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ARTICLE

Bank Credit and Agricultural Output in Bangladesh: An Econometric Analysis

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ABSTRACT

In this study, the authors tried to identify the relationship between bank credit and agricultural output in Bangladesh. Simultaneously impact assessment of bank credit on agricultural output is also investigated. Different econometric techniques are used to determine the nature of the relationship between bank credit and agricultural output and the impact of bank credit. A total of 40 years (1981-2020) of annual time series data were collected from the Annual Reports of the Bangladesh Bank and World Bank's world development indicators. Stationarity and cointegration tests were performed initially and then analyzed with Vector Error Correction Model, confirming a long-run relationship between bank credit and agricultural output. Additionally, univariate and multivariate OLS models are performed to identify the magnitude of bank credit's impact on agricultural output. Both models revealed that bank credit positively and significantly affects agricultural production in Bangladesh. Based on these findings, the authors recommend additional fund allocation to the agricultural production system by the banks in Bangladesh.

1. Introduction

1.1 Background of the Study

In any developing country, economic and financial activities largely depend on smooth financial intermediation. Banks, as financial institutions, can play a vital role in this regard. Hence, Banks in Bangladesh can contribute to the economic development process through effective and efficient lending. On the other hand, the agricultural sector plays a crucial role in the overall economic development process of Bangladesh. This sector is regarded as the primary source of rural employment and income generation. As a priority sector of the Bangladesh economy, this sector, directly and indirectly, contributed to the industrial and service sectors. Moreover, the agricultural sector has been playing a significant role in fulfilling the nation's food and nutrition demands.

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Given this sectoral importance, Bangladesh Bank has announced agricultural credit as a priority sector lending and mandatorily incorporated all scheduled banks to lend in this sector for agricultural production upliftment.

Every year Bangladesh Bank issues an Agricultural and Rural Credit Policy and Programme for every scheduled bank in Bangladesh. In this credit policy, Bangladesh Bank specified disbursement target, interest rate, loan sanctioning procedure and monitoring process. In Financial Year 2020, the actual disbursement of banks' agricultural credit was 227.5 billion BDT which increased to 255.1 billion BDT in 2021 [1].

The above-mentioned initiatives and indicators regarding the banks' agricultural credit disbursement and credit policy seem satisfactory. Nevertheless, the following research questions should be addressed.

1.2 Research Questions

(i) Is there any relationship between bank credit and agricultural GDP in Bangladesh? If so, what is the nature of the relationship (i.e., short run or long run) between banks' agricultural credit and agricultural gross domestic production?

(ii) Does bank credit significantly impact agricultural output in Bangladesh? If so, what is the magnitude of the impact of bank credit on agricultural GDP in Bangladesh?

1.3 Research Objectives

Hereafter, this study's following research objectives are specified based on the above research questions.

(i) Investigate whether any relationship prevails between bank credit and agricultural output and identify the relationship between bank credit and agricultural GDP.

(ii) Estimate the significance level, effect and magnitude of bank credit on agricultural production.

2. Literature Review

Banks' agricultural credit and other input variables are found positive and significant in explaining agricultural yield in Pakistan at a five percent level of significance [2-4]. A measurable positive and significant impact of agricultural bank credit and other macroeconomic factors on agricultural GDP revealed that banks' agricultural loans to the agricultural sector significantly influence agricultural output in Nigeria [5-8]. In many other previous studies, we found that non-bank agricultural credit positively impacts agricultural output. Agricultural and rural credit had a measurable positive impact on agricultural output in India [9,10]. Fund allocation in Agricultural Credit Guarantee Scheme positively influences agricultural yield [11]. In Pakistan, another study confirms that agricultural credit disbursement positively and significantly influences wheat production [12]. The VECM model based on annual time series data revealed that a long-run relationship exists between bank credit and agricultural yield in south African and south Asian economies [13-15]. Whilst in Nigeria, time series data of 1981-2013 is evident that bank credit and agricultural production had a short-run relationship using VAR estimation [16].

From the previous empirical evidence, we have seen a statistically significant and positive impact of bank credit on agricultural output and the nature of the association between bank credit and output in different parts of the world. In this section, some exceptions will be discussed. The impact of agricultural credit was positive on agricultural output but was found insignificant [17,18]. In another study in Nigeria, agricultural credit had a negative impact on agricultural output at a 5% significance level and confirmed the presence of agricultural credit fungibility [19].

Recent literature and empirical findings also robust the previous findings and disclosed a positive and significant relationship between agricultural credit and agricultural production. In Pakistan a positive relationship is found between bank credit and agricultural output by applying ARDL and Bound test method [20]. In Nigeria a long-run significant association is found between bank credit and agricultural output [21]. In Turkey it was found that agricultural GDP per hectare increased by 0.17 percent for a one percent increase in agricultural credit applying the spatial panel model [22]. The coefficient of the agricultural credit guarantee scheme fund to crop, livestock and fishery sector output is found to be 0.1607, 0.2320 and 0.2110 correspondingly in Nigeria [23]. Another study in Nigeria revealed that the elasticity of agricultural production to agricultural credit is found as 0.006 [24]. Simple OLS regression suggests a one percent increase in banks' agricultural credit rise in agricultural GDP by 0.045 percent in Turkey [25].

Based on the previous empirical findings, discussion and concepts, the following research hypotheses have been developed.

Hypothesis 1:

H_0: There is no significant relationship between bank credit and agricultural production.

H_A: There is a significant relationship between bank credit and agricultural production.

Hypothesis 2:

H_0: There is no significant impact of bank credit on agricultural production.

H_A: There is a significant impact of bank credit on agricultural production.

3. Methodology

3.1 Data and Variables

In this study, we considered both univariate and multivariate OLS model to estimate the magnitude of banks' agricultural credit on agricultural production. In the univariate OLS model, banks' agricultural credit is solely considered to estimate bank credit's possible effect on agricultural production and identify their relationship nature. Annual time series data from 1981 to 2020 is applied in this model. The highest available data are found from 1981 to 2020 for the variables considered in the univariate model. Hence, we have a total of 40 observations. Agricultural gross domestic production in billion BDT is the dependent variable that proxied Bangladesh's agricultural output and and is denoted as AGDP. Scheduled banks' credit to the agricultural sector is the proxy of bank credit which is our independent variable and also termed in billion BDT and denoted as ACRED. In the multivariate OLS model, in addition to our target variable banks' agricultural credit, foreign direct investment and inflation rate variables are considered as some control variables. Foreign direct investment is measured in billion BDT and termed FDI. On the other hand, the inflation rate is denoted as INF and expressed in percentage. Data has been collected from different secondhand sources, i.e., annual reports of the Bangladesh Bank and World Bank's world development indicators [26].

3.2 Data Analysis Techniques

In any econometric analysis, consistency checking of series data is mandatory. In the first phase of our data analysis, we go through with summary statistics. Maximum and minimum values gave us information about the presence of outliers. The mean and median values indicated central tendency, and standard deviation measured the dispersion. Finally, skewness and kurtosis values provided statistics about the normality of data distribution. The following econometric approaches have been applied in the subsequent phases of our data analysis, which are discussed below.

3.2.1 Stationarity Test

Econometric model selection for time series data requires some sequential statistical tests. Based on the data stationarity level, a further model can be chosen. The Augmented Dickey-Fuller (ADF) unit root and Phillip-Perron (P-P) unit root tests are widely applied. In our study, we performed the ADF unit root test to detect data stationarity. Within the ADF unit root test, there are three models, i.e., only intercept, trend and intercept; no trend and no intercept. Considering the nature of the data, only the intercept model has been deployed in our study.

3.2.2 Cointegration Test

After detecting the stationarity level of series data, further models can be selected based on the cointegration test results. Application of the cointegration test requires the stationarity of series data at their first difference value. The cointegration test was first introduced by Nobel laureates Robert Engle and Clive Granger in 1987. The engle-Granger two-step method was widely applied for cointegration tests earlier. Nowadays Johansen cointegration test is widely applied. In this paper, we have conducted the Johansen cointegration test. Johansen cointegration test has two primary forms, i.e., Trace statistics and Maximum Eigenvalue statistics. We have considered both statistics in this paper to find the number of cointegration equations.

3.2.3 VECM Estimation

Based on the outcome of the cointegration test, we have to select a subsequent econometric model. If the cointegration test indicates no cointegration equation exists between variables, then Vector Auto Regressive (VAR) model can be performed. The presence of at least one cointegration equation guided us to run the Vector Error Correction Model (VECM). We have accomplished the VECM model in our study, indicating the nature of the relationship (i.e., short run or long run) between the variables.

3.2.4 OLS Regression

The VECM model can identify the relationship between variables. In addition to this framework, we have applied the commonly used Ordinary Least Square (OLS) model to estimate the coefficient of the independent variable to identify the magnitude of the impact of the independent variable on the dependent variable. In this OLS estimation process, we have developed both univariate and multivariate models, where the agricultural gross domestic product is our dependent variable. OLS is a linear regression model based on the principle of least squares. Since our dependent and independent variables are continuous variables, we expect a linear relationship between them. Thus, we have performed OLS regression in this paper to identify the direction, significance level, and magnitude of bank credit on agricultural output in Bangladesh. Simultaneously OLS model has provided necessary information about the explaining power of the explanatory variables on the explained variable.

4. Results and Discussion

4.1 Descriptive Statistics

Table 1 shows that the mean and median values of AGDP and ACRED are within the highest and lowest values, indicating that the series data are consistent. Greater than one value indicates high positive skewness in AGDP and ACRED. However, both results are found within the acceptable range of +3 to –3. Later we have both the variables' have positive kurtosis values stating that leptokurtic distribution was found within an acceptable limit of +10 to –10.

4.2 Analytical Statistics

4.2.1 ADF Unit Root Tests (Only Intercept)

The ADF unit root test results are furnished in Table 2. In this ADF unit root test, we have considered the 'only intercept' model to identify the stationarity level of the variables. All the variables 't-statistics are lower than the variables' respective critical values at their level data. Hence, the H_0: Variables that are not stationary cannot be rejected. In the 2nd column of Table 2, we have found that after taking the level data's first difference value, the t-statistics of the variables are higher than the corresponding critical values at a one percent significance level. Therefore, the H_0 can be rejected, and the alternative hypothesis H_A: Variables are stationary can be accepted. Since the variables become stationary at their first difference value, we conclude that they attain their stationarity level at I (1). For time series data analysis, identifying the data stationarity level is essential because this stationarity level guides the other statistical model selection. For example, if the data are integrated in a different order, i.e., I (0) and I (1), the ARDL model is suitable. I (1) and I (2) ordered data should go through the AR model. The cointegration model can be applicable when data are integrated at I (1). Therefore, this study will perform the Johansen cointegration test to know the number of cointegration equations between the variables.

4.2.2 Results of Johansen Cointegration Test

The Johansen Test of cointegration determines the number of cointegration equations between the variables, indicating the chance of a long-run equilibrium relationship between the variables.

Table 3 represents the estimated outcomes of the cointegration test. In this test, we considered both the Trace and Max Statistics. In the 'zero hypothesized cointegration equation', both trace and max statistics' value exceeds their particular critical values. So, the H_0: No cointegration equation exists between the variables can be rejected, and the H_A: One cointegration equation between the variables can be accepted. At least one cointegration equation indicates there is a chance of a long-run equilibrium connection between the variables. Then 'At the most 1' level, the trace and max statistics are lower than their critical values. Meaning the non-rejection of the Null: One cointegration equation that indicates a long-run relationship may be between agricultural GDP and banks' agricultural credit. Detection of the cointegration equation is necessary to choose the subsequent statistical model. The presence of no cointegration equation guided us to run the VAR model, and the existence of at least one cointegration equation directed us to perform the VECM model. Having one cointegration equation, we can run the VECM model. In the next section, we will discuss the results of the VECM model.

Table 1. Summary Statistics

Variables	Observation	Maximum	Minimum	Mean	Median	Standard Deviation	Skewness	Kurtosis
AGDP	40	3472.74	105.72	990.37	623.25	934.37	1.24	3.42
ACRED	40	236.2	3.74	62.08	29.85	72.45	1.23	3.11

Table 2. Results of ADF unit root tests (Only intercept)

Variables	At level		First Difference	
	t-Stat.	Critical values	t-Stat.	Critical values
LnAGDP	–0.662	–3.621 (1%) –2.943 (5%) –2.610 (10%)	–4.004***x	–3.615 (1%) –2.941 (5%) –2.609 (10%)
LnACRED	–0.477	–3.610 (1%) –2.938 (5%) –2.607 (10%)	–5.751***x	–3.615 (1%) –2.941 (5%) –2.609 (10%)

Note: ***, **, * indicate 1%, 5%, and 10% of significance level respectively

Table 3. Results of Johansen Cointegration Test

Hypothesized no. of CE (s)	Trace stat.	5% critical value	Max stat.	5% critical value
None (r=0) *	18.5904	15.41	18.3695	14.07
At most 1	0.2209	3.76	0.2209	3.76

* rejection of theH_0 at 0.05 level.

4.2.3 VECM Estimation

In the VECM estimation, we have selected lag length as one since our lag order selection criteria suggest optimal lag as one. Then the number of cointegration equations is set as one because Johansen cointegration results provide the existence of one cointegration equation between the variables. Here we have applied Least Squares (Gauss-Newton / Marquardt steps) method. Thus, the software-provided system equation is found as:

D(LNAGDP) = C(1)*(LNAGDP(–1) – 0.7224*LNACRED(–1) –4.0249) + C(2)*D(LNAGDP(–1)) +C(3)*D(LNACRED(–1)) + C(4)

Here, D(LNAGDP) is the dependent variable. C(1) stands for the coefficient of the cointegration equation which is also labeled as an error correction term and indicates the speed of adjustment toward equilibrium. C(2) and C(3) indicate the coefficient of D(LNAGDP(–1) and D(LNACRED(–1), respectively, which are the independent variables of this estimation procedure. Lastly, C(4) is denoted as the residuals of the estimation.

The summary results of the VECM estimation have been exhibited in Table 4. Here we have estimated the F-statistic value as 6.6010, and the corresponding probability value is 0.0012, less than five percent. Consequently, we can conclude that the overall VECM estimation is significant. Moreover, the R-squared value is found as 0.3680, indicating that the regressors can explain the 36.80% variation of the outcome variable.

Table 4. Summary results of VECM estimation

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	–0.1150	0.0334	–3.4415	0.0016
C(2)	0.1349	0.1547	0.8719	0.3894
C(3)	–0.0396	0.0349	–1.1338	0.2648
C(4)	0.0814	0.0158	5.1245	0.0000
R-squared	0.3680	F-statistic		6.6010
Adjusted R-squared	0.3123	Prob(F-statistic)		0.0012

The VECM estimation encompasses two features, i.e., detection of long-run association and short-run association. Identification of the long-run relationship is subject to the probability value of the coefficient of the cointegration equation and its respective sign. Here, the coefficient of cointegration equation C(1)'s coefficient value is found as –0.1150, and the corresponding probability value is found as 0.0016, which is less than one percent.

According to the decision rule, if the coefficient values' sign is found as negative and the probability value is less than five percent, we can conclude that a statistically significant long-run relationship remains among the variables. Since the C(1) coefficient value is negative and the probability value is less than one percent, our concluding remarks regarding VECM estimation is that a long-run equilibrium relationship exists between agricultural GDP and banks' agricultural credit. This association is also found statistically significant at a one percent significance level.

In the previous discussion, we applied sequential statistical analysis one after another and finally detected the nature of the association between the variables. In addition, popular OLS estimation has been carried out in the next section to know the magnitude of banks' agricultural credit to explain agricultural GDP.

4.2.4 OLS Regression

Table 5 shows the results of the univariate regression analysis. OLS estimation, an econometric technique, is employed to estimate the regression analysis of the simple univariate model for the data from 1981 to 2020. The full implication of a model can be evaluated from the value of multiple determinations. In the present results, the F-stat's estimated value is 634.78, and the corresponding probability is 0.000, which is an acceptable level and highly significant. This result detects that this model's independent variable banks agricultural credit significantly influenced agricultural productivity. The calculated value of the R^2 is 0.94, which specifies that approximately 94% of the overall variation in agricultural GDP can be described by agricultural bank credit. The bank's agricultural credit intercept is 0.7263332, suggesting that a 10% rise in the bank's agricultural credit will raise the agricultural GDP by around 7.26%. These results are similar to the conclusions of other related studies, including Iganiga and Unemhilin, 2011; Ammani, 2012; Adofu et al., 2012; Obilor, 2013; Agunuwa et al., 2015. Those studies also showed a strong, positive, and significant effect on the agricultural GDP of the bank's agricultural credit. The probable reason behind the positive impact of bank credit on productivity is its close monitoring by bank officials. Farmers who get bank's agricultural credit cannot easily divert it into other unproductive sectors. Hence, credit acts as an enabling and mediating factor for variable and fixed inputs used at different agricultural production stages.

Table 5. Results of univariate OLS model

Variables	Coeff.	Sd. Error	t-Stat.	Probability
Constant	4.009193	0.1041856	38.48	0.000
LnACRED	0.7263332	0.0288286	25.19	0.000***
R^2 0.9435	Adjusted R^2 0.9420	F-stat. 634.78	(F-stat.) Prob. 0.0000	DW Stat. 0.3694741

Note: ***, **, * correspondingly show 1%, 5%, and 10% significant level

In the following Table 6, the outcome of the multivariate OLS model has been furnished. To check the robustness of the OLS model, we developed a multivariate model alongside the univariate OLS model. In the multivariate regression model, foreign direct investment and inflation rate are considered as some control variables. Results showed that the F-stat's value is found as 373.38 with the corresponding probability of 0.000, which indicates the overall model is significant at a one percent level. The estimated value of the R^2 is 0.9851, which specifies that around 98.51% of the variation in agricultural GDP can be explained by the independent variables considered in this model. The coefficient of the bank's agricultural credit is found as 0.8423063, indicating that a one percent increase in the bank's agricultural credit will raise the agricultural GDP by 0.8423%. On the other hand, the coefficient of foreign direct investment and the inflation rate is found negative and statistically insignificant.

Finally, we can conclude that both models affirm banks' agricultural credit has a positive and statistically significant impact on the agricultural gross domestic product in Bangladesh.

Table 6. Results of multivariate OLS model

Variables	Coeff.	Sd. Error	t-Stat.	Probability
Constant	4.508307	0.5386841	8.37	0.000
LnACRED	0.8423063	0.0508791	16.56	0.000***
LnFDI	–0.0490672	0.039316	–1.25	0.229
LnINF	–0.0100843	0.0912313	–0.11	0.913
R^2 0.9851	Adjusted R^2 0.9824	F-stat. 373.38	(F-stat.) Prob. 0.0000	DW Stat. 1.227189

Note: ***, **, * correspondingly show 1%, 5%, and 10% significant level

5. Conclusions

This paper inspects the relationship between bank credit and agricultural output in Bangladesh. The impact assessment of bank credit on agricultural output is also considered. Different statistical models were performed sequentially over 40 years of annual time series data. In the first phase of data analysis, the unit root test confirms that series data obtain stationarity at their first difference value. Later cointegration test indicated that one cointegration equation remained in between the variables. In the third phase, VECM estimation was carried out, which affirms that long-run causation comes from the banks' agricultural credit to agricultural GDP. Hence, according to our first objective of the study, we can conclude that there is a significant relationship between bank credit and agricultural output, which is long-run in nature. Finally, we estimate the OLS regression. Both univariate and multivariate models affirm a significant positive impact of the banks' agricultural credit on agricultural GDP.

Bangladesh is one of the high populous countries in the world now. Food and nutrition demand fulfillment for this vast population is a very crucial task. Increasing agricultural production should be ensured thereby. Due to the huge population's housing demand and industrial expansion, agricultural land is decreasing gradually. Thus, high-yielding inputs and equipment are necessary to raise agricultural productivity from a given resource. Bank financing can play a vital role in this regard. This study evident that bank credit has a significant long-run relationship with agricultural production, and a measurable, significant positive impact of bank credit is found on agricultural output. Therefore, we conclude that banks in Bangladesh can elevate agricultural output through their effective and efficient lending.

Conflict of Interest

There is no conflict of interest.

References

[1] Bangladesh Bank, 2021. Annual Report, 2001-2021. Agriculture and CMSME Finance. 90-106.

[2] Iqbal, M., Ahmad, M., Abbas, K., et al., 2003. The impact of institutional credit on agricultural production in Pakistan. The Pakistan Development Review. 469-485.

[3] Kareem, R.O., Bakare, H.A., Raheem, K.A., et al., 2013. Analysis of factors influencing agricultural output in Nigeria: Macro-economics perspectives.

American Journal of Business, Economics, and Management. 1(1), 9-15.
[4] Rehman, A., Chandio, A.A., Hussain, I., et al., 2019. Fertilizer consumption, water availability, and credit distribution: Major factors affecting agricultural productivity in Pakistan. Journal of the Saudi Society of Agricultural Sciences. 18(3), 269-274.
[5] Adofu, I., Abula, M., Agama, J.E., 2012. The effects of government budgetary allocation to agricultural output in Nigeria. Sky Journal of Agricultural Research. 1(1), 1-5.
[6] Ammani, A.A., 2012. An investigation into the relationship between agricultural production and formal credit supply in Nigeria. International Journal of Agriculture and Forestry. 2(1), 46-52.
[7] Agunuwa, E.V., Inaya, L., Proso, T., 2015. Impact of commercial banks' credit on agricultural productivity in Nigeria (time series analysis 1980-2013). International Journal of Academic Research in Business and Social Sciences. 5(11), 337-350.
[8] Ogbuabor, J.E., Nwosu, C., 2017. The impact of deposit money bank's agricultural credit on agricultural productivity in Nigeria: Evidence from an error correction model. International Journal of Economics and Financial Issues. 7(2), 513-517.
[9] Binswanger, H.P., Khandker, S.R., 1995. The impact of formal finance on the rural economy of India. The Journal of Development Studies. 32(2), 234-262.
[10] Das, A., Senapati, M., John, J., 2009. Impact of agricultural credit on agriculture production: An empirical analysis in India. Reserve Bank of India Occasional Papers. 30(2), 75-107.
[11] Obilor, S.I., 2013. The impact of commercial banks' credit to agriculture on agricultural development in Nigeria: An econometric analysis. International Journal of Business, Humanities, and Technology. 3(1), 85-94.
[12] Chandio, A.A., Jiang, Y., Joyo, M.A., et al., 2016. Impact of area under cultivation, water availability, credit disbursement, and fertilizer off-take on wheat production in Pakistan. Journal of Applied Environmental and Biological Sciences. 6(10), 10-18.
[13] Sial, M.H., Awan, M.S., Waqas, M., 2011. Institutional credit and agricultural production nexus. MPRA Paper No. 30932. 2(13), 279-284.
[14] Awan, F., Mustafa, U., 2013. Key factors contributing to agricultural growth in Pakistan: An application of time series analysis. Journal of Agricultural Economics and Development. 1(2), 6-13.
[15] Chisasa, J., Makina, D., 2015. Bank credit and agricultural output in South Africa: Cointegration, short-run dynamics, and causality. Journal of Applied Business Research (JABR). 31(2), 489-500.
[16] Anetor, F., Ogbechie, C., Kelikume, I., et al., 2016. Credit supply and agricultural production in Nigeria: A vector autoregressive (VAR) approach. Journal of Economics and Sustainable Development. 7(2), 131-143.
[17] Hussain, A.H., 2012. Impact of credit disbursement, area under cultivation, fertilizer consumption, and water availability on rice production in Pakistan (1988-2010). MPRA Paper No. 41963. 28(1), 95-101.
[18] Narayanan, S., 2016. The productivity of agricultural credit in India. Agricultural Economics. 47(4), 399-409.
[19] Iganiga, B.O., Unemhilin, D.O., 2011. The impact of federal government agricultural expenditure on agricultural output in Nigeria. Journal of Economics. 2(2), 81-88.
[20] Ahmad, D., Chani, M.I., Afzal, M., 2018. Impact of formal credit on agricultural output: Empirical evidence from Pakistan. Sarhad Journal of Agriculture. 34(3).
[21] Emenuga, P.E., 2019. Effect of commercial banks' credit on agricultural productivity in Nigeria. Acta Universitatis Danubius Economical. 15(3).
[22] Koç, A.A., Yu, T.E., Kıymaz, T., et al., 2019. Effects of government supports and credits on Turkish agriculture: A spatial panel analysis. Journal of Agribusiness in Developing and Emerging Economies. doi:10.1108/jadee-11-2018-0164.
[23] Reuben, J., Nyam, C.M., Rukwe, D.T., 2020. Agricultural credit guarantee scheme fund and its effect on agricultural output in Nigeria. Review of Agricultural and Applied Economics (RAAE). 23(1340-2021-020), 102-111.
[24] Osabohien, R., Adeleye, N., De Alwis, T., 2020. Agro-financing and food production in Nigeria. Heliyon. 6(5), e04001.
[25] Bahşi, N., Çetin, E., 2020. Determining of agricultural credit impact on agricultural production value in Turkey. Ciência Rural. 50(11). doi:10.1590/0103-8478cr20200003.
[26] World Bank, 2020. World Development Indicator [Internet]. Available from: https://databank.worldbank.org/source/world-development-indicators.