

**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
SCHOOL OF SOCIAL SCIENCES
DISCIPLINE OF ECONOMICS**

FINAL PROJECT PROPOSAL

**THE CONTRIBUTION OF AGRICULTURE TO
ECONOMY WIDE GROWTH & POVERTY
REDUCTION IN ETHIOPIA: A SAM BASED
MULTIPLIER ANALYSIS**

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October, 2010
ADDIS ABABA
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PROJECT PROPOSAL PROFORMA

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Date: October 2010

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Title of the Project **THE CONTRIBUTION OF AGRICULTURE TO ECONOMY WIDE GROWTH AND POVERTY REDUCTION: A SAM BASED MULTIPLIER ANALYSIS IN ETHIOPIA**

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Has been prepared after due consultation with me. I agree to supervise the above mentioned project till its completion

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Table of Content

I. INTRODUCTION.....	1
1.1 Background & justification of the study.....	1
1.2 Statement of the problem.....	3
1.3 Objectives of the study.....	3
1.4 Research questions.....	4
1.5 Scope of the study.....	4
1.6 limitations of the study.....	4
1.7 Significance of the study.....	4
1.8 Organization of the study.....	5
1.9 Test Procedure.....	
II. LITRETURE REVIEW.....	5
III. RESEARCH METHODOLOGY.....	6
3.1 Description of the study area	6
3.2 Type and sources of the data.....	7
3.3 Method of data analysis.....	7
3.3.1 SAM based multiplier model.....	12
IV. EXPECTED OUTCOME.....	14
V. WORKPLAN.....	14
5.1 Time schedule.....	14
5.2 Budget.....	15
 BIBILOGRAPHY.....	 16

List of Acronyms

ADLI Agricultural Development Led Industrialization

EDRI Ethiopian Development Research Institute

EMM Economy wide Multi-market Model

GDP Gross Domestic Product

IFPRI International Food Policy Research Institute

ISIC International Standard for Industrial Classification

MoFED Ministry of Finance & Economic Development

NBE National Bank of Ethiopia

SAM Social Accounting Matrix

SNA System of National Accounts

I. INTRODUCTION

1.1. Background and Justification of Study

The ultimate goal of Economic policy is to bring economic development, reduction of poverty and inequality in a society. Empirical evidence suggests that economic growth is the most effective means to increase the welfare of the poor and alleviate poverty (Sadoulet, 2000; Adams, 2004). In addition to this, Fields (1989) suggested that, a decline in poverty is not possible without economic growth. However, the decline in poverty does not necessarily imply equal distribution of income. According to Simon Kuznet, The relationship between economic growth and income inequality is an inverted **U** shape. i.e. economic growth increase income inequality in the early stage and decrease income inequality in the later stage.

In the context of developing countries, agricultural growth is believed to the key driver of economic development and structural transformation. Mellor and Dorosh (2009) argued that, “A high rate of Agricultural growth has a far reaching positive implications for the economic development of low-income countries in terms of increasing employment and accelerating poverty reduction through its linkages with other sectors”. Chenery and Syrquin (1975) also argued that, structural transformation transfers capital and labour from agriculture to fuel growth in industry and service sector in developing countries. On the other hand, Johnston and Mellor, 1961; Hirschman, (1975) argued that agriculture has weaker production linkages with the rest of the economy, hence, has fewer stimuli effect to the overall growth.

Similar to developing countries, Agriculture is a dominant sector in Ethiopian economy in-terms of its contribution to Gross Domestic Product (GDP), Export earning and employment generation. According to the Ministry of Finance and Economic Development (MoFED) National Accounts Statistics of Ethiopia, January 2010 report, starting from 2005/06, the Ethiopian economy is growing on an average of 10.9% annually. During this period, agricultural, industry and service sectors grow at an average of 8%, 10% and 14.6% respectively. In 2005/06, the share of agriculture to the overall Gross Domestic Product (GDP) of the country was 47% that of the industry and service was 13% and 40% respectively. In the year 2009/10, the share agriculture to the GDP drop by 11.9% from 47% to 41%, and the share of industry also drop from 13.4% to 13%. However, the share of service sector increase by 16.1% from 40.4% to 46.9%. In addition to the contribution to the overall Gross

Domestic Product (GDP), agriculture is the main sources of export earning. According to the 2008 National Bank of Ethiopia (NBE) report. Agriculture account 82% of export earning. Furthermore, 85% of rural population's livelihood is directly or indirectly linked with agriculture. It is also serves as source raw material for cottage, small & large scale industries.

Based on the above theoretical justification and the structure of the economy, In 1994, Ethiopia has formally adopted Agricultural Development Led Industrialization (ADLI) as its main development strategy of reducing poverty. The objective of ADLI is to strengthen the linkages between agriculture and industry by increasing the productivity of small farmers, expanding large scale private commercial farms, and by integrating the output of agriculture with the input of industry. It is believed that, the growth in agriculture will induce overall economic growth, and structural transformation by stimulating demand and supply. In this research paper, the researcher will use a Social Accounting Matrix (SAM) as a tool to study sectoral linkages.

A Social Accounting Matrix (SAM) is a square matrix that represents all the transaction that are taking place in an economy during a period of one year. It is simple and comprehensive framework that shows the interaction of the three basic forms of economic activity, namely; production, consumption and accumulation plus the transaction of the domestic economy with the rest of the world. In SAM receipts are recorded in rows and expenditures are recorded in the column. The corresponding row and column total of the matrix must be equal to each other, consistent with the bookkeeping idea that the sum of receipts equals the sum of expenditure for each account. It is a framework that is widely used for the analysis of sectoral linkage and income distribution in the country. Therefore, the purpose of this research paper is to empirically investigate whether the Agricultural Development Led Industrial (ADLI) policy is reducing poverty through investigating the sectoral linkages between agriculture, industry and service and to study the effect of exogenous shocks such as increase in government spending, investment & export on overall demand, GDP growth and poverty reduction based on the 2005/06 Ethiopian SAM constructed by the Ethiopian Development Research Institute (EDRI).

1.2. Statement of the Problem

As explained above, The Ethiopian government has adopted the Agricultural Development Led Industrialization strategy in 1994 to promote growth and reduce poverty. The strategy has the objective of increasing agricultural production and productivity for export as well as domestic consumption. Since the adoption of the strategy, public spending on agriculture and various rural infrastructures has increased tremendously. However, the welfare impact of this strategy has not been assessed through SAM based multiplied analysis model which shows the interaction of all sectors of the economy.

On March (2007), International Food Policy Research Institute (IFPRI) has studied the Agricultural growth linkages in Ethiopia using Semi-Input-Output model and Economy wide Multi-market Model (EMM) by classifying the economy into agriculture and non-agriculture. However, the link between agriculture, industry and service has not been dealt.

Now a day, questions are rising on the welfare impact of ADLI and the link between agriculture, industry and service. This research paper will attempt to investigate the income generating capacity of the agricultural sector to the households and will try to answer the impact of exogenous injection such as increase in government spending, investment and Remittance from the Rest of the World on the overall demand, economic growth and poverty reduction based on the 2005/06 Ethiopian SAM constructed by Ethiopian Development Research Institute (EDRI).

1.3. Objectives of the Study

The general objective of the study is to empirically investigate the welfare impact of the Agricultural Development Led Industrialization (ADLI) through investigating sectoral linkages.

The specific objectives of the study are as follows:

- To identify the impact of exogenous injection such as increase in government spending, increase in investment & increase in export demand on the output of agriculture, industry & service.
- To identify a sector which creates greater demand and growth?

1.4. Research Questions

Based on the objective of the study, the following research questions have been tested.

- I. Which sector of the economy creates greater demand?
- II. Which sector of the economy play a significant role in the overall economic growth?
- III. Which sector of the economy plays a significant role in poverty reduction?

1.5. Scope of the Study

This study will cover all economic activity that are covered in National Accounts Sources and Methods of Ethiopia, (MoFED), May 2005. Industries are classified based on International Standard for Industrial Classification (ISIC rev 3.1) and the 1993 Systems of National Accounts (SNA) is applied. Accordingly, agriculture includes: crop production, animal farming, forestry production & fishing. Industry includes: Manufacturing, construction, Electricity and water production & Mining and Quarrying production. Service includes: Banking and Insurance, Trade, Hotels and Restaurant, Transport and communications, Health, Education, Real Estate and Renting activity & Domestic and other service activities. This study will cover all economic activities in Ethiopia in the year 2005/06.

1.6. Limitation of the Study

The SAM based multiplier analysis model has two limitations. First, it assumes that there is excess capacity in all sectors and unemployed (Underemployed) factors of production. Second, prices are fixed; there is no allowance for substitution effects at any stage.

1.7. Significance of the Study

SAM based multiplier analysis has significant contribution for Macroeconomic policy making and decision taking. This research will

examine the welfare impact of Agricultural Development Led Industrialization (ADLI) and the sectoral interdependence between agriculture, industry and service. Hence, it will help policy makers to understand the impact of ADLI on demand, growth and household income. In addition, it will help policy makers to prepare appropriate sectoral policy for industry and service. The research finding will also help to bring new ideas which will require further studies.

1.8. Organization of the Study

The research paper will be organized into six chapters. The first chapter will introduce, background, Statement of the problem, Objective of the research paper, research questions, Scope and limitation of study , and significance of the study. The second chapter will describe Ethiopia's geographical location, the structure of the economy & economic policies. The third chapter will explain the Structure of the 2005/06 Ethiopian Social Accounting Matrix (SAM) and the various literatures on SAM based multiplier analysis and sectoral linkages. The fourth chapter will present the research methodology, data source, data collection and analysis. The fifth chapter will present the empirical results of the research. The sixth chapter will provide the conclusion and policy recommendations.

1.9. Test Procedure

The multiplier results computed from the 2005/06 SAM is compared to different sectors. A sector which has a larger multiplier in terms of demand, GDP growth rate & household income is more important in creating demand, growth & poverty reduction.

II. LITERATURE REVIEW

Breisinger,C., Thomas, M. and Thurlow,J. (2009) conducted a SAM based multiplier analysis for Ghanaian economy in 2008 and have found that, agriculture has a stronger linkage to almost all sectors and the multiplier analysis confirms that the need to target agricultural led growth to raise economy wide growth and improve household income in Ghana.

Azharia A. Elbushra, Ibrahim El-Dukheri and Ali A.salih (2010) conducted a SAM based accounting modeling and analysis for Sudan economy in 2000, The result has shown that, the injection of one unit of income in agricultural sector yields the highest multiplier effects in GDP

and household income and hence the development of agriculture is vital in poverty alleviation of Sudan.

B.Rocchi, D.Romano and G.Stefani (2005) carried out a SAM based multiplier analysis for alternative agricultural policies for Italy for the year 2004, they have concluded that agricultural price supporting interventions are less effective as agricultural income increasing policies and their distributive impacts are biased against poorer households both in agricultural and non-agricultural sectors.

Therbecke and Jung (1996) conducted SAM-based multiplier effects and poverty elasticity of Indonesia, their study has shown that a growth in agriculture and agriculture related activities tend to do more to alleviate poverty than growth in industry and service activity.

Saari M. Yusof, Dietzenbacher Erik and Los Barf (2008) conducted a SAM based analysis on Growth Poverty and distribution of Malaysian economy and found that agriculture is a sector where growth is the most beneficial to the poor. All strategies to promote growth and development of the agriculture should be given a special attention.

Husain M.Jami (2006) carried out SAM based multiplier model for Bangladesh. He compared the income generating power of a one unit injection of capital on rural and urban households; he found that agricultural sector is the highest in generating income for rural households and the least in generating income for urban households. Urban households generate their highest income when injection takes place in service sector.

Steven A. Block (1999) conducted a growth multiplier from a four sector simulation model for Ethiopia; he found that the growth multipliers are 1.54 for agriculture, 1.8 for service & 1.22 for traditional industry. The results imply that the link between agriculture and service is the highest. He also concluded that Ethiopia's modern industrial sector is unrelated to the agricultural sector.

X. Diao, B. Fekadu, Bingxin Yu (2007) conducted agricultural growth linkages in Ethiopia based on the 2001/02 SAM, they have concluded that growth in agricultural products has a stronger linkages than growth in non-agriculture, thus the potential benefit of stimulating growth in agriculture is substantial.

III. RESEARCH METHODOLOGY

3.1. Description of the Study Area

The Federal Democratic Republic of Ethiopia is located in the eastern part of Africa neighboring Sudan in the west, Kenya in the south, Somalia in the east and Djibouti and Eritrea in the Northeast and North respectively. It is divided into nine regional states and two administrative councils. The total area of the country is 1,133,380 sq km. According to the Central Statistical Agency 2006 population and housing census estimate, the total population of the country is 74, 777,981. 16 percent of the population lives in urban area and 84 percent live in rural areas. Addis Ababa is the capital city of the federal government and the seat of African union. The country is composed of 80 ethnic groups the largest include Oromo, Amhara, Somali, Sidama, Tigray & Gurage .Agriculture is the main economic activity and livelihood of the of the rural population. Coffee and hides and skins are the main export commodities .The religious composition among other includes, Orthodox Christians, Muslim, Protestant and catholic. The climatic variation varies from tropical zone with an average temperature 27°C to subtropical zone 22°C and temperate zone 16°C. *Birr* is the name of the National currency. According to March 31, 2012 exchange rate, 1US dollar is equivalent to 17.39 Birr.

3.2.Types and Sources of Data

The data which will be used in this research paper will be collected from the secondary sources; The 2005/06 Social Accounting Matrix (SAM) of Ethiopia which is constructed by Ethiopian Development Research Institute (EDRI) will be collected and intensively used. In addition to this, The Ministry of Finance and Economic Development (MoFED) 2010 National Accounts Statistics of Ethiopia, The various publications by the Central Statistical Agency (CSA) of Ethiopia, including the 2004 welfare monitoring survey, the 2003/04 Household Income Consumption and Expenditure survey, the 2005/06 annual agricultural sample survey, the 2005/06 large and medium scale manufacturing industries survey, the 2003 distributive and service trade survey will also be used. Other sources of information will include SAM based research papers, journals and reports from the government and private websites.

3.3. Method of Data Analysis

The circular flow of income is the way of depicting all the transactions that are taking place in the economy in a specified period of time. It captures all transfers and transactions between sectors and institutions. Productive activities purchases land, labour & capital inputs from the factor markets, and intermediate inputs from commodity markets, and use these to produce goods and services. These are supplemented by imports (M) and then sold through commodity markets to households (C), the government (G), Investment (I) and export (E). In the circular flow diagram, one institution expenditure becomes another institution income. A Social Accounting Matrix (SAM) represents all these transactions in a matrix format. It is a square matrix in which each row and column represents total income and expenditure. In line with the accounting principle, the account in row must be equal to the account in column.

The SAM distinguishes between “Activities” and “Commodities”. Activities are entities that produce goods and services, and commodities are those goods and services that are produced by activities. Activities produce goods and services by combining factors of production with intermediate inputs. The payment of factors such as wages, rents, profit is known as value added. Commodities are either supplied domestically or imported. Final demand for commodities consists of household consumption, government consumption, gross capital formation or investment and export. We can describe all transactions that are that are taking place in the economy in the Social Accounting Matrix (SAM) format as follows.

Table 1. The Basic Structure of a SAM
Expenditure Columns

	Activities C1	Commodities C2	Factors C3	Households C4	Government C5	Savings & Investment C6	Rest of the World C7	Total
Activities R1		Domestic Supply						Activity Income
Commodities R2	Intermediate Demand			Consumption Spending(C)	Recurrent Spending (G)	Investment Demand(I)	Export Earning (E)	Total Demand
Factors R3	Value- added							Total Factor Income
Households R4			Factor Payments to Households		Social transfers		Foreign remittances	Total Household Income
Government R5		Sales taxes & Import tariff		Direct taxes			Foreign Grants & Loans	Government Income
Savings & Investment R6				Private Saving	Fiscal Surplus		Current account balance	Total Savings
Rest of the World R7		Import payments (M)						Foreign Exchange Outflow
Total	Gross Output	Total Supply	Total Factor Spending	Total Household Spending	Government Expenditure	Total Investment Spending	Foreign Exchange Inflow	

Table 2. SAM entries expressed as symbols

	Activities		Commodities		Factors	Households	Exogenous Demand	Total
	A1	A2	C1	C2	F	H	E	
A1			x ₁					X ₁
A2				x ₂				X ₂
C1	Z ₁₁	Z ₁₂				C ₁	E ₁	Z ₁
C2	Z ₂₁	Z ₂₂				C ₂	E ₂	Z ₂
F	V ₁	V ₂						V
H					V ₁ + V ₂			Y
E			L ₁	L ₂		S		E
Total	X ₁	X ₂	Z ₁	Z ₂	V	Y	E	

Where X is gross output of each activities (i.e. X₁ and X₂)
 Z is the total demand for each commodity (i.e. Z₁ & Z₂)
 V is the total factor income (equal to household income)
 Y is the household income (equal to factor income)
 E is exogenous component of demand (government, investment and exports)

Table 3. M-Matrix

Dividing each column by its column total to derive the coefficient matrix called “ M-Matrix”

	Activities		Commodities		Factors	Households	Exogenous Demand	Total
	A1	A2	C1	C2	F	H	E	
A1			$b_1 = \frac{X_1}{Z_1}$					X ₁
A2				$b_2 = \frac{X_2}{Z_2}$				X ₂
C1	$a_{11} = \frac{z_{11}}{X_1}$	$a_{12} = \frac{z_{12}}{X_2}$				$c_1 = \frac{C_1}{Y}$	E ₁	Z ₁
C2	$a_{21} = \frac{z_{21}}{X_1}$	$a_{22} = \frac{z_{22}}{X_2}$				$c_2 = \frac{C_2}{Y}$	E ₂	Z ₂
F	$v_1 = \frac{V_1}{X_1}$	$v_2 = \frac{V_2}{X_2}$						V
H					1			Y
E			$l_1 = \frac{L_1}{Z_1}$			$s = \frac{S}{Y}$		E
			$l_2 = \frac{L_2}{Z_2}$					
Total	1	1	1	1	1	1	E	

Where \mathbf{a}_{ij} is technical coefficients (i.e. input or intermediate share in production)

\mathbf{b}_{ij} is the share of domestic output in total demand

\mathbf{v}_{ij} is the share of value added or factor income in gross output

\mathbf{l}_{ij} is the value of total demand from imports or commodity taxes

\mathbf{c}_{ij} is household consumption expenditure shares

\mathbf{s} is the household saving rate (i.e. saving as a share of total household income)

3.3.1 SAM based Multiplier Model

Using the symbols in the table, we can derive a SAM based multiplier model as follows: total demand Z in each sector is the sum of intermediate input demand, household consumption demand, and other exogenous sources of demand E , such as public consumption and investment.

$$Z_1 = a_{11}X_1 + a_{12}X_2 + c_1Y + E_1$$

$$Z_2 = a_{21}X_1 + a_{22}X_2 + c_2Y + E_2 \dots\dots\dots (1)$$

From the SAM we know that gross output X is only part of total demand Z ,

$$X_1 = b_1Z_1$$

$$X_2 = b_2Z_2 \dots\dots\dots(2)$$

The total household income depends on the share factor's earning in each sector as follows.

$$Y = v_1X_1 + v_2X_2 \dots\dots\dots(3)$$

$$Y = v_1b_1z_1 + v_2b_2z_2 \dots\dots\dots(4)$$

Replacing X & Y and combining (2) & (4) with (1) we get the following.

$$Z_1 = a_{11}b_1z_1 + a_{12}b_2z_2 + c_1(v_1b_1z_1 + v_2b_2z_2) + E_1$$

$$Z_2 = a_{21}b_1z_1 + a_{22}b_2z_2 + c_2(v_1b_1z_1 + v_2b_2z_2) + E_2 \dots\dots\dots(5)$$

Moving all terms, except for exogenous demand E, onto the left hand side, we get

$$\begin{aligned} Z_1 - a_{11}b_1z_1 - c_1v_1b_1z_1 - a_{12}b_2z_2 - c_1v_1b_2z_2 &= E_1 \\ -a_{21}b_1Z_1 - c_2v_1b_1z_1 + Z_2 - a_{22}b_2Z_2 - c_2v_2b_2z_2 &= E_2 \dots\dots\dots(6) \end{aligned}$$

Finally, grouping Z terms together

$$\begin{aligned} (1 - a_{11}b_1 - c_1v_1b_1)Z_1 + (-a_{12}b_2 - c_1v_2b_2)Z_2 &= E_1 \\ (-a_{21}b_1 - c_2v_1b_1)Z_1 + (1 - a_{22}b_2 - c_2v_2b_2)Z_2 &= E_2 \dots\dots\dots(7) \end{aligned}$$

We can use matrix algebra to convert equation 7 into matrix format.

$$\begin{bmatrix} 1 - a_{11}b_1 - c_1v_1b_1 & -a_{12}b_2 - c_1v_2b_2 \\ -a_{21}b_1 - c_2v_1b_1 & 1 - a_{22}b_2 - c_2v_2b_2 \end{bmatrix} \begin{bmatrix} Z_1 \\ Z_2 \end{bmatrix} = \begin{bmatrix} E_1 \\ E_2 \end{bmatrix} \dots\dots\dots(8)$$

This is the identity matrix (I) minus the coefficient matrix (M)

$$\begin{bmatrix} 1 - a_{11}b_1 - c_1v_1b_1 & -a_{12}b_2 - c_1v_2b_2 \\ -a_{21}b_1 - c_2v_1b_1 & 1 - a_{22}b_2 - c_2v_2b_2 \end{bmatrix} = I - M \dots\dots\dots(9)$$

If we rename the other two vectors Z and E we can express equation (8) as equation (10)

$$(I - M)Z = E \dots\dots\dots(10)$$

By rearranging the terms, we arrive at the multiplier formula

$$Z = (I - M)^{-1}E \dots\dots\dots(11)$$

Equation (11) tells us that, when exogenous demand (E) such as government spending, Investment & export increases, the final increase into the total demand equal to Z. Matrix Z is known as multiplier matrix or SAM based multiplier model. With this formula, we can calculate the size of multiplier across the different sectors and households. This multiplier indicates the relative income generating capacity of different sectors to the household, and also indicates the sectoral interdependence between agriculture, industry and service.

To derive matrix multipliers in equation (11), the collected data will be analyzed using the matrix algebra in excel, MINVERSE and MMULT function. MINVERSE inverts matrix and MMULT multiply two matrix.

IV. Expected Outcome

In the past five years, together with other economic policies, Agricultural Development Lead Industrialization strategy (ADLI) has brought significant double digit economic growth in Ethiopia. As agriculture is the livelihood of 85% of the population, it is believed to be a key player in reducing poverty, the researcher will expect the welfare reducing impact of agriculture is more than that of the industry and service and also there is a strong linkage between agriculture and Industry.

V. WORK PLAN

5.1 Time schedule

The following is tentative schedule for the main activities throughout the research process.

No	Activities	Duration
1	Project Proposal writings	September 1- 30,2010
2	Completion of first draft project proposal and submission	October 10,2010
3	Final Project Proposal submission	October 12,2010
4	Data collection	October 12- 30,2010
5	Literature review	November,2010
6	Data cleaning and organizing	December ,2010
7	Data Analysis and write-up	January ,2011
8	Completion of first draft report and submission.	February, 2011
9	Final research paper submission	March 30, 2011

5.2 Budget

With the assumption of current price, the research will be carried out with the following logistics and budget.

No	Item	Unit	Quantity	Unit Price/Birr	Total Cost in Birr
I	STATIONARY EXPENSES				
1	Photo copy & printing Paper	Ream	8	100	800
2	Rewritable CD	No	10	20	200
3	DVD	No	2	30	60
4	Flash Disk 3GB	No	1	450	450
5	Note Book Medium Size	No	5	12	60
6	Pen	No	15	3	45
7	Stapler	No	1	35	35
8	Staples	No	2	10	20
II	TRANSPORT EXPENSES				1500
III	MISCELLANEOUS EXPENSES				
1	Telephone and Postage				500
2	Internet service				2500
3	Photocopy and print service				1800
4	Secretarial service				1000
5	Contingency(5% of the total)				448.5
6	Total				9418.5

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