Labour Force Participation in Economic Development: Coffee in Rwanda

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Abstract:

Growth in the agricultural labor force is one of the key determinant of the nation's maximum production in the country. The purpose of this study was to assess whether the Labour Force participation has effective contributed to boost Coffee Agricultural Production in Rwanda for during a period of 2006-2013. The Researcher aims to provide evidence of labour force as factor which boost coffee agricultural production in Rwanda. It was found that there are perfect correlation between coffee production and its labour force, with coefficient of correlation (=0.995), (Table 3). According to the student's t-test, the t-statistics for labour force (= 4.344) is large than t-critical (=2.36), for the degree of freedom (DF=7) during 8 years taken as period at significance level of 0.05 (Table4). The p-value (=0.012) is less than 0.05 (0.012<0.05. Similarly, for more evidence, (Table5) shows by using analysis of variance with the same level of (0.05), that F ratio calculated (Fcal = 262.783) is greater than F critical (Fc=6.59) and the p-value is less than 0.05, (0.000< 0.05). This means that there is significant relationship between Coffee quantity produced and Labour Force Participation used. Therefore, Labour Force is an explanatory of Coffee production quantity. According to the finding results, the study indicates that the labour force led to increase coffee agricultural production. Rwandan Government Policies should involve more Labour Force again with purpose of improvement of sustainable agricultural performance, especially in Coffee sectors. The

Coffee production and labour force participation, both have been decreased and increased respectively during the same. This shows that at the same time the change of Labour Force implies the change of Coffee production quantity in the same direction and vice versa. The figure 1, shows the trends between coffee production and the Labour force participation. Due to, above multi results the researcher confirmed that the production of coffee dependent of labour force used.

Key words: Labour force, Coffee production, Economic Development, Rwanda

INTRODUCTION

Rwanda is a hilly and evergreen country located in East Africa, between the 1°04' and 2°51' Southern Latitudes and between the 28°53' and 30°53' Eastern Longitudes of the Equator. The climate of the country is temperate to subtropical, with two rainy seasons and two dry seasons each year. The shortest route to the Indian Ocean is 1,200 km long. Rwanda has an area of 26,338 km² with an estimated population of about 11millions inhabitants. Arable land is estimated at 1, 3 million hectares. Labor force growth is determined by the native-born population, net immigration, and the labor force participation rate, which is the percentage of the working-age population (16+) working or looking for work. In Rwanda, the population is regarded as the major factor to consider when it comes to the nation existence both in terms of its economy development and inhabitants' life style. The Rwandan labour force increases national income through coffee agricultural production which led to the creation of local farms such as coffee agricultural industries.

Agricultural development can be referred to as the intensive and extensive production. Rwanda is a developing countries, where coffee are one of the major agricultural

development sectors of its economic growth, due to growing and cheap labour force.

According to the Dependency theorists argue that poor countries have sometimes experienced economic growth with little or no economic development initiatives; in the same context Rwanda has established initiatives to facilitate the enhancement of coffee sector, in order to generate foreign currencies through their exports. Therefore, encouraged foreign investors to come in and invest in above mentioned agricultural sectors, consequently, involve the overpopulation's labour force employment.

PROBLEM STATEMENT

This paper is based on of labour force participation in coffee agricultural development sector in Rwanda. Labour force is an important element of agricultural development. Nowadays, the main major and most pressing problems facing Rwanda is unemployed population. The increase of population in Rwanda remains a problem on its economic growth in the case that Rwanda's population is not involved mostly in agricultural development. According to this statement, rapid population growth has and will cause many social issues if the Rwandan government policies and strategies doesn't emphasize on this overpopulation involvement in modern intensive agricultural activities especially in coffee which plays a key role in export, generating foreign currencies. Additional clear policies and strategies must be taken by Rwanda's leaders in order to contribute drastically in the involvement of this overpopulation in improved agricultural development.

OBJECTIVES

In most countries with the highest economic growth rate, it was largely due to involvement of massive employment of its

growing population as labour force. The objectives of this paper are:

(1) examining the role of labour force in coffee agricultural development sector,

(2) Analyzing the labour force participation in economic development.

CONCEPTUAL FRAMEWORK OF LABOUR FORCE IN AGRICULTURE DEVELOPMENT

Population Theories suggest that an economy supports population (Malthus, 1803), but labour force too, in sense, boosts the economy. It is the aim of an economy to supply people's needs for foods and services, but the people too make an important participation to the productive capacity of an economy, the labour force in Rwandan economy has played a tangible role through coffee production (See Table 1).

There are two schools of thought about the relationships between population and economic cycles. The first school contends that population growth translates into positive economic development effects such as a large and cheap labour force, especially when it comes to businesses that are inclined to cheap labour (e.g. Kothare, 1999). Likewise, population growth increases the market for goods and services and leads to competition for existing resources which in turn fuels various development innovations and options (Birdsall, 1988, Barlow, 1994, Crenshaw et al., 1997). Similarly, according to Kremer (1993) stated and empirically confirmed that larger population was associated with higher population growth rates and faster technological development. Technological development, a consequence of population growth, leaded to an increase in labor productivity, per capita income and improvements in living conditions. Julian Simon (1976) believed that technological development depended on population size for both: (a) innovation technology pushed, made more likely by the

larger number of people; and (b)innovation demand pulled, because larger population creates new needs and increases those already existing granting higher rewards for the innovator (Ahlburg 1998). The higher and probably more stable demand for consumption and investment goods is another positive effect of population growth that can lead to expansionary economic cycles.

The second group of scholars argue that declining population growth, fertility and mortality are conducive for economic growth and argue rather for the accumulation of qualified human capital an educated, skilled, and healthy population to be employed in the farm and non-farm sectors (e.g. Strulik, 2005; Barro, 2001), according to Malthus, population growth is supposed to decrease the per capita output, because output growth rate cannot keep the same pace. Preventive and positive checks on population growth are necessary to keep the natural balance between production especially food and consumption (Malthus 1826).

The ideas that lead current development interventions of this paper sit within the first school of thinking outlined above, which encourages population growth as source of labour force in pursuit of economic development.

DATA AND METHODS

Data

Table 1: Coffee production 2006-2013

Years	2006	2007	2008	2009	2010	2011	2012	2013
Quantity (MT)	26.2	14.7	19.9	15.4	18.2	15.6	17.0	20.0
Values ($ Million)	53.4	32.3	46.7	37.4	56.1	74.6	60.9	55.2
Price/us$/Kg	2.04	2.20	2.37	2.42	3.07	4.78	3.58	2.76
Labour Force(000s)	43	23	25	23	24	23	24	25

Source: Rwanda Agriculture Board (RAB), 2013

METHODS

The data used in this study was secondary and provided in coffee agricultural sectors, especially collected and used as material for analysis. The statistical tools methods have been used for analyzing the contribution of labour force in coffee agricultural sectors and it is used to examine its role in the agricultural development. It is focused essential on the relationship between the quantities productions due to the Labour force used in that production activity. Finally, software package social statistics (SPSS) was applied to interpret data and listing below finding results.

Descriptive Statistics

Table 2: Descriptive Statistics

	Mean	Std. Deviation	N
Quantity(MT)	18.34	3.724	8
Labour Force(000s)	26.04	6.755	8
Values(US$ million)	52.07	13.353	8
Price(us$/Kg)	2.90	.909	8

The Descriptive Statistics table above gives the average means, the Standard Deviations and the number of years taken in our study for each indicate. According to the standard deviation values during eight(8) years, the indicators used show a large variations or changes which means that both, the Coffee production quantity and Labour Force participation were presented with different values during the period of study. The quantity increased or decreased as well as the Labour Force Participation increased or decreased also. So both indicators (Coffee quantity production and Labour Force Participation) are directly related each other.

Correlations Analysis

Table 3: Relationship between Dependent and Independent Variables (2006 - 2013)

		Quantity(Kgs)	Labour Force	Values(US$)	Price(us$/Kg)
Pearson Correlation	Quantity(Kgs)	1.000	.905	.143	-.413
	Labour Force	.905	1.000	.068	-.397
	Values(US$)	.143	.068	1.000	.838
	Price(us$/Kg)	-.413	-.397	.838	1.000

The table 3 presents the matrix of correlation in which the principal diagonal is presented by unit (1), and all elements of this matrix are symmetrical related from left side to right side of that diagonal and vice versa. The observation of elements of the above table explains or proves that there degrees of correlation between the chosen indicators are effectives and positives correlated. The Pearson's Coefficient of Correlation was found very high and approached to the unit with the value of R = 0.995. Therefore, the involvement of the Labour Force Participation in agricultural production of Coffee increase or improve the quantity production which consequently boost the money values and contribute to the country's Economic Development.

Regression Analysis

Table 4: Regression Analysis used

Model	Coefficients	Std. Error	Coeff. Beta	t	Sig.
(Constant)	12.152	.987		12.310	.000
Labour Force	.154	.035	.279	4.344	.012
Values(US$)	.353	.030	1.265	11.697	.000
Price(us$/Kg)	-5.578	.481	-1.362	-11.587	.000

Dependent Variable: Quantity (MT), Predictors: (Constant), Labour Force, Values (US$), Price (us$/Kg)
Source: Computation using SPSS.

According to the regression Methods, with the student's t - test by using software SPSS, we found that the values of t - statistics are (12.310, 4.344, 11.697 and -11.587) as showed in (Table4). At confidence level of 0.95, with the significance level of 0.05, for 7 degrees of freedom (DF=7), the critical value is (Tc = 2.36). Due to the values of t statistics which are highly significant as significant values for two -tailed tests which are also (0.000, 0.012, 0.000, and 0.000), (Table4). Therefore, we reject the null hypothesis (there is no relationship between Coffee Production and Labour Force Participation). Then, there is significant between the two variables and the statistical tests are said to be significant because p-values are all less than the significance level of (0.05). The Coffee Production depend of the Labour Force Participation. With regression, an estimation linear model is determine and could forecast the future Coffee production quantities in different years. The Estimated Model here is linear regression or bivariate called "Vector Auto regression" expressed as: $Q_t = \alpha + \beta LFP_t + u_t$, with Q_t, Coffee production quantity, LFP_t, Labour force Participation, α is intercept, β as coefficient of Labour Force and u_t is the error committed during model estimation. Table 4 gives the values of the constants ($\alpha = 12.152$, $\beta = 0.154$ *and* $u_t = 0$). Estimated Model is $Q_t = 12.152 + 0.154 LFP_t$, with (t = 2006, 2007... 2013). If LFP is added of one unity, the coffee quantity production will be augmented with 12.306 MT. This predicts or forecasts the coffee production quantity due to the number of Labour Force which has been planned in the year as Coffee production field workers.

Analysis of Variance

Table 5: Analysis of Variances

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	96.610	3	32.203	262.783	.000[b]
Residual	.490	4	.123		
Total	97.100	7			

D Dependent Variable: Quantity(MT), Predictors: (Constant), Labour Force, Values(US$), Price(us$/Kg

For more evidence, the table 5 shows the analysis of variances, for the numerator degrees of freedom (df1= 3) and the denominator degrees of freedom (df2 = 4), with the significance level o of (0.05), the F critical is (Fc=6.59), compare to F ratio calculated (Fcal = 262.783), the null hypothesis was rejected in favour of the alternative hypothesis, which is that there is significant relationship between Coffee production and Labour Force Participation. Again we say that Labour Force is an explanatory of Coffee production quantity. At level of significance of 0.05 the p-value is less than 0.05, (0.000< 0.05) (Table 5), there is significant relationship between LLabour Force Participation and the quantity produced for the Coffee production.

Relationship between Coffee Production and Labour Force Participation

Table 6: Percentages of Variation of Indicators during the period of study (2006-2013)

Years	2006	2007	2008	2009	2010	2011	2012	2013
Quantity (MT)		-44	35	-23	18	-14	9	18
Values ($ Million)		-40	45	-20	50	33	-18	-9
Price/us$/Kg		8	8	2	27	56	-25	-23
Labour Force (000s)		-47	9	-8	3	-2	4	5

MAJOR FINDINGS

According to results found, we can summarize some of them which ended at a good conclusion.

First: Student's t-test, shows that t-statistics (tcal=4.344) was greater than its critical value (tcri=2.36). This means that the null hypothesis is rejected and we conclude that there is significant relationship between Labour Force Participation and the Coffee quantity produced.

Second: The p-values for statistical tools such as regression analysis and analysis of variances are both respectively less than significance level of 0.05 (0.012<0.05) and (0.000<0.05) which confirm that there exist a positive relationship between the dependent and independent variables.

Third: According to the Analysis of Variances (ANOVA), the value of F ratio (Fcal = 262.783) is greater than F critical value with the degrees of numerator and denominator respectively equals to (dl1=3) and (dl2=4) of (Fcri = 6.59). This also confirm the existence of relationship which is significant between both variables (dependent and independent).

Fourth: The estimated Model**:** $Qt = 12.152 + 0.154 LFPt$, with Qt the quantity of Coffee produced. LFPt the labour force participation which elements help to forecast and make projection for different years and predict the quantity of Coffee productions.

Fifth: The Coffee production and labour force participation, both have been decreased respectively in the years 2007 and 2009 and 2011 as shown in figure 1. However, in the years 2008, 2010, 2012 and 2013 the Coffee production and labour force have both increased. This shows that at the same time the

change of Labour Force implies the change of Coffee production quantity in the same direction and vice versa. The figure 1, shows the trends between coffee production and the Labour force participation.
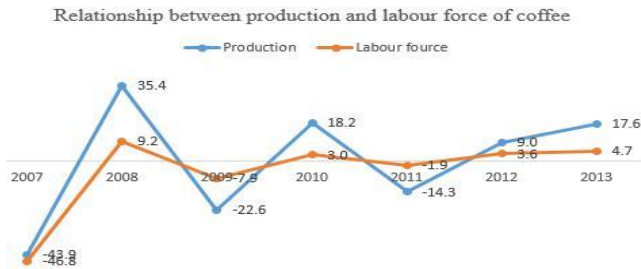

Figure 1: Relationship between production and labour force

CONCLUSION

Labour force is one of the factors that has an important influence on the agricultural development. Based on finding results, the paper's output shows that labour force has direct impact on coffee agricultural sectors in Rwanda. It has been observed that whenever the labour force increased, it affects the production of coffee. Therefore, the results found above confirm that statement.

For instance, the dependent variable is coffee production while the labour force is independent variable, which shows mathematically, the linear function related by both variables and conclude that the coffee quantity produced was function of labour force used. This give the mathematic function where production is a function of labour force (production = f (labour force) in this case study. The climate change can be examined as second factor which affected also the production of coffee agricultural sectors. In this study, we suppose the absence of others external influences by taken the case of the normality of entire atmosphere of environment.

Acknowledgement

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