98	2.58a
Supervisors	-	-	13(34%)	20(53%)	5 (13%)	38	84	2.21a
Junior Staff	-	-	-	7(18%)	31(82%)	38	45	1.18b

Analysis of Variance: $F = 226.15$, $p < 0.05$, means followed by the same letter are not significantly different ($p < 0.05$)

NoVte: Rating

- 1 - Rarely
- 2 - Very low
- 3 - Low
- 4 - Moderate
- 5 - High

Table 4: Impact of investment in technology

	High Positive Impact	Positive Impact	No Impact	Negative Impact	High Negative Impact	Total Response	Weighted Score	Mean
Production Efficiency	17 (45%)	21 (55%)	-	-	-	38	169	4.45a
Administrative Efficiency	2 (5%)	3 (8%)	33 (87%)	-	-	38	121	3.18c
Labour Cost Savings	11 (29%)	23 (61%)	4 (10%)	-	-	38	159	4.18a
Quality of Products	10 (26%)	28 (74%)	-	-	-	38	162	4.26a
Information Management	9 (24%)	13(34%)	16 (42%)	-	-	38	145	3.82b

Analysis of Variance: $F = 27.521$, $p < 0.05$, means followed by the same letter are not significantly different ($p < 0.05$)

Note: Rating

- 1 - High negative impact
- 2 - Negative impact
- 3 - No impact
- 4 - Positive impact
- 5 - High positive impact

Table 5: Factors influencing investment decisions in technology in cocoa processing

	Strongly Agree	Agree	Undecided	Disagree	Strongly disagree	Total Response	Weighted Score	Mean Rating
Political Trend	11 (29%)	9 (24%)	4 (10%)	10 (26%)	4 (10%)	38	127	3.34d
Social Trend	-	2 (5%)	7 (18%)	22 (58%)	7 (18%)	38	76	2.0e
Consumer Trend	18 (47%)	11 (29%)	3 (8%)	2 (5%)	4 (10%)	38	153	4.03bc
Supplier bargaining power	16 (42%)	15 (39%)	1 (3%)	5 (13%)	1 (3%)	38	154	4.05bc
Market Competition	9 (24%)	17 (45%)	5 (13%)	3 (8%)	4 (10%)	38	138	3.63cd
Improve Production Process	21 (55%)	12 (32%)	-	3 (8%)	2(5%)	38	161	4.23ab
Technological Change	22 (58%)	16 (42%)	-	-	-	38	174	4.58a
Industry Market	18 (48%)	10 (26%)	10(26%)	-	-	38	160	4.21ab
Company's Profitability	5 (13%)	23 (61%)	8 (21%)	2(5%)	-	38	170	4.58bc
Tax Incentives	17 (45%)	13 (34%)	4 (10%)	3 (10%)	1 (3%)	38	156	4.11ab
Power Supply	28 (74%)	7 (18%)	3 (8%)	-	-	38	177	4.66a
Raw Materials	21 (55%)	5 (13%)	12(32%)	-	-	38	161	4.24ab
Government Policy	15 (39%)	12 (32%)	3 (8%)	5 (13%)	3 (8%)	38	145	3.82bc
Human Resource	13 (34%)	15 (39%)	10(26%)	-	-	38	155	4.07bc
Funding	31 (82%)	7 (18%)	-	-	-	38	183	4.82a
Replacement of Obsolete Equipments	19 (50%)	11 (29%)	4 (10%)	2 (5%)	2(5%)	38	157	4.13bc
Returns on Capital Employed	14 (37%)	18 (47%)	6 (16%)	-	-	38	160	4.21ab

Analysis of Variance: $F = 14.356$, $p < 0.05$, means followed by the same letter are not significantly different ($p < 0.05$)

Note: Rating

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Undecided
- 4 - Agree
- 5 - Strongly Agree.

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