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SUPPLY CHAIN REACTIONS TO INFLATION AND EXCHANGE RATE VOLATILITY IN GHANA

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Abstract

Because Ghana's microeconomic market relies primarily on import demand, changes in products and product prices might affect government income. Numerous currency depreciations hurt economic growth and budgetary balance. According to the argument, manufacturing promotes growth, profitability, and development while services provide lower-paying jobs. We propose the "supply chain economy," which emphasises corporations and organisations that

supply businesses and the state with goods and services. This study examines Ghana's supply chain response to inflation and currency rate volatility. Ghana's monetary policy targets 8% inflation to avoid double-digit inflation. Ghanaian inflation management is to reduce costs, fight poverty, and boost economy. However, the government must use objective scientific research to evaluate Ghana's supply chain reaction to inflation and currency rate volatility to create an effective strategy. The exchange rate-inflation link is determined using generalised autoregressive conditional heteroscedastic and autoregressive distributed lag co-integration. Exchange rates effect import, export, industries, and other economic sectors. Gross domestic product, foreign direct investment, private market loans, and government infrastructure expenditure affect export efficiency statistically in the long and near term. Including manufactured imports, inflation is statistically negative. The Public Procurement Authority website offers data on all supply chain players that supply goods and services to public procurement bodies. Thus, the study examines Ghana's supply chain response to inflation and currency rate volatility.

Keywords: Exchange Rate Volatility, Inflation, Import, Procurement entities, Procurement data, Gross Domestic Product

INTRODUCTION

Ghana has a long history of being rich in natural resources, including gold, diamonds, cocoa and timber. Most of these products are transported in their unprocessed form and at 1960s, Ghana produced very significant volumes of produced goods along with its transaction history (OwusuSarpong, OtchereFianko, and KwabenaAnin 2013). The Ghanaian economy cannot function without the export and import industry. The significance of international commerce in the developmental process caught the attention of macroeconomists. Manufacturers and retailers can look for products, facilities, and components made abroad thanks to international trade. A nation can rely on both things that are produced domestically and those that are imported. By highlighting the significance of trade, well-known conventional trade theories like the factor endowments and productive capacity simplify the idea of trade (Balassa 1978). In order to encourage domestically produced goods, nations are contemplating limiting imports through initiatives like the import substitution plan. Ghana is one of several undeveloped nations that have chosen this import substitution method, but sadly, it has not worked out for them as they had hoped (Okyere and Jilu 2020a). These shipments generate significant amounts of cash for the administration and foreign currency exchange for the nation (Aryee 2001). The amount of domestic manufacturing, the need for foreign goods, the

manufacturing costs and other variables all affect the quantities and prices of commodity exports and imports (Okyere and Jilu 2020b). Nevertheless, in each instance, the rate of exchange plays a significant role in determining each one of the parameters. The financial standing of a country is influenced by the volatility of the foreign currency (Loloh 2014a). Changes in the foreign exchange rate have a financial impact on consumers, businesses and the government (Adu and Karimu, n.d.). According to the study (*ibid*), exchange rate fluctuation has serious economic consequences which have an impact on firm profitability and growth, the nation's stability and pricing stability. Exchange rate volatility has an impact on a nation's financial system, particularly its stock exchange (Lawal and Ijirshar 2013). Nevertheless, several scholars (Agrawal, Srivastav, and Srivastava 2010) (Wenshwo Fang 2002) (C. K. Adjasi 2009)have different opinions on the matter of whether international currency depreciation affects stock price volatility. Financial economists have been forced to determine the relationship between these two markets in terms of three stages: the Asian Currency Emergencies, the introduction of floating exchange rates in the early 1970s, and financial market changes in the early 1990s (Delgado and Mills 2017). Additionally, the internationalization of capital markets has led to the bridge of stocks and the movement of enormous sums of money between nations (WenShwo Fang and Miller 2002). Consequently, transnational corporations are now intensely interested in exchange rate volatility and how it affects stock price volatility (Mechri et al. 2018). The attractiveness of export industries is decreased by floating currency development, which also has a detrimental impact on the domestic stock market (Bala Sani and Hassan 2018). But for a nation where imports predominate, it might boost the financial markets by lowering costs of production (Kostov *et al.,* 2015).

The trade of securities by public corporations, entities and companies' corporations and the government takes place on the stock market (Iyke and Ho 2018). A key economic entity that significantly influences and predicts a country's economic development is the marketplace. The goal of share market analysis and prediction is to anticipate a company's equity price so that buyers may make well-informed financial decisions (OwusuSarpong, OtchereFianko, and KwabenaAnin 2013). The quest of optimizing return on investment (ROI) has rendered it a crucial objective for money managers, traders, and academics, despite the claim that its prediction is difficult owing to its exceptionally variable and unpredictable character (Nti, Adekoya, and Weyori 2020). As a result, the performance of the share market determines how the industry develops. It is commonly accepted that certain basic macroeconomic conditions, such as bond yields, influence stock values, real GDP growth, inflation, exchange rates, and gross domestic product (Ratih and Candradewi 2020). In developed nations, fluctuations in stock values are related to macroeconomic behavior. Stock prices respond fast to news

releases in an efficient market. This implies that stock price volatility can be a key indicator for gauging a nation's financial strength because it provides solid data on market conditions. As a result, it is possible to assess a country's economic activity using the complex relation between stock price oscillations and macroeconomic indicators (Kyereboah-Coleman and Agyire-Tettey 2008).

The value of a currency is expressed in terms of other forex markets like the Dollars that serve as the purchasing power parity (PPP) and Major Currencies. Most of the times, free markets will determine whether a currency will appreciate or devalue against these currencies (Aryee 2001). It is worthnoting that exporters are impacted by the everyday swings in currency fluctuations, exchange rate fluctuations (devaluation or appreciation) are important in deciding the value of a country's gross domestic product (Nortey et al. 2015). In a similar spirit, researchers assert that global commerce has taken on the role of the primary determinant of economic development and that exporters generally have a far greater significant effect on economic growth than imports do. The factor that helps tradeable and non-tradeable goods, trade balance, and the relative utilization of local and imported supplies are all determined by exchange rates, according to research (Loloh 2014a). The researcher indicated that the relative profitability of tradeable and non-tradeable goods, exports and imports, and the relative utilization of domestic and international inputs are all determined by currency exchange (Sarpong, Mohammed, and Nketiah-Amponsah 2021). Likewise, they contend that successful exporting and the enforcement of programs in the international trade industry could contribute to successful industrial prosperity (Adu et al., 2019).

Each economy encounters inflation on a constant schedule, yet the type, reasons and rate of inflationary increase might vary from one nation to the next. Most of the time, industrialized economies work hard to tame inflation at a moderate level, frequently aiming for a rate of at most 2%. This is because inflation lowers a nation's disposable income and promotes capital consumption and investment while discouraging savings (Abu et al.,2015) Inflation also boosts borrowing costs, lowers living conditions, and increases living costs in a country. Inflation can make local pricing less comparable with those in other nations, impacting export markets and endangering the viability of domestic enterprises (Osei 2015). If it is not stopped, it can result in hyperinflation, which is an increase in inflation that exceeds 100%. Rational economic actors and agents would not want to be in this scenario because of the numerous unfavorable consequences that increased inflation has on the national market and sustainable development. What generates inflationary circumstances is the main issue in this situation (Berganza and Broto 2012). There have been numerous instances of civilizations experiencing inflation, for which different scholars have offered different justifications. They try to describe what causes

inflation, although the reasons can differ from market to market. Many economic indicators, including the demographic, the broad creation of money, oil prices, and currency value, are thought to have an effect on inflation in Ghana (Akinbobola, 2012).

Recent research has identified several factors, including external, domestic, and accommodating policy in the form of an exaggerated increase in the money supply, that support abrupt increases in inflation in emerging nations. External influences include the increase in global inflationary pressures. Because the majority of emerging economies import a sizable portion of their food, an increase in global food costs will inevitably increase domestic food prices. Given that food makes up a sizable amount of the average typical household grocery budget in many nations, an increase in domestic food prices leads to an overall increase in price. Similarly how domestic prices are affected nearly immediately by global energy price shocks like the price of oil (Osei 2015)..

According to the study, economic expansion is defined as a rise in the real gross domestic product (GDP). Gross domestic GDP has been inflated-adjusted. Utilizing multiple regression analysis models, the researcher looked at how military spending affected the productivity expansion of Sub-Saharan African nations. They concluded that military spending has a detrimental effect on economic expansion. His stated findings, nevertheless, were poor and did not support his policy conclusions after a modification of his methodology, which revealed that the defense burden/growth rate multiplier's computed value is not statistically meaningful. The argument about the relationship between aid and growth has gained steam. They focused on a topic that has gotten less attention in Sub-Saharan Africa: the influence of the macroeconomic policy environment in the aid-growth nexus (SSA) (Antwi et al. 2013a). Ghana's fiscal and monetary policies are designed to maintain high growth rates of GDP and low inflation through market stability. A high single inflation rate average seems to have been Ghana's goal. As a consequence of the economy's strengthening, the Bank of Ghana's monetary policy committee (MPC) decreased its policy rate from 13.5 percent to 13 percent on May 15, 2011. It was anticipated that this would lead to a decrease in the commercial banks' risk premium and, as a result, lower borrowing costs. A cross-sectional sample of data from 1960 to 1995 is examined by the researcher, including a five-year sample calculation on bank loan extensions to the private sector, the number of bank liabilities existing, stock market valuation and trading strategies, and inflation (Agalega and Antwi 2013).

Although there has been a continuous increase in global commerce, concerns were also voiced about the impact of exchange rate changes on the trade of goods and exports and imports operations. After the Bretton Woods Agreement failed in the early 1970s, many governments (both developed and developing) began to take a keen interest in exchange rate

fluctuations. In this arrangement, all the other currencies were tied to the dollar as the national currency, and a fixed exchange rate regime was used to try to achieve gold parity (Akinbobola, 2012).

Additionally, a study indicated that exchange rate volatility had a greater impact on export-oriented enterprises' productivity improvement than it did on other sectors of the economy or industries. It is acknowledged that a country's economic accessibility contributes to the market's volatility. Ghana serves as a prime illustration of an open economy that conducts international trade. Additionally, due to globalization and the resulting increase in import and export flows, emerging economies are more connected in purely economic terms. No exception was Ghana. A quick review of Ghana's historical foreign exchange rates reveals a high degree of volatility. The main objective of the research are stated as follows:

- To determine the inflation rate due to supply chain reaction.
- To determine the effect of Ghana economy due to exchange rate changes
- To measure the change of inflation and volatility using GARCH, Autoregressive distributed lag co-integration.

RELATED WORKS

The (Mohammed, Mohammed, and Nketiah-Amponsah 2021) proposed the paper on Exchange rate volatility and interest rates are related to one another Ghanaian evidence which provide the impact of lending rates on Ghana's currency rate volatility is examined in this essay. It investigates the long-run and short-run interactions among the variables using the Quart Time Series database covering 2000 Quarter 1 through 2017 Quarter 2, the Autoregressive Distributed Lag model, and the Vector Error Correction Model. The findings demonstrated that the central bank's monetary rate, inflation, the supply of money, and the market index of the Ghana Stock Exchange were all observed to have an impact on exchange rate volatility in the long-term model. Nevertheless, it was discovered in the short-run model that the policy rate of the Central Bank and the exchange rate's historical values had a considerable impact on volatility. The findings of this study have several policy-related ramifications (L. A. Asamoah, Agana, and Sakyi 2016). First, as demonstrated by various research on lending rates in Ghana, the favorable impacts of the Bank of Ghana policy rate on exchange rate changes in the short and long terms add to the case for interest rate management. This means that maintaining lower funding interest rates is now a must, not just a call, to reduce exchange currency volatility. Secondly, the Central Bank must take action to reduce inflation expectations given that both

inflation and the supply of money have a long-term impact on exchange rate volatility (Mensah, Ofori-Abebrese, and Pickson 2016).

The research on exchange rate volatility's effects on nigeria's inflation proposed by (Nuhu 2021) r present the annual data for the period spanning the years 1986 to 2019 to assess the impact of currency rate volatility on inflation in Nigeria. To determine the long-term influence of exchange rate volatility on inflation, the research used the generalized autoregressive conditional heteroskedasticity (GARCH) and vector error correction model (VECM). The consumer cost index was used in the research as a stand-in for inflation, with money supply (MS), import (IMP), a nominal exchange rate (NER), and export (EPT) serving as the research's independent factors. The outcomes of the test of normality revealed that the model had mixed cointegration, and the co-integration boundaries test verified that the variables have a long-term relationship. Results demonstrate a significant positive relationship between the money supply (MS) and nominal effective exchange rate (NER) and the consumer cost index, demonstrating that both factors contribute to inflation in Nigeria (Lawal and Ijirshar 2013). According to the research's conclusions, the reserve bank must regulate the expansion of the money supply to keep inflationary to a barest minimum. This study looked at the impact of currency rate volatility on inflation in Nigeria from 1986 to 2019. According to the Vector error correction model findings, the supply of money (MS) and nominal effective exchange rate (NER) had a significant and positive effect on Nigeria's inflation rate throughout the study. The consequence of this discovery is that Nigeria's increased inflation can be fueled by an expansion of the money supply (Danmola 2013).

The changes in the RMB real exchange rate and structural change proposed by (Gong 2022) shows the subset of network distortions when adopting PPP as the optimum real effective exchange rate measuring standard because of the macroeconomic variables. Throughout this study, the optimum value of the RMB or yen real effective exchange rate is re-estimated using annual financial periodicity information recorded since 1994, taking into account demographic changes and a weaker Balassa-Samuelson effect, and the mismatch of the RMB real effective exchange rate is measured (Jiang 2014). The observational findings demonstrate that the behavioral equilibrium currency exchange prototype is a sensible approach employed for the true RMB exchange rate at balance and that during the study period, the real RMB rate of exchange was stable. Demographic characteristics are also significant in influencing the real RMB exchange rate at balance. The RMB's exchange rate and China's economic development project are closely tied. The balassa-samuelson impact is a significant supply-side aspect that influenced the real effective exchange rate level. The nation attributes component is a crucial factor to take into account when utilizing the BEER model for estimating the exchange rate of emerging markets (Hua, Sun, and Wang 2015). Due to the unique economic status of China's

emerging market economies, there seems to be an excess of the labor force in remote regions, which restrains income growth and weakens the balassa-samuelson impact, which in turn restrains the exchange rate. The increase in pay rates would be further represented in the appreciation of the real effective exchange rate after the gradual elimination of China's demographic transition and the basic spending of the excess rural labor force (Mikhaylov 2018).

Effect of oil price volatility on sub-Saharan Africa's trade balance proposed by (Forson et al. 2022) offers a wealth of information on how crude price fluctuation affects nations' balance of trade. There has been little research on how the fluctuation in oil prices affects the balance of trade in sub-Saharan Africa (SSA). Utilizing the estimation method from the Pooled Mean Group and Common Correlated Effects Pooled Mean Group for the years January 2004 to December 2017, we investigate in this study how the fluctuation of crude prices affects the trade deficit between 34 SSA nations. Researchers discover that fluctuations in crude oil prices have a detrimental impact on the trade deficit of Sub - Saharan countries (Akinlo and Apanisile 2015). They also show that important transmission routes for the influence of oil price shocks on the balance of trade include inflation, borrowing costs, and exchange rates. To lessen the relationship between oil price volatility on the balance of trade, researchers advise authorities to both hedge and use valuation strategies (Korley and Giouvris 2022). Once more, nations should implement an inflation-targeting system to guarantee the constancy of the average level of prices. Lastly, to lessen the effects of oil price fluctuation on their balance of trade when the exchange rate is factored into the equation, the financial institutions of the individual nations must use a mixture of intervention in the foreign exchange market and adjustments in lending rates (Allen and Giovannetti 2011).

A comparison of Turkey, Peru, and the United States' dollarized economies' gold, inflation, and exchange rates proposed by (Sui, Rengifo, and Court 2021) presents the trading partners studied in this article—Turkey (which has a high dollarization rate), Peru (which has a low dollarization rate), and the United States—are used to perform a thorough empirical analysis of gold's ability to hedge against inflation and exchange rate volatility (benchmark). Researchers discover that gold could provide coverage against currency fluctuations and inflation fluctuations at all points of time for Turkey and the United States, but underperformed to do that during Turkey's hyperinflation time frame (Remzi and Tiwari 2022). In Peru, precious metals are a good hedge if the transition of CPI is over 3.29 percent or the currency depreciation percentage is just above 3.24 percent. Researchers demonstrate that the assumption that gold protects against hyperinflation or fluctuating currency rates is related to both the state of the gold market and the type of macroeconomic shocks Furthermore confirming gold's value in portfolio risk managers in order of return compounding and risk

reduction compared to a currency-only transaction, researchers incorporate the QQCOR findings into a portfolio hedging approach (Tiwari 2022).

METHODOLOGY

The research is based on the supply chain reaction to inflation and exchange rate volatility in Ghana. The following section provides the detail description on the micro and macro economic indicator which represents the growth of the economy. The section start with the data collection and goes down with descriptive analysis which is performed using the regression analysis. Next to the descriptive statistical analysis of the inflation and exchange rate in Ghana economy ia analyzed based on their parameter and empirical identification. Finally, the inflation rate based on supply chain reaction and the exchange rate volatility is presented.

Data collection

For the analysis of supply chain reaction to inflation and exchange rate volatility several data based on the economic condition of Ghana is combined. From the research of the (Agrawal, Srivastav, and Srivastava 2010) exchangr rate and stock market volatility data were collected. The research done by (OwusuSarpong, OtchereFianko, and KwabenaAnin 2013) provides the data on supply chain management in industries. Exchange rate on volatility is taken from the study proposed by (C. Adjasi, Harvey, and Agyapong 2008). Even more data were collected from the open source network such as world bank (https://data.worldbank.org/country/GH), Ghana Economy, GDP inflation, CPI and interest rate (https://www.focus-economics.com/countries/ghana) and Ghana GDP -2022 data (https://tradingeconomics.com/ghana/gdp).

Descriptive statistical analysis

Descriptive or analytical methods were used to analyze the data. Descriptive statistical analysis has been used to evaluate numerical results and find patterns within the data set when using a qualitative approach. The material in the dataset is typically summarized by statistics utilized to characterize data by revealing the typical indications of the factors employed in this study. A linear regression modeling is being used for the statistical analysis to forecast the actual value of dependent parameter b for a vector of independent factors $a = a_1, a_2, \dots a_n$. The following equ (1) presents the linear regression design:

$$f(b_u) = \delta_0 + \sum_{t=1}^{n} a_u \delta_u + \gamma_u \qquad (1)$$

Where a and b are the independent and dependent parameter, whereas γ denotes the error term and δ denotes the estimated variable respectively. The given data presents

$(b_1, a_1), \ldots, (b_n, a_n)$ coefficient $\delta = (\delta_1, \delta_2, \ldots, \delta_n)$. The maximized Residual Sum of Square is presented in the following equ (2):

$$RSS(\delta) = \sum_{u=1}^{n}(b_u = f(a_u))^2 \qquad (2)$$

If the given independent variable is conditionally independent, then the independent variable b_u could be written as follows in equ (3):

$$RSS(\delta) = (b - a\gamma)'(b - a\gamma) \qquad (3)$$

Hence the final equ (4) presents the value of γ:

$$\hat{\delta} = (a'\,a)^{-1}\,a'b \qquad (4)$$

Equation 4's left side shows how the predictor variables change when the independence assumption is changed by one unit. Numerous econometric techniques could be used to determine the parameters of economic connections using statistical records following the (Gauss-Markov theorem). However, it's been found that the OLS approach is the most frequently utilized method for identifying five distinctive traits. These include the fact that the estimated coefficients produced by OLS have some ideal qualities, the developed system is very straightforward when contrasted to other empirical studies, and the parameters are reasonable. Additionally, with generally satisfying results, this approach has been applied to a wide variety of economic connections, and it is a crucial part of the majority of other empirical studies (D. Asamoah, Abor, and Opare 2011).

Inflation and Exchange Rate in Ghana

The Ghanaian economy has historically been vulnerable to external shocks due to its small size and strong dependency on the foreign sector and low domestication, making changes in currency trading a crucial component of economic stability. During Ghana's freedom, there have been numerous regime changes affecting the foreign exchange market, including several periods of restrictions and liberalization that were frequently related to the decade's economic circumstances (Maka 2013). The economy generally ran on a fixed exchange rate system before the economic reforms in 1983, especially between 1972 and 1982, where the exchange rate remained steady and was susceptible to exchange restrictions, rare devaluations, and monetary inconvertibility. Around 1983 and 1993, a series of measures were carried out in response to periods of subpar management of the economy and macroeconomic conditions (Monastyrnaya et al. 2016). These include Financial Sector Program, the Structural Reform Training course, and the Financial Treatment Program. These restores' main objectives were to liberalize the economy and move it in the direction of a market-oriented one. One of these reforms is the gradual shift from a controlled to a liberalized foreign exchange market. According to previous research, the sequence of exchange rate policy changes in the post-1983 era

included "a step-by-step depreciation in 1983–1986; the presence of foreign exchange bidding; the legalization of the concurrent exchange market along through presence of new exchange agency; and the institution of an interbank market in 1992. (Sanusi 2010)" Before the changes, the currency rate was a significant political tool since it could have a negative impact on politics. The degree of politicization of nominal exchange rate fluctuations so decreased by the early nineties after the gradual shift to a floating exchange rate system, even though it continues to have an impact on the political results of Ghanaian administrations (Adom et al. 2015).

In the years after the change, the forex economy's functioning hasn't exactly been stellar. Before the 1990s, the national currency exchange between the Ghanaian cedi and the US currency has consistently declined, with sporadic periods of appreciation mentioned in Figure 1. The average annual depreciation in the nominal exchange rate (cedi-dollar) was 29% from 1990 to 1999; 17% from 2000 to 2009; and 10.1% from 2010 to 2012. (IMF, 2013) (Ahiabor 2013). The trade-weighted efficacious exchange rates, and in this instance relate to the weighting factor of the Cedi's currency rate with the currencies of the major trading partners, also show a similar tendency and the general trend of the cedi's devaluation may be seen in both the national real effective exchange and real effective exchange rate. Organizations are required to do so in agreement with the predetermined criteria to implement these margins efficiently (Procurement Digest, 2013). This research sought to investigate the degree to which preferred treatments are granted to SMEs in Ghana due to research gaps about the existence of favorable treatment for SMEs in Ghana from the perspective of public purchasing (Ngmertey 2019).
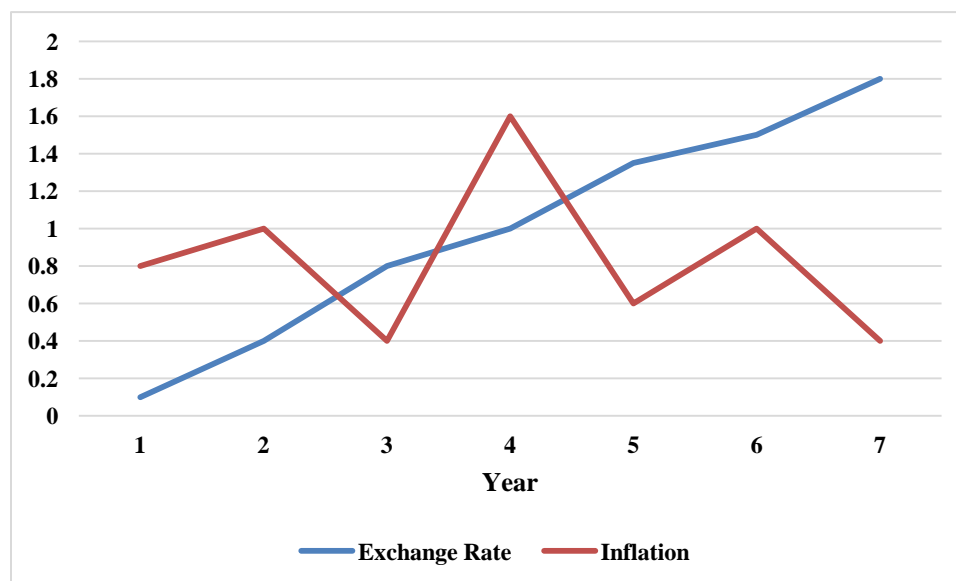

Figure 1: Exchange Rate and Inflation Evolution in Ghana
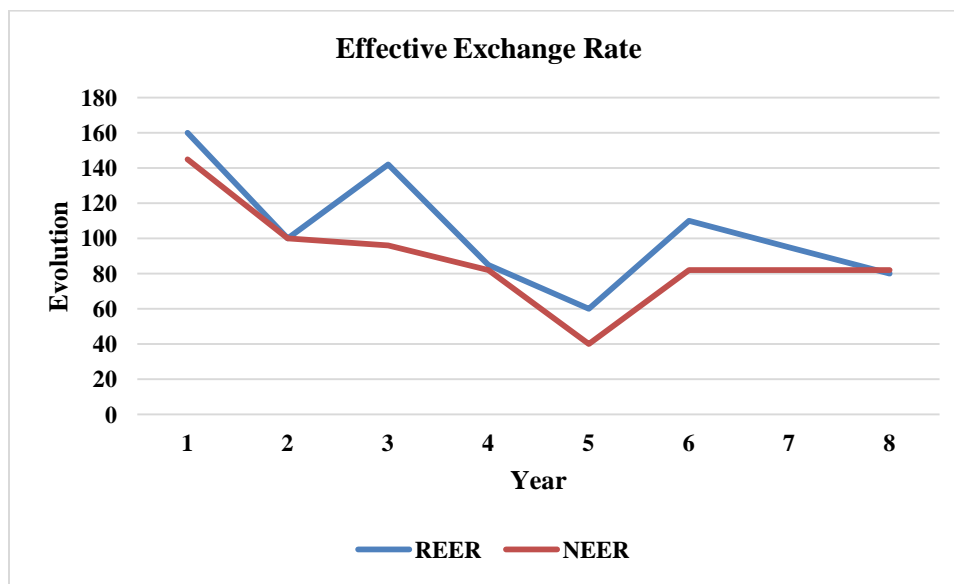
Effective Exchange Rate

Figure 2: Effective Exchange Rate

Nevertheless, after taking into consideration the relative cost seen in Figure 2, the REER exhibits some event of appreciation in contrast to the NEER. Substantial variations in domestic rates comparable have also been seen during the time, despite an overall drop. Table 1 illustrates how average annual inflation decreased from 48.5% in the 1990–1999 period to 18.6 % in the 2000–09 period and further to 9.3 % in 2012.

Table 1: Economic Factor Variation

Factors	1979	1989	1999	2009	2010	2011	2012
GDP Growth	1.3	2.5	4.5	5.5	8.1	15.2	7.8
Real GDP Growth	-0.6	-1.5	1.7	2.9	5.6	12.5	5.5
Debt %	18.3	22.8	64/6	62.8	46.5	43.9	50.3
Inflation	38.7	48.5	27.7	18.6	10.8	8.8	9.3

Source: World Bank (2014)

Parameter Identification

Economic expansion, as per the earlier study, is the degree of change in the workforce from one quarter to the next. The U.S. Secretary of Commerce's Bureau of Economic Analysis defines it as the rate at which the industry could generate and fill new positions. To achieve a continuous rise in economic income, economic expansion refers to the long-term (year-to-year) expansion in the human resources' potential to offer extremely diversified products and services

by putting more of a country's population overall into job channels (Precious 2020). The choice of an appropriate export diversification design is determined based on theoretical factors. The analysis looks at how to export diversity in Ghana is impacted by exchange rate volatility. The structural equation f, which is given by, describes Ghana's export competitiveness as a vector of import tariffs broadly utilized trade flows, exchange rate volatility, public spending on infrastructure, loans to the private industry, and Gross domestic product growth (Loloh 2014b).

$$EP = f(TR, GDPG, EXV, GE, CPS) \qquad\qquad (5)$$

In the above equ (5) Tariff Rate is represented as TR, Gross Domestic Product Growth is represented as GDPG, Exchange Rate Volatility is represented as ERV, Credit to Private Sector is represented as CPS and Government Expenditure is represented as GE.

Empirical Specification

The research produced a model that improved the models employed by other studies and showed that export production was logically tied to the economic growth rate and several macroeconomic factors. The specification of the econometric models for this study takes into account the variables raised, and it departs slightly from previous research (Oseni 2016).

By controlling for GDP Growth (GDP), Tariff Rate (TR), Inflation Rate (INF), Credit to Private Sector (CPS), and Government Expenditure on Infrastructure (GE), it was possible to investigate the dynamic relationship between export efficiency and some macroeconomic determinants. Exchange rate volatility (EXV), which is not an economic variable, was also computed (created) and included in the framework. Equ (6) below shows the functional framework specification:

$$EP = f(GE, CPS, TR, EV, GDPG) \qquad\qquad (6)$$

Four (4) models in total were calculated. Models 2, 3, and 4 used the export competitiveness of the farming, service, and industry sectors as their response variable, whereas Model 1 used the overall trade efficiency as their predictor variable. Equation (7), which expresses the experimental description of model 1 reflecting the connection among export competitiveness, exchange rate volatility, and other selected variables, is obtained by converting the factors in equation (6) into logs (Nchor, Darkwah, and others 2015).

$$\ln EP_t = \delta_0 + \delta_1 \ln GE_t + \delta_2 \ln CPS + \delta_3 \ln TAR_t + \delta_4 \ln GDPG_t + \delta_5 \ln EV_t + \varepsilon_t \qquad (7)$$

In a similar context, the empirical relationships for models 2, 3, and 4 are provided as follows and estimate the impact of exchange rate fluctuation on Ghana's primary economic sectors (Kyereboah-Coleman and Agyire-Tettey 2008).

Exchange Rate

The rate at which one currency is traded for another one is known as the exchange rate. Every time one of the two constituent currencies' rates adjusts, the market-based rate of exchange also shifts. When there is growing pressure for money then there is a supplier, and that money tends to appreciate. When demand is lower than supply, it loses value (although this does not indicate that people would no longer want the devalued dollar; rather, it only means that they would rather store their assets in another kind, potentially another monetary system). Fiat exchange becomes more affordable with a high exchange rate, which lowers the cost of imports (Akinbobola 2015).

Exchange Rate Volatility

Exchange rate volatility, the main component of relevance, does not prove to be more effective. Thus, it was estimated. Since the rate of exchange might exhibit volatility at periods, the concept of uniform variation is incorrect, and ongoing and continuous models cannot account for some crucial aspects of exchange rate-related consequences. Hence, it is suitable for examining real exchange rate volatility using capabilities that help the variance to be affected by its history. In the research, different strategies have been taken to estimate exchange rate volatility (Omari-Sasu et al. 2015). These methods include the time series technique, the standard deviation technique, and Bollerslev's Generalized Autoregressive Conditional Heteroscedasticity (GARCH). The GARCH (1,1) system, which is described in equ (8) below, is one of several variations of the GARCH design that this study chose to use. This is due to its economy and capacity to absorb variability in the majority of time series (Adu Jack, Okyere, and Amoah 2019).

$$\Delta(lnRER)_t = x_1 + \delta\Delta(lnRER)_{t-1} + e_t \qquad\qquad (8)$$

The research took into account Generalized Autoregressive Conditional Heteroscedastic (GARCH) models, which permit time-dependent error deviations. However, it was crucial to conduct a test to determine whether a time-varying predicted response (ARCH Effect). If there is an indication of heteroscedasticity, the GARCH design can be used to estimate the sequence. The GARCH framework won't be suitable for usage if the results show that there is no ARCH Impact, or in other words, the opposite (Owusu-Ankamah and Sakyi 2021). Mean equ (8), which describes changes in the real effective exchange rate, RER, as a proportion of its dependent variable, is the first step in the GARCH (1,1) model development. The standard error e_t, has a normal distribution with a variation d_t and zero mean. The GARCH (1,1) hypothesis of relevance is then specified using the volatility as shown in equ (9):

$$d^2{}_t = x_2 + \mu e^2{}_{t-1} + \delta d^2{}_{t-1} \qquad\qquad (9)$$

where the log difference of the real effective exchange rate from t to t-1 is represented as $\Delta(lmRER)$, the variance of the error term e_t is presented as d_t and the ARCH term is represented as $e^2{}_{t-1}$ and the GARCH term is defined as $d^2{}_{t-1}$.

The variance equation above comprises one GARCH term ($d^2{}_{t-1}$) and one ARCH term ($e^2{}_{t-1}$). The dependent variable (d_t), the lag of the squared error term (ARCH effect), and conditional volatility (GARCH effect), δ and μ accordingly, are used to express the conditional distribution (Omari-Sasu et al. 2015). Both are used to represent the estimated volatility. While a high GARCH coefficient indicates that disturbances to conditional variance take quite some time to die out, thus suggesting that volatility is durable, a high error correlation means that volatility reacts fast to internal movements. The variance equation's coefficient ($\mu + \delta$) indicates strong persistence in volatility and suggests market inefficiency if it is very near to one. Ghana's EXP position is anticipated to suffer as a result (Luguterah, Akumbobe, and Yaan 2015).

In the table 2, findings imply that the exchange rate implements a GARCH (1,1) approach because it was the most reliable. Equations (10) and (11), which are derived from the outcomes, specify the mean and variance equations, accordingly.

$$REXR = 0.5253 + 1.033REXR(-1) \qquad\qquad (10)$$

$$d_t = 0.127 + 0.77003e_{t-1}{}^2 + 0.2154 \qquad\qquad (11)$$

Table 2: Real Exchange Rate Volatility

Parameter	Co-efficient	SE	Statistics	Probability
Con	0.5354	44.4088	0.1335	0.0138
RER	1.0335	0.0089	114.4052	0.0016
Variance				
ARCH	0.1276	3.7545	3.8719	0.0032
GARCH	0.7704	0.4885	1.5775	0.00148
R^2	0.892330		Mean dependent variable	0.06789
Modified R^2	0.782051		SD dependent variable	0.31236
Regression based on SE	0.152393		Akaile info criterion	-1.88828
Squared residual sum	0.435679		Schwarz criteria	-1.9903
Log-likelihood	-13.6321		F-statistic	5,385.319
Durbin Watson Statistic	1.841104		Probability	0.000012

A valid definition of conditional volatility, which is statically important at the 1% level, is indicated by the conditional volatility equation's conclusion, which shows that average from equation (8) is positive. The outcome also demonstrates that the prior forecast mistake and volatility data, as evaluated by the lag of the squared residual from the mean equation (ARCH term), are both positive (Techie Quaicoe et al. 2015).

Inflation Rate

From 1990 to 2018, Ghana experienced high rates of inflation, with annual rates reaching over 20 percent and varying from a peak of 60 percent in 1995 to a low of 7 percent in 2012. Apart from 2011, 2012, and 2018, which registered single-digit levels, these sporadic rising incidences are signs that the living costs seem to have been quite high for typical Ghanaians. The Ghanaian company employs a monetary policy strategy to lessen the effects of high inflation of above 8.5% inflation objectives on the industry (Ahiabor 2013). By switching from using the exchange rate as the inflation control aims to the use of inflation targets, the Central Bank's management of the supply of money has experienced a metamorphosis. The primary objective of Ghana's monetary policy has changed from the employment of direct instruments to a market-based strategy. The yearly average inflation rate in Ghana from 1990 to 2001 was 27.8 percent before the country introduced monetary policies policy (IT) in 2002. However, from 2002 to 2018, the annual average inflation rate decreased to 13.8 percent, with the least being 7.2 percent, when the Bank of Ghana implemented inflation targeting (IT) as a monetary policy mechanism to manage inflation. This demonstrates that the adoption of IT as a tool for financial regulation has resulted in a slight improvement in inflation. Such numbers still need to be improved, though, as they are significant (Gritli 2021).

A consistent and noticeable increase in the average cost of goods and services within an industry is referred to as inflation. The value of money, or its buying power, fluctuates along with prices. An industry will often be stimulated in a country that places a strong premium on lowering unemployment to boost income and create jobs. The local currency's value may decline in comparison to other currencies as a result of this activity (Chiaraah and Nkegbe 2014). Employment growth is anticipated to expand dramatically when inflation is very high. When incomes rise, the demand for produced goods rises along with it, leading to business expansion and the creation of more jobs. As a result, a positive correlation between the inflation rate and economic growth is anticipated. This variable's definition refers to the Consumer Price Index's percentage change (CPI) (Peprah, Mensah, and Akosah 2016).

Economic and financial indicators are contrasted across two points in time. When considering the average inflation rate from 2002 to 2018, the average inflation rate from 1990 to 2001 decreased by 50%.

Average crude oil prices rose by 456% on average throughout this time, while the broad money supply climbed by 7400%, the exchange rate went up by 848%, government expenditure went up by 6233%, and the populace went up by 44%. This contrast aids in understanding how each variable changed following the 2002 introduction of the inflation targeting program (Nchor, Darkwah, and others 2015). The study sheds light on the recurring policies and programs that, under several administrations of administration since 1990, forced such economic shifts. It is demonstrated that Ghana's early 1990s economic realities encouraged the government to use fiscal and monetary policies to help mitigate the severity of inflation, which had favorable impacts on economic growth (Keshtgar, Pahlavani, and Mirjalili 2020). These policies included the execution of an economic expansion program including the use of inflation targeting as monetary and fiscal policy. It was mentioned that the World Bank and IMF's participation was crucial to Ghana's economic recovery and its move into middle-income status (Techie Quaicoe et al. 2015).

Interest Rate and Gross Domestic Product

Interest rates are referred to as the cost of capital by Colander. Interest rates are subject to change based on the preferences of investors due to changes in the time frame, level of risk, and processing fees related to various investment products. It is anticipated that an increase in interest rates will impede job development.

The primary indicator of national accounts, which summarises a country's financial environment, is gross domestic product (or region) (Abasimi et al. 2018). The outcome approach, the spending approach, and the income capitalization may all be used to compute it. Instead of utilizing market exchange rates to transform GDP statistics in exchange rates into Buying Power Standards (PPS), Purchasing Power Parities (PPPs) that represent each currency's spending power could be used. This eliminates disparities in price levels among nations. Estimating the gross national income, includes the earnings of all families, governmental organizations, and the private sectors and performs a statistical measure of the investment rate of an economy (Antwi et al. 2013b). This study used an expenditure technique to determine GDP. The multiple regression model's general structures are defined in the following Equ (12):

$$EG_u = \delta_0 + \delta_1 ER_u + \delta_2 \text{IFY}_u + \delta_3 IR_u + \delta_4 \ln GDP_u + \gamma_t \qquad (12)$$

RESULT AND DISCUSSION

Table 3 and Figure 3 display the descriptive and inferential statistics for the factors utilized in the analysis. For the studied period, the mean employment rate of percent growth is 1.8, with a standard error of 1.0238. According to the findings, Ghana's manufacturing industry saw an average increased employment rate of approximately 2%, which is quite low when compared to the rate of population growth and the pace at which higher education institutions are graduating students.

Table 3: Regression Model Descriptive Statistics

Parameter	Employment Growth	Exchange Rate	Inflation Rate	Interest Rate	Gross Domestic Product
Total	1.91	0.66	22.61	32.7	0.00412
SD	1.03	54.26	12.85	7.79	0.00325
Max	4.81	2.17	59.51	59.51	0.00899
Min	1.11	0.33	10	10	0.00057

Additionally, the low standard deviation of 1.0238 indicates that the growth rate throughout the time is around typical. With a standard deviation of 0.00326, the average Gross Domestic Product (GDP) for the period is 0.00410625 billion cedis. As a result, there is relatively little variation from the mean over the different years. With a standard deviation of 12.8423 and an average rate of inflation of 22.6 percent, the observational values are largely consistent with our estimate.
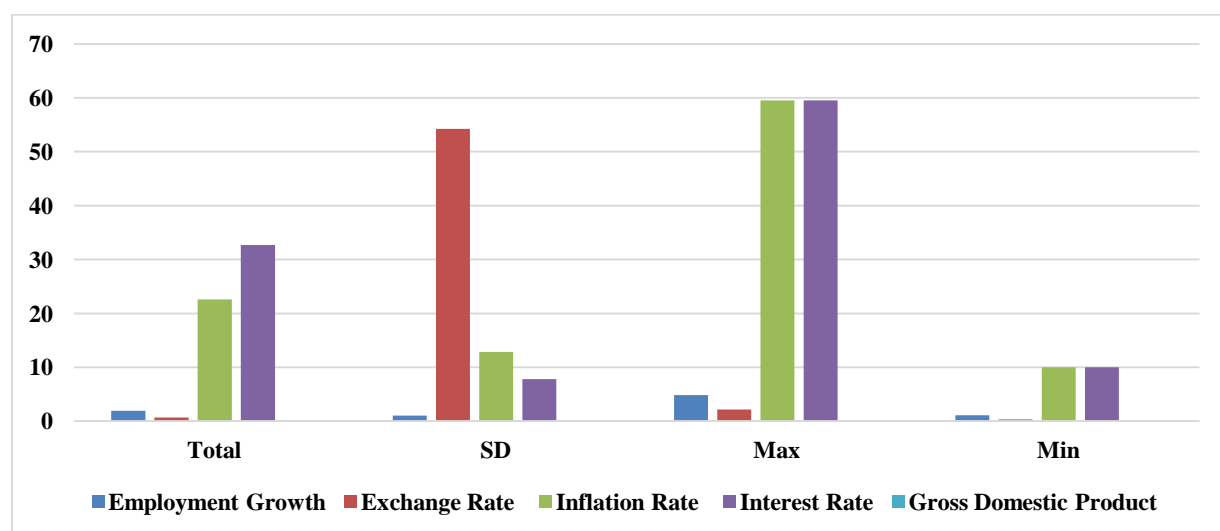

Figure 3: Descriptive Statistics of Gross Domestic Product

The large standard deviation indicates that the mean inflation rate of 22.6 percent was only attained just several years ago. On either side, over the period under consideration (1990–2010), the mean mortgage interest rate or return on capital from the traditional financial sector is 32.671 percent, which is distributed at 7.776. The limited variance suggests that in the majority of the period of analysis, the interest rate was close to the fairly high mean interest rate of 32.7%, which could have adverse effects on production enterprises' ability to finance to boost sales and create jobs. Due to its lack of security, the exchange was very volatile throughout that time. The mean rate of exchange for the time was 0.66 cedis for every dollar majority reported in America (USA). For the time frame, the rate of exchange had a fairly greater variance of 54.26.

The correlation method was done to analyze the link between Employment Growth (EG) and the independent variables. The findings of the relationship study are shown in Table 2. The findings indicate a substantial beneficial link between employment growth and Gross domestic product, suggesting that employment growth rises in tandem with rising GDP and vice versa. However, a correlation test between employment growth and exchange rate showed a statistically significant but adverse link. Therefore, an exchange rate appreciation tends to slow the expansion of the labor force, and vice versa in Table 4. In which the significance at 1% is represented as ***, 5 % is represented as ** and 10% is represented as *.

Table 4: Parameter based on Correlation Matrix

Parameter		EG	ER	IF	IR	GDP
EG	Pearson correlation	1	-0.487**	0.345	-0.036	0.575**
	2 tailed	-	0.026	0.125	0.881	0.008
	N	22	22	22	22	22
ER	Pearson correlation	-0.489**	1	-0.348	-0.158	-0.755**
	2 tailed	0.026	-	0.122	0.497	0
	N	22	22	22	22	22
IF	Pearson correlation	0.345	-0.350	1	0.475*	0.599**
	2 tailed	0.125	0.122	-	0.031	0.05
	N	22	22	22	22	22
IR	Pearson correlation	-0.036	-0.158	0.475**	1	0.394*
	2 tailed	0.881	0.495	0.031	-	0.079
	N	22	22	22	22	22
GDP	Pearson correlation	0.575**	-0.754***	0.599**	0.394	1
	2 tailed	0.008	0	0.005	0.079	-
	N	22	22	22	22	22

The association between inflation and employment growth is favorable. However, there is no statistically significant relationship. Conversely, the link between interest rates and employment levels is negligible yet considerable.

A one-way causal relationship runs from inflation to the exchange rate in the near term. It follows that while fluctuations in the currency rate are Granger caused by inflation, the opposite is not true. Additionally, there is a causal relationship in both directions between inflation and government spending as well as between inflation and population. Therefore, both inflation and population growth are Granger causes, as well as inflation and government spending. As a result, inflation is short-term and determined by demographic and government spending. Therefore, every short-term strategy on government spending and demographic will have a knock-on effect on inflation. Therefore, inflationary policies must be consistent with government spending and population increase.

Multiple regression analysis produced an R^2 value of 0.728. This shows that changes in the independent variable may account for around 73% of all relating to employee development. This indicates that the design variables account for 73% of the variation in (Employment Growth) in the industrial sector of Ghana. This means that additional confounding factors can only explain 28% of the variation in the dependent variable (EG). The F-Statistic was calculated to be 2.245 with a 95 % confidence level, which is statistically significant at the 1 percent level.

The coefficients of the personal independent variables, as seen in Table 5, understand the majority transformation in Employment Growth whenever there is a component transition in the independent variable. This value provides that all the independent variables collectively made a significant contribution to the differences in Employment Growth in the industrial segment. For instance, the coefficient for Exchange Rate (-1.085) suggests if the changes in exchange rates by one unit while all other factors are maintained constant, employment growth in the manufacturing industry will vary by -1.084 units. The negative indication suggests that a 1% exchange rate appreciation would result in a $1.084 10-6$ unit fall in employment levels.

Table 5: Regression Outcome

Parameter	Co-efficient	Standard Error	t-ratio
Intercept	2.699	1.173	2.304
ER	-1.085	0	-0.022
IF	0.016	0.024	0.662
IR	-0.062	0.002	-1.286
GDP	0.189	115.125	1.638
RMSE	0.80	**F- value** 2.246	

In Ghana's manufacturing and services sectors, the relationship between interest rate and economic growth has a t-ratio of -1.285. This demonstrates that rising interest rates have a detrimental impact on employment development. This means that a high rate of interest raises the cost of borrowing and manufacturing, which results in low productivity levels and low employment rates. The interest rate, though, is not statistical significance. If other independent variables are held constant, the figure -0.062 indicates the average difference in Employment Growth when Interest Rate varies by one percentage, indicating that if Interest Rate rises by one unit.

DISCUSSION

This study highlighted a wide range of subpar methods and processes used during the tendering and contract improvement initiatives, which were the root of many of Ghana's public procurement issues. These processes and standards are also where the majority of funding leaks in procurement contracts happen and significant savings might be made. The Public Procurement Act 2003, (Act 663) as amended, which incorporates new rules for the purchase of products, works, and management consulting to be implemented by all Procurement Entities, is now correcting most procedural irregularities. The requirements for standardized tender documentations and standard requests for consultation proposals, which are now being finished, will outline the overarching principles included in the PPA, such as the standards for search and assessment. Additionally, being prepared are standard contract agreements, which will simplify current issues with procurement and payment services, labour protections, and grievance redressal. There should be no opportunity for misunderstanding by procurement practitioners in the use the procurement manuals and other standardized procurement documents.

To assess the growth of the economy, it is necessary to know the import and export data and the tender deals among the countries and there could be a lot of issues in maintaining the terms and conditions among the country. Thus, to overcome these types of problems the procurement act was developed. Hence, in this research, macroeconomic statistics from the ten years between 2010 and 2020 were used. The datawas gathered from the Ghana Statistical Services, World Bank development indices, and information about the state of the Ghanaian economy based on the Procurement Act (Peprah, Mensah, and Akosah 2016). At a 5% threshold of significance, the foreign aid indicator has a negative sign and is significant statistically. If all other factors remain constant, a one percent increase in foreign aid will result in a 0.038 percent decline in real GDP per capita. This suggests that, over time, foreign aid does not significantly or statistically significantly affect Ghana's real GDP per capita growth. This

finding contradicts hypothesis and confirms research by Lloyd, Morrissey, and Osei (1973), Gupta (1975), and Papanek (1973). (2001). However, the outcome is in line with a number of studies conducted in poor nations, including those by Griffin and Eno (1970) and Voivdas (1973) (Antwi et al. 2013b).

According to prior instances, Ghana does not appear to have any laws (or legislations) that are particularly tailored to SMEs in terms of public procurement. Despite this, Procurement Act focuses on the margin of preference, which is a particular allowance or treatment granted to local suppliers, contractors, and consultants over their overseas rivals when bidding for the same commodities, works, and activities. It is presented as a proportion of the agreement's significance (Peprah, Mensah, and Akosah 2016). These margins, which are given to locally registered businesses during the assessment stage, are intended to offer local construction companies a competitive advantage over those from other countries. This rule shall be followed whether the business is completely owned by Ghanaians or a joint venture with a foreign partner (Owusu 2020).

For the first time, changes in inflation could fully account for all other changes. Inflation changes over in the second overtime were accounted by changes in the money supply (0.79%), exchange rate depreciation (1.19%), and inflation innovation itself (96.75%). Less than 5% of the second period's inflation change was accounted by the breakthroughs in the other explanatory factors. While the new technologies in the rates in different itself decrease over time, the significance of the unpredictable discoveries of the endogenous variables on inflation increases (Chiaraah and Nkegbe 2014). The data from the Procurement services department provides the entire supply chain participants in the supply of goods and services to public procurement entities. Nevertheless, the main factors of interest, fluctuating exchange rates, and the relationship between economic growth (tariff rate) have adverse long-and short-term impacts on Ghana's import and also sectoral exports hence the effect on inflation and exchange rate.

CONCLUSION

Ghana's high rates of inflation have led to a decline in living standards and an increase in poverty. The administration has formulated multiple attempts to reduce the price of existence by utilizing both fiscal and monetary policies to enhance the performance of life for Ghanaians. However, inflation continues to vary and now exceeds the goal rate of 8%. This shows that the government has failed to achieve its inflationary goals. If the administration can correctly foresee the factors that drive inflation, low inflation below the 8 percent objective can be attained. Due to its effects on the capital markets, particularly the financial sector, exchange rate

volatility has received a lot of attention in finance and economics in both established and emerging nations. The relationship between exchange rate volatility and inflation was shown to have different consequences; a depreciation in the domestic currency improves equity market values. In contrast, it lowers investment growth in the near term. This is consistent with certain empirical research that claims exchange rate depreciation is advantageous for financial markets, particularly when the financial system is situated in an economy that is heavily dependent on exports. The market management team and, to a lesser extent, the facility executive team handle the organizational strategies for purchases, which results in a lack of participation from those involved at the top management of the purchasing process. Respondents indicated displeasure with how things were stored in terms of storage. They did, however, believe that the methods of tracking things are successful. Regarding the topic of service elements that cause delays in the procurement of market logistics, respondents named late payments to suppliers, slow deliveries by suppliers, delays in reviewing bids, and bad supply officer attitudes. The results of the talks indicate that while the supply chain's operations and those of its connected components can adopt environmentally preferred practices to have a good contribution to the environment, the activities of the energy sector harm the environment. Policymakers and management should follow the recommendations to address the issue in mining businesses with a more thorough focused approach and devise precise strategies for implementing a green supply chain strategy. From the foregoing conclusion, it can be inferred that exchange rate volatility has an impact on job growth in Ghana's manufacturing sector. One of the root factors of the weak job development in the industrial sector of the economy is the deteriorating value of the Ghanaian cedi. So, governments and bankers should work together to boost economic growth by using the interest rate as a tool.

Further studies could explore the precise mechanisms by which exchange rate volatility affects different sectors of the economy, assess the long-term impacts of fiscal and monetary policies on inflation control, and develop more effective strategies for managing procurement logistics and supply chain operations to support environmental sustainability and economic growth.

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