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IMPACT OF VALUE ADDITION TO TOMATOES ON POVERTY IN GHANA

Diploma thesis

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Abstract

The aim of the thesis is to determine the impact of value addition to tomatoes on poverty in Ghana. The research is based on the Scholarly Internship Development (SID) project that was taken in Ghana 2014 in association with Mendel University in Brno. There were used qualitative and quantitative methods for the research. The main methods were comparative analysis, regression and correlation analysis to determine whether domestic production is cheaper than imported tomato paste and its impact on poverty in Ghana. The result of this work shows a positive impact based on the research provided in this work.

Key words: Poverty, Value added, project plan, tomato paste, domestic production, import and export

Abstrakt

Cílem této práce je posoudit dopad přídatné hodnoty k rajčatům na chudobu v Ghaně. Výzkum je založen na projektu vědecké rozvojové stáži (SID), která byla vykonána v Ghaně v roce 2014 ve spolupráci s Mendelovou univerzitou v Brně. V práci byly použity kvalitativní a kvantitativní metody pro výzkum. Hlavní použité metody v práci byla komparativní analýza, regresní a korelační analýza, kde bylo určeno zda domácí produkce je levnější než dovážené rajčatové protlaky a popsání dopadu na chudobu v Ghaně. Výsledek práce poukazuje pozitivní dopad na základě provedeného výzkumu v práci.

Klíčová slova: Chudoba, přídatná hodnota, projektový plán, rajčatový protlak, domácí produkce, dovoz a vývoz

Content

Introduction

Poverty and projects had taken place since the independence of Ghana. The first president of Ghana and government had emerged the first project plan to develop all business sectors. The developing project plan had been many times proposed and some of them implemented, but most of them failed to sustain. Establishing a well prepared developing project plan may increase the wealth of the region and the country itself and of course plays a great role in reducing poverty. A developing project plan includes many advantages and risks that may occur before, during and after running an entrepreneurship.

The Upper-East region in Ghana is the poorest part of the country. Yet, this region has a potential to increase its wealth and agriculture sector. The majority part of economic production is based on agriculture. The farmers in this area face numerous problems, such as lack or none irrigation, lack of fertilization, knowledge and information, bargain power, etc.

Year after year farmers experience post-harvested losses of their crops (in this case tomatoes). It is due to the low demand of tomatoes in the past few years, where government finds easier to import raw tomatoes or tomato products. This means that farmers are forced to lower their production, which leads to lower income for the farmers, but the consumption of tomatoes rises each year. The reason is that they are not able to add value to their primary production. One possible way is to propose a proper developing project plan to a chosen company that will be able to add value and sustain a long-term profit to the company and income to the farmers and therefore to reduce poverty in the rural area.

1 Aim and Methodology

The aim of this work is to determine if value added to tomatoes has an impact on the reduction of poverty in Ghana and therefore to determine whether domestic processing of tomatoes into tomato paste is cheaper than imported tomato paste in Ghana.

1.1 Methodology

The work is divided into two main parts on theoretical and practical part. The theoretical part includes a rich literature review which is the reflection of the practical part.

The practical part is focused on different methods and data collection. For part of the research was used the developing project plan based on SID project as source of data. The field research has been surveyed in the Upper-East region of Ghana, in small town called Pwalugu. There was taken the discussion with the former manager of the Northern Star Tomato Company (NSTC) in order receive data for the project. The project is divided into selected areas which are background of the problem, executive summary, brief description of the company, strategy and activities, production and harvesting period of tomatoes in Ghana, human resource plan and financial plan, where, based on the received data from discussion of the manager, were used for setting up the start-up costs and operative cost, cash flow and selected indicators of investment efficiency (payback period, net present value, internal rate of return, profitability index).

$$(1)\ PB = t + \frac{b-c}{d-c}$$

$$(2)\ NPV = \sum_{t=1}^{n} \frac{NCF_t}{(1+k)^t} - IN = PVCF - IN$$

$$(3)\ IRR = \sum_{t=1}^{n} \frac{NCF_t}{(1+k)^t} - IN = 0$$

$$(4) PI = \frac{\sum_{t=1}^{n} \frac{NCF_t}{(1+k)^t}}{IN}.$$

Furthermore, there will be used SWOT analysis to recognize the possible strength and weakness inside the company and opportunities and threats surrounding the company. Risk management is shown as possibility occurrence based on information and discussion from the former manager of the NSTC.

For setting the cost of domestic production and imported cost of that product will be used comparative analysis at international prices and discussion advantages and disadvantages of the result. The comparative is measured in year 2011. The main method used for comparison were

$$(5)\ Cost\ of\ DP\ per\ unit = TC_{DP} / \sum Q_i$$

$$(6)\ Cost\ of\ IP\ per\ unit = TC_{IP} / \sum Q_j.$$

The result is the difference between these two formulas.

As a main part is to establish regression and correlation analysis to determine the relation between selected variables and evaluate the upcoming result. The mode for regression analysis is:

$$(7)\ y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$$

As for the correlation analysis was used Pearson correlation which is based on normal distribution and therefore the data had to be standardized.

$$(8)\rho_{X,Y} = \frac{cov\ (X, Y)}{\sigma_X \sigma_Y}$$

Qualitative and Quantitative techniques were used to analyse the data, and computer programmes such as SPSS and Excel was employed to help in the analysis of the data obtained at a *0.05 significance level*. In order to test for the impact of value addition to tomatoes in Ghana, there was made a use of a multiple regression analysis as given below:

VAT =f (AGR, ECG, HPI) where,

VAT is the Value addition to Tomatoes, ECG is economic growth and HDI is the Human development Index of Ghana as defined above.

The base econometric model is given as;

$$(9)\ VAT = \beta_0 + \beta_1 AGR_{it} + \beta_2 ECG_{it} + \beta_3 HDI_{it} + \mathcal{E}_{ti}$$

Where all variables are as previously defined except ε, which represents the usual error term, t, is time. The origin data required for the regression and correlation analysis are in the appendices.

The last part of the work will be summarized and discussed, therefore given recommendations and briefly conclude.

1.2 Objectives of the Study

- To establish the extent of value addition of tomatoes and its contribution to economic development
- Determine the cost of domestic production and import of tomatoes
- Determine the level of living standard by selected measures

1.3 Research questions

- How can value addition impact the standard of living in the selected area?
- To what extent can domestic production and processing decrease import of tomato paste?
- Will value addition help to reduce post-harvested losses of raw tomatoes?

1.4 Hypothesis

- There is a significant relationship between value addition to tomatoes and human development.
- There is significant relationship between value addition to tomatoes and economic growth
- There is significant relationship between value addition to tomatoes and agricultural sector growth

All of these hypothesis will verified by regression and correlation analysis to determine the relationship of selected mentioned variables above and the acceptance of hypothesis or otherwise the opposite.

Theoretical part

2 Poverty

Poverty is part of the development problems in global terms. Over a billion people today live in the conditions of extreme poverty. These conditions will be discussed more in the following chapters. To understand poverty we can just see from the economic perspective, but it is also connected to other dimensions such as social and cultural. Over the past half century there has been detected a significant improvement in reducing poverty, but extreme poverty still remains a widespread development problem. Poverty mainly includes developing countries in the world. In this chapter there will be discussed the different definitions of poverty, its types and characteristics, the main connections that contributes to poverty and measures of poverty.

2.1 Definitions of poverty

Poverty has been studied for very long time. At first there were used social science methods and measures of poverty to find explanations and understanding levels of poverty. There many types of definitions that describes poverty, but there is no exact definition for it, which would determine the scale of the problem. Some authors criticises the means of explanation and practical use. In this work there will be used a number definitions of poverty, in order to understand the concept from different point of views.

"Poverty is best understood as a function of social, economic and political structures and processes which create and perpetuate an unequal distribution of resource both within and, in a global context, between societies (Lister, 2004, p 51)." The author also argues that poverty is not only connected to material concepts but it tries to explain what does poverty mean to people who live in it and people without experience of poverty. According to Lister (2004) poverty takes place in the area of international development and real-life accounts to emphasize aspects of poverty which includes powerlessness loss of dignity, lack of voice and respect.

Another argument is defining the term of "*Othering the poor*" which may be understood as a discursive practice, which is reinforced by media representations. It describes how non-poor people think and the same time act towards and talk about poor people, not just at a personal level, but also at an institutional level (Lister, 2004). Othering the poor can be also seen from two different views in positive and negative point of view. In a positive way of thinking of the non –poor can look at the poor with pity or indifference or on the opposite side with fear or hostility, which leads to help or punishment, to ignore or further studies, but rarely to treat them as equal citizens with rights (Katz, 1989, p. 236).

According to Townsend (1979) he defines poverty in the lack of resource meaning. "By poverty, we mean the experience of lacking resource to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or are at least widely encouraged or approved in a particular society (Townsend, 1979, p 31)."

According to some poverty researches they agree on this definition which focuses on understanding the implications of not being able to afford for simple things, such as hot meal, but on the other hand things like to have a washing machine or go for a drink is not the main thing for survival. Defining poverty is also about what people need. Poverty is not just about statistics and other scientific measures but also it connected to political actions (Lister, 2004).

Nevertheless, different definition poverty leads to its different conceptions that generates different types of meanings of poverty which reflects different value position. Poverty and disadvantage is a range from structural and social to the area of cultural and individualism. Examples such as lone parents, sick and disabled people, unemployed people lead to different policy actions that explains poverty from different point of views which generates conceptions, measurements and meanings of poverty (Townsend and Gordon, 2002).

Poverty can also be seen as a political term. A conservative politician John Moore argues that facing the evidence of the higher levels of poverty, where he describes a relative approach…"*When the pressure groups say that one-third of the population is living in poverty, they cannot be saying that one-third of people are living below the draconian subsistence levels used by Booth and Rowntree* (Moore, 1985, p 5)."

In this case the poverty is the cause of political aspects and it should be effectively use through the instruments of policy in order to reduce poverty. Policy and definitions are closely connected to each other. In the UK during the lead of ex-prime minister Tony Blair was child poverty recognized as a key political issue that should be removed within twenty years (Walker, 1999).

Nevertheless, poverty is a global problem that stands as an obstacle for most of the developing countries that are experiencing at this moment. Furthermore, these definitions and measurements should describe and ultimately suggest solutions how to lower or destroy poverty.

2.2 Absolute and relative poverty

As in the chapter of definitions of poverty there is no exact definition for poverty. For this reason it is necessary to describe in different approaches.

2.2.1 Absolute poverty

"*Absolute poverty is usually associated with the idea that those who are experiencing poverty do not have enough to survive, and is sometimes also referred to as subsistence poverty* (Ridge and Wright, 2008, p 39)."

The term of absolute poverty focuses on the limit of amount of money necessary to meet basic needs such as clothing, food and shelter. It does not just depend the income but also it is necessary to find access to services that can be affordable. Unfortunately it does not take in concern the quality of life issues and the level of inequality in society. This may lead to lack of recognition of individual needs in the social and cultural concept.

As Extreme poverty was mentioned in above in the work, it is explained as an absence of factors that enables a person or families to assume basic responsibilities and continuously to enjoy fundamental rights. Absolute poverty was also defined by the former President of the World Bank in the 70s as "*a condition of life so degraded by diseases, illiteracy, malnutrition and squalor, as to deny its victims basic human necessities – a condition so limited as to prevent the realization of the potential of the genes with which one was born* (Sachs, 2005)."

2.2.2 Relative poverty

According to Townsend he believes that level of poverty is different in different societies. For this reason he defines "Relative poverty, which is based on the idea that the nature of poverty will be different in different social circumstances and therefore will change as society itself changes (Ridge and Wright, 2008, p. 39)." It is closely connected to economic inequality in a certain area (region) or society including people living in that society. To understand this term it is necessary to have people compared to other people around them or to what people can afford. For instance it can compare health care, lack of educational opportunity, civil rights and social opportunity. Townsend also defined relative poverty in the following way. "Individuals can be said to be in poverty when they lack the resources to obtain the types of diet, participate in activities and have the living conditions and amenities which are customary, or are at least widely encouraged or approved, in the societies to which they belong (Townsend, 1979)." For example it includes access to holidays.

2.3 Subjective and objective poverty

The concept of subjective and objective measuring of poverty is based on direct (subjective) and indirect (objective) ways of measuring poverty. Subjective poverty is based on feelings of persons of how do they see and feel it. This measurement is less used than objective measurement. It can also be understood that people feel poor if others have more than them.

The objective approach is based on statistic data, such as income. Most used indicators for objective measures are standard of livings. Sometimes it is very difficult to find the right and reliable measure of the economic sector and resource that people control and then to define the line of poverty (Ridge and Wright, 2008).

Nevertheless, poverty can be seen from two approaches, which was separated by Rowntree (2000) as primary and secondary poverty. Primary poverty defines people when they do not have enough financial resources or other resources to buy their needs. On the other hand Secondary poverty describes people who have enough resources for basic needs, but still does not meet their necessities, because they spend it on other activities.

2.4 Social exclusion

One of the latest concept that focuses on the social activity and on the ability to participate in popular social groups, which determines if people have an affordable and acceptable standard of living.

Social exclusion does not just refer to poor countries, but to all people who are unable to participate in social activities and they are force to live in deprived lifestyle.

Social exclusion can be understood from numerous different point of views, but according to this work there has been chosen a definition that refers to the quality of life and availability of resource.

"*Social exclusion is a complex and multi-dimensional process. It involves the lack or denial of resources, rights, goods and services, and the inability to participate in normal relationships and activities, available to the majority of people in a society, whether in economic, social, cultural or political arenas. It affects both the quality of life of individuals and the equity and cohesion of society as a whole* (Levitas, R. and col., 2006, p. 25)."

The social exclusion approaches consideration of social relationships and their opportunities to modify their situation, which described in the following factors:

- **Multi-dimensional** – connection of different dimensions of social exclusion

- **Relational** – defining the availability of resource of the community, which includes individuals and households
- **Relative** – including social context
- **Dynamic** – monitoring changes in a long time period
- **Process-oriented** – overseeing institutions and their role that cause poverty or social exclusion in the processes

Another way how to see social exclusion are the terms of participation in social and other activities in the community, which are:

- **Consumption** – access to affordable prices of goods and services
- **Production** – take part in economic and social activity
- **Political engagement** – participate and involve in decision making at a local or national level
- **Social interaction** – create and be part of a family and community (Burchardt et al, 2002)

The governments and institutions recognized certain indicators to monitor social exclusion that differ from traditional measures such as income and lack of resources. The following indicators are divided in to two groups.

Government measures (DWP, 2006b)	Independent measures (NPI, 2006)
School attendance	Insecure at work
Infant mortality	Mental health
Fear of crime	Help to live at home
Households in fuel poverty	Without a bank account

However these indicators can only provide us a closer look to depth and extend of the society, but it cannot define or reason the poverty or social exclusion (Berthoud, 2006).

To conclude this chapter of social exclusion, it acts as a product of social relations and people who actually exclude and those who are excluded. Social exclusion contributes and connects to poverty, but at different areas and society is not the one and same problem for everybody and during the time its impacts act differently.

2.5 Characteristics of Poverty

As it was mentioned above many times in the text, poverty is connected to many aspects and dimensions of socio-economic, political and environmental factors. According to this work there will be used only certain factors that connects, contributes and explain the main features and problems of poverty. These factors include health, economic aspects, social features, level and quality of education, shelter, infrastructure and political approach.

2.5.1 Health

More than 1.2 billion people in the world live in extreme poverty. Poverty is a great contributor of diseases, such as Tuberculosis, Malaria, Cholera, water borne diseases, etc. Most of diseases appear in water, where access to clean water is a global problem for the poor, but having clean water doesn't mean using it properly, which leads to sanitation problems. For instance in India they clean there laundry in the river, which creates most of the known diseases. On the other hand in some countries they lack of medical facilities, medicines and information of basic health, which is up to the government and other organizations to secure their basic needs. As you can see the causes of lack of health are created not just by lack of facilities, but also by people living in it.

2.5.2 Economic

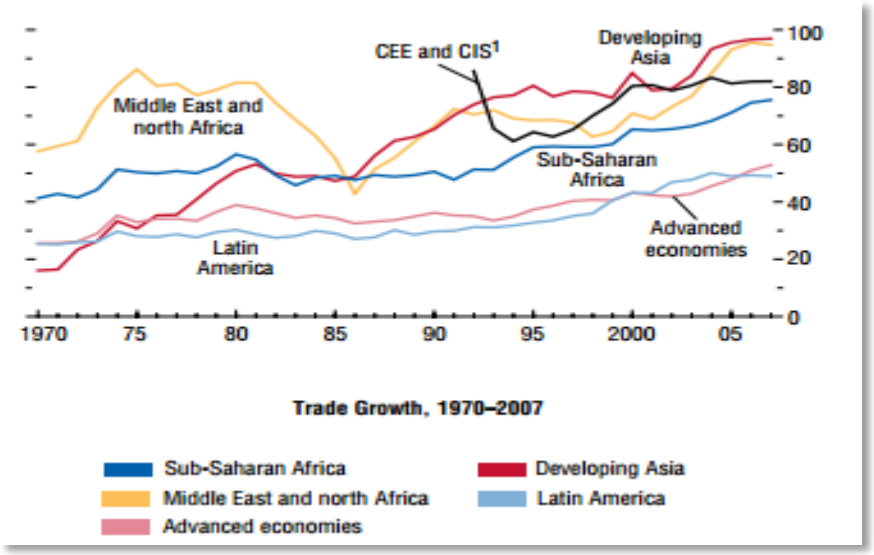
Due to a large scale of characterization of economic dimensions and description, in this shall be shown what causes poverty according to section of agriculture, access and use of resources and finally trade.

The importance of agriculture contributes to productivity and growth in the rural areas. It is the basic commodity for other sectors of the economy, such as industrial and manufacturing plants. In most of developing countries agriculture is the basic income for people. Not to mention that these developing countries lack of inputs, irrigation, technology and information and skilled labour that can boost the other sectors of economy. Agriculture creates the demand for industrial sectors, which means if agriculture fails to grow, the industrial sectors will also fall in growth.

Africa today has one of the largest reserves of natural resources in the world, but still they are poor in compare to countries in the world. There are several causes of ineffective use of resource, which may be poor management, lack of effective allocation of resources, inadequate or none infrastructure, technology and information.

In order to increase growth in all economic sectors it is necessary to identify the market, meaning by settling the demand and supply. Developing countries face a problem with competing the prices at the international market. For instance you can see in figure 1 the changes of regional GDP in the last decades. As you can see, developing countries tend to increase their trade, where they exceed the advanced economies where catch up their growth, but even though the GDP of developing countries grow, they still face the problem of international prices, which decreases their income if the price is too high.

Fig. 1 Trade in goods and services (% of Real GDP)



Source: https://www.imf.org/external/pubs/ft/weo/2008/01/c5/Fig5_1.pdf

2.5.3 Education

Probably is the main key element to development. Africa and other developing countries in the world faces lack of literacy, numeracy and practice skills to generate economic added value. It is one of the main contributor to increase their living standard and community. Some developing countries experience “brain drain”, which is caused by temptations of environmentally and modern developed countries, who may offer better conditions for educated people from developing countries. Nevertheless, recent research showed that enrolment of school attendance has increased, but in several countries (Ethiopia, Nigeria, Zambia, etc.) more than 40 per cent of children do not meet the minimum knowledge or level of education the 4th and 5th grade (www.brookings.edu, 2012).

Tab. 1 Youth literacy rate (15 – 24 years, in percent)

Countries and areas	Time Period	Total	Male	Female
Sub-Saharan Africa	2011	70	76	64
Eastern and Southern Africa	2011	75	78	71
West and Central Africa	2011	64	73	56
Middle East and North Africa	2011	92	95	89
South Asia	2011	80	86	74
East Asia and Pacific	2011	99	99	99
Latin America and Caribbean	2011	97	97	97
CEE/CIS	2011	99	100	99
Least developed countries	2011	71	76	67
World	2011	89	92	87

Source: http://data.unicef.org/education/overview

Tab. 2 Adult literacy rate (15 years and older, in percent)

Countries and areas	Time Period	Total	Male	Female
Sub-Saharan Africa	2011	59	68	51
Eastern and Southern Africa	2011	66	73	59
West and Central Africa	2011	52	63	42
Middle East and North Africa	2011	79	86	71
South Asia	2011	62	73	50
East Asia and Pacific	2011	94	97	92
Latin America and Caribbean	2011	92	92	91
CEE/CIS	2011	98	99	98
Least developed countries	2011	58	67	50
World	2011	84	89	80

Source: http://data.unicef.org/education/overview

If we compare both tables (1 and 2) you can see on the first look that youth literacy rate is higher at both genders and in total. This is a good news that education has made a slight progress for children and youth, which may eventually increase their living standard. Nevertheless, adult literacy rate is also important, because they create the active population where they add value to economy as a whole. The lack of adequate distribution of education between male and female still continues at global level. As one wise man said,

"Education is the most powerful weapon which you can use to change the world (Mandela, 1993)."

2.5.4 Infrastructure

In many developing countries infrastructure plays a key role of creating a network of transportation and communication. Although Africa lacks of transportation, such as trains, roads and water transport, the weakest link is energy, where more than 30 countries in Africa faces regular power outages (WB and France Development agency, 2010). Some companies in Africa are force to operate with diesel operated generator, which increases their cost of production (Mathias Grossmann, 2011). At these days China is the biggest financer and builder of infrastructure in Africa (WB, 2010).

Main sectors of infrastructure:

- Energy
- Transport
- Telecommunications
- Water
- Sanitations

According to AICD they define the main areas for policy making:

- Access
- Affordability
- Pricing

- Institutional aspects
- Fiscal and financial aspects (ICA, 2005)

For instance, if we look at agriculture in Africa they suffer from low levels of productivity which leads to hunger or famine. One of problems to feed the people of developing countries is poor infrastructure (transportation, telecommunication, energy and irrigation). This mainly includes rural farmers who suffer from hunger (Calestous Juma, 2011).

2.5.5 Political

Politics in Africa can be noticed since the era of colonization, where there can be seen the first shapes of policy in Africa. After the era of great independence African countries started to act on their own, but most of the countries simply continued and copied the previous political model, that was once established.

Nevertheless, policy plays a crucial part in decision making of social, economic and cultural development. The UNDP (1997) has identified nine points of characteristics of good governance, which should be a part of every country in order to increase the effectiveness of policy and create conditions that are suitable for the nation.

1. **Participation** – Everyone (men and women) should participate and have a voice in decision making
2. **Rule of law** – all laws should be fair
3. **Transparency** – access to information and provide an explanation of these information and monitor them
4. **Responsiveness** – services to all stakeholders by institutions
5. **Consensus orientation** – differing interests in order to reach a broad consensus in favour of interests of the group
6. **Equity** – Bothe genders have the same opportunities to improve their living standard
7. **Effectiveness and efficiency** – Effective use of information leads to better use of resource

8. **Accountability** – Politicians, private and other organisations are accountable to the public.
9. **Strategic vision** – leaders of the country and together with the public should have a long-term perspective on good governance and a prepared strategy on how to improve and what is needed for such development.

2.5.6 Shelter

Majority of the population in developing countries do not have decent shelter, such as sanitation and adequate accommodation. Lack of housing creates in the urban cities slums or homelessness. A part from the cities, in rural area are established uncontrolled settlements, which also leads to inefficient sewage system. In some cases people are forced to live outside at terrible conditions (UN, 2006).

2.5.7 Environmental

Since the 60s the year of independence, Africa has experienced economic and environmental problems. Lack of financial resources for investment forced some countries to exploit their natural resources which in fact left some impact on the environment.

The world organizations UNECA (1992, 1993a, 1993c), OAU (1995) and UNEP (1996a) recognized severe features that should be concerned:

- Land degradation and desertification
- Protection and sustainable use of forests
- Effective management and protection of biodiversity
- Water scarcity and efficient water management
- Pollution
- Climate change
- Demographic changes

2.6 Measurements of Poverty

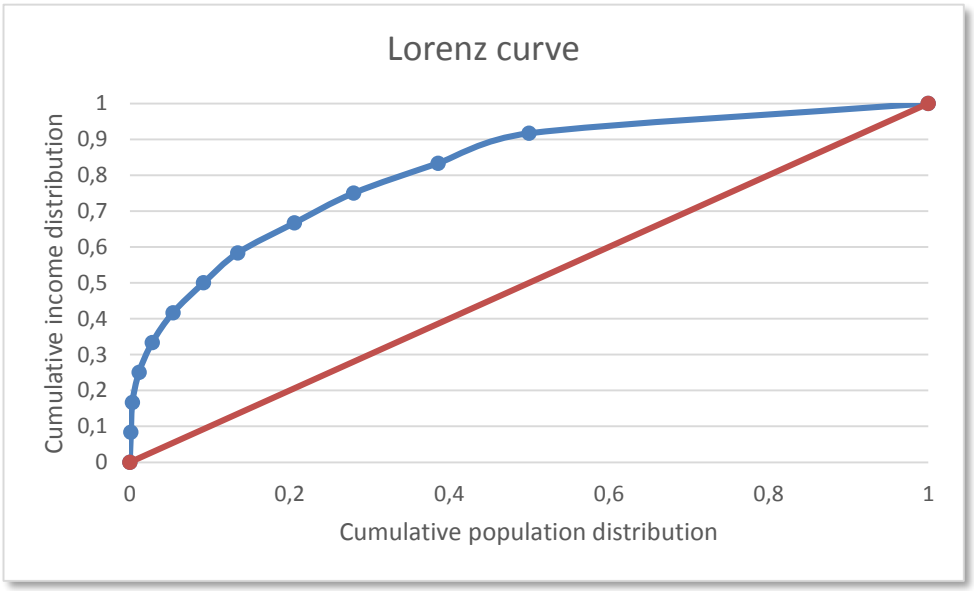
By measuring poverty we must choose the right strategy to reduce poverty. There is a whole scale of indicators that measures each factor that causes poverty. According to the scale of this work there will be only mentioned the most known indicators and indicators that will refer to the analytical part of work.

One of the traditional measurements of poverty is based on the minimum income that will meet the necessary needs for a decent living. Probably the most know for measuring the size of income is the Lorenz curve.

2.6.1 Lorenz curve

The Lorenz curve was designed by Lorenz (1905) as measurement of distribution of income in a given society. It explains the relation of the cumulative proportion of income to the cumulative proportion of households.

Fig. 2 Lorenz curve



Source: Author's calculations

Note: The values of the Lorenz curve are fictive and are only for description of use of Lorenz curve

The x-axis (Cumulative Population Distribution) represents the population (households) in a given society that are divided into quintiles. The y-axis (Cumulative Income Distribution) describes and represents the total income of the society. The Line of Perfect Equality is a situation when income is distributed equally to the whole society. Unfortunately in real time for instance the curve can be stated as it is shown in the figure above (Lorenz curve). For example 80 % of the population receives 90 % of the total income.

The Lorenz curve can be used for measuring inequality in the distribution of income, education, health, land use, infrastructure and many other factors.

2.6.2 Gini index

This measure calculates the area between the Line of Perfect Equality and Lorenz Curve. Its range is from 0 to 1. According to the World Bank (2013) it is an "*extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution* (World Bank, data.worldbank.org, 2013)."

Tab. 3 Gini indexes for the year 2013

Country (continent)	**2013**
Africa	
South Africa	63.1
Ghana	42.8
Zambia	57.5
Rwanda	50.8
Europe	
Poland	32.7
Finland	26.9
United Kingdom	36.0
Sweden	25.0

Source: http://hdr.undp.org/en/content/income-gini-coefficient

Indexes are in percentages which range from 0 to 100, where 0 is absolute equality and 100 absolute inequality

As you can see on table 3 generally European countries distribute their income more equally than African countries.

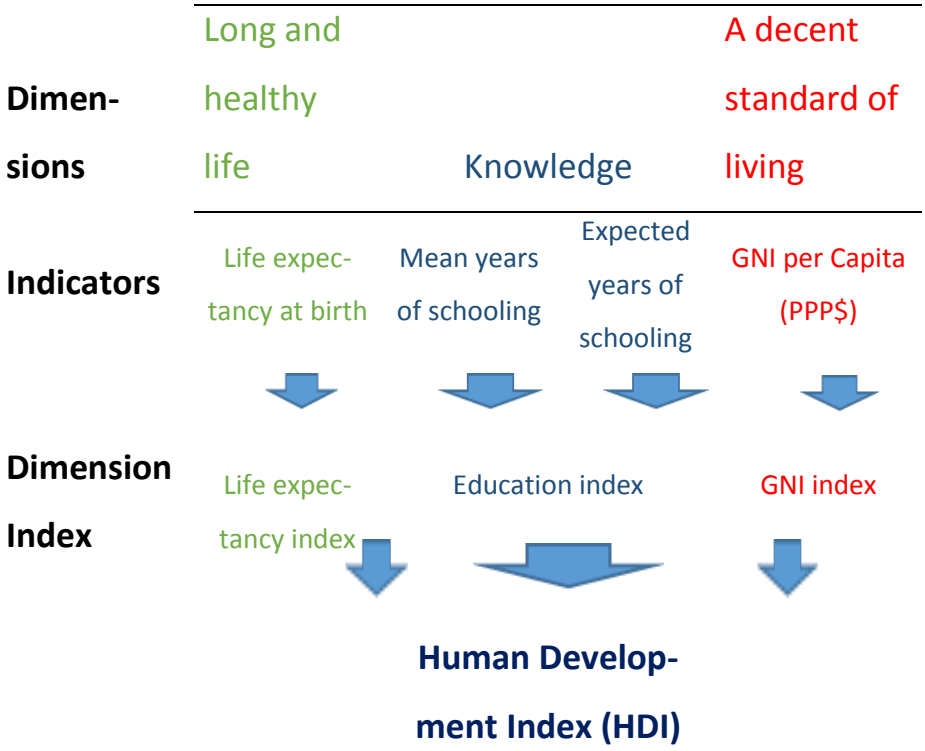
2.6.3 Human Development Index

The Human Development Index (HDI) is represented in the series of reports by the UNDP every year. According to the UNDP (2014) they define HDI as an index that measures the average achievement in key dimensions of human development which are based on three main goals:

1. A long and healthy life
2. Knowledge
3. A decent standard of living

In the following figure you may see how it is possible to calculate the HDI through certain indicators.

Fig. 3 Calculating the Human development indices



Source: http://hdr.undp.org/sites/default/files/hdr14_technical_notes.pdf

As you can see on figure 3 for each dimension is used a certain indicator.

- **Life expectancy at birth** – expected years that new-born infant could live if able to prevail patterns of mortality rates at the time of birth and to sustain throughout its life
- **Mean years of schooling** – it is the mean number of years of education that is finished by the population (25 years and older)
- **Expected years of schooling** - the number of years of attendance at school since the entrance age of a child and the expectation to spend a full (part) – time schooling during a life cycle
- **GNI per Capita (PPP $)** – gross national income (GNI) is basically explained as conversion from GNI to international dollars by using PPP rates.

The HDI is calculated by geometric mean of normalized indices of the three dimensions. The range of HDI is between 0 (low HDI) and 1 (high HDI).

2.6.4 Establishing the poverty line

For each country or region is line of poverty which determines the edge of living at a decent level a meets the basic needs. The World Bank determined the line of extreme poverty, which is below **$1.25 a day**. This measure is mainly used for comparison and identification of number of people living below the poverty line. For instance it is used for Sub-Saharan region.

On the other hand, for middle-income countries the poverty line is settled at **$2 a day**, which is more precise for these countries (World Bank, 2010).

2.7 Poverty reduction

There are several prepared plans to reduce poverty. In this chapter there will be mentioned the Poverty Reduction Strategy Papers (PRSPs).

2.7.1 Poverty Reduction Strategy Paper

The PRSPs was initiated by the IMF and WB (1999) as a coherent strategy for poverty reduction. It replaced the previous World Bank's Policy Framework Paper and it was respond to the Structural Adjustment Programmes (SAPs).

The PRSP describes a programme to promote economic growth and reduce poverty and focuses on the progress of macroeconomic, structural and social policies which takes an approximated three year or longer period.

Five core principles of the PRSPs

- Country-driven
- Result-oriented
- Comprehensive
- Partnership oriented
- Long-term perspective

The aim of PRSPs is to help to design a macroeconomic framework that is linked to the national strategy and budget of those countries, to strengthen public expenditure in order to maximize public spending on poverty, work closely with other donors to enhance cooperation and its effectiveness and align the Fund's country operations with domestic cycles and PRSPs.

2.7.2 Selected methods of reducing poverty

There is whole scale of methods of describing the level poverty in a surveyed country, but it is not significant which method is best to show how macroeconomic trade indicators (such as export) can affect the poverty.

For the research was chosen regression and correlative analysis to determine whether there is a relation among selected variables. The chosen variables are export, Human Development index (HDI), Agricultural growth and Economic growth. All of these variables have an impact on poverty reduction.

For instance if export increases it assumed that HDI, agricultural growth and economic growth would also increase. This state would prove that there is a positive relation among the variables. The relation of variables could also be negative in the regression and correlative analysis which means that with the increased export decreases HDI, agricultural growth and economic growth.

3 Value Added

3.1 Definition of value added

It is described as a process to transform the form of a raw product to create a final product with a higher value. It can also be explained as an addition of time and place to transform the form of raw product to meet the demand (preferences) of customers.

According to Royer (1995) he explains that market forces have created an opportunity to add value to primary commodities, which are:

- High demand of consumers for higher health, nutrition and convenience
- Processing companies are increasing their effort to improve their productivity
- New technologies that are able to meet demand of customers and their desire

3.2 Measures of value added

The most often used tool for measuring value added is the concept of comparative advantage. Basically its aim is to compare the relative efficiency of domestic production of goods with the rest of the world. On other hand it doesn't mean that processing raw commodities can be sold at price with profit influenced by economic conditions. There are a scale of elements that are not considered in this comparative measure such as marketing features and product quality. It means that it is focused on competitive advantages.

One of the comparative measures is the revealed comparative advantage index (RCA), Domestic Resource Cost index (DCR) and comparison of costs of domestic production and imported products related to the domestic production.

RCA it is an indirect measure that is based on macroeconomic features. The index is calculated as "the extent to which an exporting country captures world market share in a particular area relative to the degree at which it captures export market share for all traded goods (Webber and Labaste, 2010, p. 30)"

$$RCA = (E_{mn}/E_{mt})/(E_{xn}/E_{xt})$$

The formula represents indicators that was introduced by Balassa (1965), where there are explained as:

- E…….export
- m…….country index
- n…….commodity index
- t…….set of commodities
- x…….selected number of countries

If the RCA index is higher than 1 than it indicates a comparative advantage and if it's lower than 1 than the country experiences a comparative disadvantage. The RCA index can only measure historical performance. In other words it is missing the potential to evaluate future trends (Webber and Labaste, 2010). The RCA is only reliable on trading records and does not take in concern other limitations (for instance government policies).

DRC (Domestic Resource Cost) is a coefficient that shows the comparison of the domestic cost production with the international prices. It is a tool often used for cost-benefit analysis in developing country, where it is focused on the costs of domestic processing. The formula of DRC represents as it follows:

$$DRC = \sum(D * P_d)/(I_{pi} - \sum x_{ji}\, I_{pj})$$

This formula is consist of indicators which describes:

- D…….cost of domestic factors
- P_d…….economic price value
- W_p…….International prices, where indexes "i" and "j" are international traded input and output
- X_{ji}…….units of input "j" per units of output "i"

Therefore if the resulted values of DRC coefficients are lower than 1 than we can indicate a comparative advantage or if the value is higher than 1 we may expect a comparative disadvantage. Countries with a high DRC experience a lack of effective use of resource. Moreover, policies that are used by the government to enhance the production of those products without a comparative advantage leads to decrease of agricultural growth or other economic processing sectors (Webber and Labaste, 2010).

Another way how to measure value added is the comparison of the cost of domestic processing and imported products of the same item. This comparison is dependent on macroeconomic trade records and total cost of processing raw products in the country. The comparison does not include any macroeconomic externalities, market links or government regulations and policies.

It is a measure used by international prices in $US, where its aim is to estimate whether the cost of domestic processing is cheaper (higher) than imported products.

$$Cost\ of\ DP\ per\ unit = TC_{DP} / \sum Q_i$$

The formula describes the value of quantity per unit, where the indicators are as follows:

- DP…….Domestic production
- TC_{DP}…….Total cost of domestic production at international prices
- Q_i……Total quantity produced in a country

As mentioned above it is necessary to compare with cost of import per unit, which is calculated beneath the text.

$$Cost\ of\ IP\ per\ unit = TC_{IP} / \sum Q_j$$

The method of calculating the cost of import per unit is similar to the formula of cost of domestic production per unit:

- IP……Import
- TC_{IP}…….Total cost of imported products at international prices
- Q_j……Total quantity of a product imported to the country

This comparative measure will be used in the practical part of the work where it should evaluate and confirm the research question (in chapter 2).

3.3 Value-Added Agriculture

The term of value-added agriculture has been recognized as meaning to help the producers absorb shocks caused by globalization (Coltrain and col., 2000). In agriculture it is mostly connected with processing companies, where they basically increase the value of the primary commodity.

3.4 What is value-added?

Coltrain (2000) has described in his work that adding value to a primary agricultural product is a process of transforming (changing) from its previous state to a higher valuable state. In some cases, raw commodities can be feed to animals, which is also value added in form of animal protein.

In this work, it is the transformation of raw tomatoes in to tomato paste by manufacturing processing companies.

3.5 Approaches to adding value

The process of adding value can be done in different ways, but according to Tilley (1989) he argues that value added has two main waves:

- Innovation
- Coordination

He tried to focus on the questions of what, how, where and who is able to perform the marketing instruments in the most effective way.

3.5.1 Innovation

The main aim of innovation is to improve the existing processes, products and services or developing a new product or service. Developing value-added activities can be a source of country's growth by using new technologies, research and ideas (Kraybill and Johnson, 1989).

Nevertheless, not all innovations are the process of traditional crops into food products. In some cases, there are specific innovations in processing primary products of agriculture into non-food products. Some innovative processes have developed through research to transform for instance fresh tomatoes to oil.

3.5.2 Coordination

The purpose of coordination is to concentrate on the arrangements between producers and farm products. The coordination is divided into two dimensions, which are horizontal and vertical coordination.

Horizontal coordination works on the same level of food chain to consolidate companies at that level. Vertical works at different levels of food chain which focuses on creating contracts and strategy (Peterson and Wysocke, 1997).

3.6 Importance of minimizing costs before adding value

Before a producer adds value to its product, it is necessary to minimize the cost of production, because low cost will be able to compete in production and sustain its survivability in agriculture business. By implementing new technology doesn't mean that producers have added value to reach the maximum efficiency (Riemund and Harrington, 1993). In some cases, rural areas experience less farm jobs and rather enter into food processing sector as source of income and at the same time increase in employment growth (Brown and Petrulis, 1993).

According to Barkema and Drabenstott (1996) they suppose that adding value to primary products is a key to increase rural growth and therefore to encourage farm business and enhance their income which may provide further jobs in agriculture.

Sometimes it is very difficult to attract and find required skilled people to include them in the value chain according to local conditions (Ghelfi, 1993).

3.7 Value chain, value chain analysis and its approaches

Value chain is characterized as a coordination of processes and actors that take in part since beginning of the chain conception to its final use. Value is added to each part of the activity through the chain process. Due to these activities and actors they estimate where and what value is added in the supply chain. Adding value has an advantage of increasing the efficiency and potential use of the product perceived by consumers.

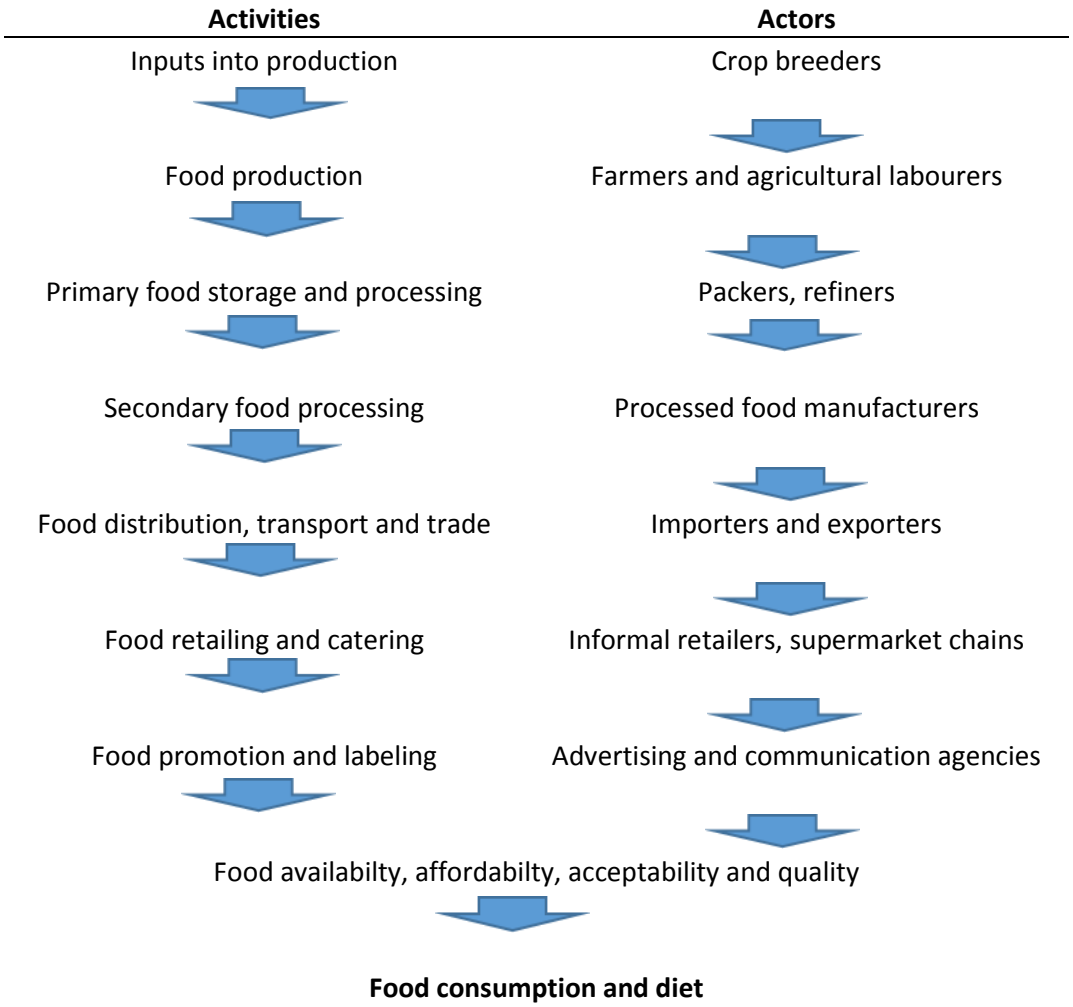
Value chain analysis identifies three features of recognizing involved actors:

- Actors that are part of the chain and their relation among them
- The role and performance of each actor's activity in the supply chain
- Activities and actors that attributes to the value chain

Nevertheless, there are many other ways to analyse value added chain, but it is assumed that the chain is affected by activities and interactions of actors and not by the individuals in the chain.

Value chain approaches to development has taken part to promote food value chain in developing countries. The main aim is to create a development project to increase the return of income to farmers. Furthermore they are not only focusing on the production improvement, but on the whole farming and processing system, which in other words is chain value. On figure 4 is shown the food supply chain, which demonstrates the activities and actors involved in the process, where each part has its own value in the chain (Hawks and Ruel, 2011).

Fig. 4 Food supply chain



Source: http://www.ifpri.org/sites/default/files/publications/oc69ch09.pdf

Note: Author's corrections

Each value chain has different requirement and therefore a different solution to set up and implement the information, research and technology and new financial impulses to the development (Hawkes and Ruel, 2011).

Practical part

4 Background of the problem

The reduction of poverty has been recognized as a key to increase economic development by using effective financial and economic tools. The agricultural sector and its activities are the main engine of Ghana's economy, where are employed 56 % of labour force of the total economic active population. Its contribution to GDP is estimated to 21.6 % (CIA factbook, 2015). All of these activities play an important role to contribute to employment, reduction of poverty, food security and increasing income levels of the rural population which leads to better standard of living.

Value added process of a primary crop, such as raw tomato, has potential to reduce the dependency of imported tomato paste (as a final product) and to improve foreign exchange reserves and employment in rural areas. According to all vegetables, tomato belongs to one of the most important vegetable in terms of production, yield, acreage and consumption. This commodity is capable to adapt to different types of soils and climate conditions (Ahmed, 1976).

According to available statistics, Ghana was estimated as the second largest importer of tomato paste after Germany, consuming over 25.000 tonnes of tomato paste a year in average (Aryeetey, 2006). The country has already available tomato processing factories, but none of them is at an operative level. The production of tomato in Ghana has failed to meet its maximum in yields. In long term, average yields continue to remain low (lower than 10 tonnes of hectare), which is mainly caused by post-harvested losses (Robinson and Kolavali, 2010).

The study is to examine the importance of value added process in tomato production in the Upper-East region of Ghana and its impact on the socio-economic development.

In the **appendix** is shown the project plan that describes steps and years of preparation of the project (the source is part of the SID project). Therefore there it continues with a figure that describes the main causes of post-harvested losses.

As part of the regression and correlation analysis has been attached the original data. The last attached figure is the Normal P-P Plot of Regression Standardized Residual that was resulted as a positive relation.

4.1 Ghana country profile

The Republic of Ghana is situated along the Gulf of Guinea, in the sub region of West Africa. It has a population of 25.9 million inhabitants with a density of 113.85 people per sq. km.

The total area is 238 533 sq. km. The country is divided into 10 administrative regions (Ashanti, Brong Ahafo, Central, Eastern, Nothern, Western, Greater Accra, Upper East, Upper West and Volta). The capital city is Accra with a 2.7 million people and it is also largest city in Ghana.

The official language is English, but Ghana also has over 50 local languages and dialects. There are more than 50 ethnic groups, which are divided as followed: Akan 47.5%, Mole-Dagbon 16.6%, Ewe 13.9%, Ga-Dangme 7.4%, Gurma 5.7%, Guan 3.7%, Grusi 2.5%, Mande-Busanga 1.1%, other 1.6% (Darkwah, 2014).

4.1.1 Economic situation

Ghana's economy has a sustainable growth with an average annual growth of about 6.0 % in the past six years. Last year in 2013 the growth experienced a decrease about 4.4% in compare with the growth of 7.9 % achieved in 2012. In the mid-year of 2015, the economy will probably expect an increase in the growth around 8%.

This could be bolstered by the increased private-sector investment, improved public infrastructure development and sustained political stability. This steady growth will help the country to better face development issues and meet MDGs goals. For example the national poverty rate in Ghana drop from 31.9 % in 2006 to 24.2 % in 2012, this is one of many proves that Ghana is making progress in development (Darkwah, 2014).

4.1.2 The situation of agriculture

The current situation in agriculture is quite deplorable in Ghana. For the past five years real growth in Agriculture has been decreasing. Between the years 2008 and 2009 there was a slight fall from 7.4% to 7.2%, then following year it dropped rapidly to 5.3%.

There was hardly any growth in the following year with only 0.8% in 2011 picking up slightly to only 2.6% in 2012. In general, if the agriculture growth will continuously stagnate, it can deepen the poverty of farmers (fisherman), which leads to a rising deprivation and hunger to food customers (Darkwah, 2014).

4.2 The Upper East region

The Upper East region is situated in north-eastern corner of Ghana. The capital is Bolgantanga, with a population of 1.064.545 inhabitants. The area is 8 842 sq. km. The whole region is covered by Savanah grassland (Darkwah, 2014).

4.2.1 Climate conditions

The climate of this region is dry. The climate is characterized by one rainy season from May/June to September/October. However the dry season from November to mid - February is characterized by cold, dry and dusty harmattan winds. The temperature at this period can drop to 14 degree at night and during the day it can reach to 35 degree (Darkwah, 2014).

4.2.2 Economic conditions

The main driver of the economy in this region is agriculture and handicraft works (65.9%). The others are production and transport equipment work (14.5%), sales work (9.5%) service work (3.9%), and professional, technical and related work 3.8 per cent. As you can see the economy is not very diversified in this region (Darkwah, 2014).

4.2.3 Farming system

The main system of farming is traditional, where they use simple farming tools hoe and cutlass. About 90% of farm holdings are less than 2 hectares in size.

The amount of agriculture production in this area is always dependent on the distribution of rainfall and nature of soil (Darkwah, 2014).

5 Importance of Tomatoes

Tomato is import from two aspects as a cash crop and diet. It is also an important component of consumption at households, distribution and marketing in Ghana. Tomatoes are usually harvested when they are fresh, but high moisture in throughout the country requires special treatment, including handling, transportation and marketing (Sablani et al., 2006).

According to Robinson and Kolavali (2010c) they estimated that more than 90.000 farmers participate in the tomato production, together with 5.000 traders and over 300.000 retailers and wholesalers. Households spend more than 40 % on all vegetables (fresh and processed).

Tomato production in Ghana has in the past years stagnated or even declined, due to higher import of tomato paste. As consumers demand higher proportions of processed foods from imports, the government is constrained with options to protect domestic food processing industries (Wilkinson and Rocha, 2006).

Nevertheless, Ghana has experienced in the past years an increase in demand for imported paste over domestic production of tomatoes, an increase of suicides of farmers who are unable to find a buyer at the market and the failure of government to reopen food processing industries. Agriculture in Ghana is losing its importance and sustainable growth, due to high demand of imported of processed products and unable to compete with the market prices of tomato products and low productivity.

5.1 Advantage of processing fresh tomatoes

If we try to image that tomatoes will not be processed than the value chain is very simple. The chain network goes through farmers to traders and lastly to the market. Traders are known as “market queens” where they sell their products from large market centres and tomatoes are sold retailers, institutions, and restaurants (Robinson and Kolavali, 2010).

If we look at countries with domestic tomato processing, they typically have a higher value than fresh tomatoes and usually tomatoes supplied to food processing industries have a contract between farmers and the supplied industry.

5.2 Post-harvested losses of tomatoes

Farmers have also experienced an increase in post-harvested losses which influences the productivity of tomatoes and yields that has failed to meet its maximum potential. Chandy (1989) describes several factors that causes post-harvested losses, which are long distances from farmers to markets, inconvenient storage facilities, rough handling that may lead to bruising and contact of tomatoes with soil that can contaminate tomatoes. For instance in 2011 Ghana produced over 510.000 metric tonnes of raw tomatoes, where approximately 30 % was estimated as waste, due to post-harvested losses mentioned above (MoFA, 2011).

5.3 Multiple dimension of processing tomatoes

There are numerous of dimensions that can describe different ways of processing food, in this case tomatoes.

- Processing of imported tomatoes for domestic market
- Processing domestic grown tomatoes for export
- Processing domestic grown tomatoes for local consumption

In most of developed countries we may find examples of the first two processing characters. The last example of processing domestic tomatoes for local consumption is mostly dominated in developing countries by informal sector, which tends to mass informal employment in Ghana (Sautier et al, 2006).

5.4 Tradable and non-tradable tomatoes

In general, food processing is a typical example of import substitution. While raw tomatoes (or other raw vegetables) are non-tradable due to high perish, processed tomatoes (or other processed vegetables) are tradable.

As mentioned above, raw tomatoes grown in Ghana are highly perishable. For instance, at the market in Accra, tomatoes can last only for 4 – 5 days before they rot due to high temperature and moisture in that area. The reason of this situation is that most of the traders in Ghana does not have access to cool storages to sustain tomatoes freshness.

The majority trade of tomatoes in Ghana is domestic and the rest is traded with close neighbours (Burkina Faso and Togo). In the past years Ghana has failed to support domestic production of processed tomatoes and rather enhance import of processed tomato products.

The price of tomatoes in Ghana, which is established by domestic demand and supply, are currently above the world price. The local chain production of tomatoes without processing, loses the opportunity to add value to raw tomatoes and income of households as whereas tax income to the government's budget (IFPRI, 2012).

6 Research in Ghana

The author of thesis has done the main part of the research during the time in Ghana as part of the SID project in association with Mendel University in Brno. The survey of the research was taken in January, 2014.

The author has shown in the research that Ghana is the second largest consumer after Germany. Thus, it was clearly realised that the country imports large amounts of tomato products mainly from China and Italy.

The research indicated that Ghana could be self-sufficient in processing tomato products and therefore it could reduce the importation of processed tomato products. At present the total production in Ghana is estimated at 340.000 (tonnes) in 2014, but according to available data there will only be used data from 2000 to 2011, which was estimated at 320.000 (tonnes) in 2011, but formally it produced enough tomatoes to feed two processing factories in the country.

The place of research was estimated in one of the processing factories, Northern Star Tomato Co. Ltd. (NSTC), in the Upper-East Region of Ghana in a small town called Pwalugu. The company was run down at that time, but it could be revamped to start processing raw tomatoes into tomato paste which could create ready market for the tomato out growers in the region and other regions and the same time create job opportunities for the people both at the factory and through its distribution networks for both wholesalers and retailers.

Therefore it shown expedient to prepare a developing project plan as part of the research of the project for the revamped of the factory and to estimate how would this impact the poverty of the region. In the following chapter will be shown a potential developing project plan of the surveyed processing company in Ghana and its result. These results will be used to compare with the value of import and therefore determine whether domestic production of tomato paste is cheaper than imported tomato paste (Darkwah, 2014).

NOTE

The source of data for the project was based on the discussion with the former manager of the Northern Star Tomato Company, where he provided necessary data for calculations of the project plan. These data are related to the manger's prediction to reopen again the company. During time of research the company was no operative.

6.1 Proposal of a project plan

According to this work, there will be included in the proposal of a project plan for NSTC the following features (Darkwah, 2014):

- Executive summary
- Description of the company
- Strategy and activities
- Harvesting period of tomatoes
- Human resource plan
- Financial plan
- SWOT analysis
- Risk management
- Conclusion

6.1.1 Executive summary

The Northern Star Tomato Company is a limited liability company processing raw tomatoes into tomato paste. It is located in Pwalugu in the Upper-East Region in Ghana. Right now the company is under the supervision of the Ministry of Trade and Industry. It has a machinery with capacity of processing five hundred metric tons of fresh tomatoes into tomato paste a day (Darkwah, 2014).

6.1.2 Description of the company

Northern Star Tomato Co. Ltd, formerly Pwalugu Tomato factory was commissioned by the National Liberation Council headed by Gen. Ankrah in 1967. The idea to establish one major factory in each District of Ghana was conceived by Ghana's first President Dr Kwame Nkrumah. It was Dr Nkrumah who contracted expert from the then Yugoslavia under the Convention Peoples Party to build the factory. Sadly Dr Nkrumah was overthrown before the completion of the factory. However after its completion the factory was placed under the supervision of the GIHOC GROUP OF COMPANIES.

The daily production capacity of the factory at that time was a hundred (100) metric tonnes per day. Interestingly and very economical the factory was processing other agricultural fruits and vegetables in addition to tomatoes.

Currently the daily processing capacity of the factory is five hundred (500) metric tonnes working twenty four (24) hours a day. The machinery and equipment can only process tomatoes for now.

Since the revamping of the factory in 2006, eight hours has been the maximum number of hours the factory.

Currently the factory has an experienced and well qualified consultant. He is in the person of Mr. Charles Gunu, who holds a master degree in Food Technology. You may call him the human calculator. He has collaborated well with the acting Managing Directed Mr. Joshua Azure, a seasoned civil servant, who is also the Upper East Regional Trade Director.

The factory only employs casual labourers for its seasonal operations, which begins in January each year and ends in May. As mentioned earlier the factory has a consultant, an acting MD, a substantive Farm Operations Manager whose core responsibility is to ensure availability of the tomato fruit to the factory. The factories financial account is being managed by a staff member of the controller and accountant's generals department. The consultant has assembled a team of technicians, and under his guidance they operate the machines.

The major challenge of the factory is the unavailability of tomatoes in the Upper East region for most part of the year. The implication is that should the factory buy tomatoes from beyond the Upper East Region added transport cost will increase its total cost of production (Darkwah, 2014).

Before reading further, it must be taken in note that the **NSTC was not operative** at the time of field research in Ghana.

6.1.3 Strategy and activities

The first part of the project will be the corporation with the farmers. Before opening the company it is necessary to find the suppliers that are able to fill the capacity of the company. The next step will be the contract between the farmers and the company, where the farmers will supply the agreed amount of fresh tomatoes to the company.

The second part will be the installation of the canning machine, vacuum pump and also the purchase of seven trucks. Once these parts are installed, the company may higher casual labourers and start with the training. Canned tomatoes have an advantage of low requirement of storages and also can last longer than fresh tomatoes, which gives at same time an advantage for the customers to use canned tomatoes any time within a year.

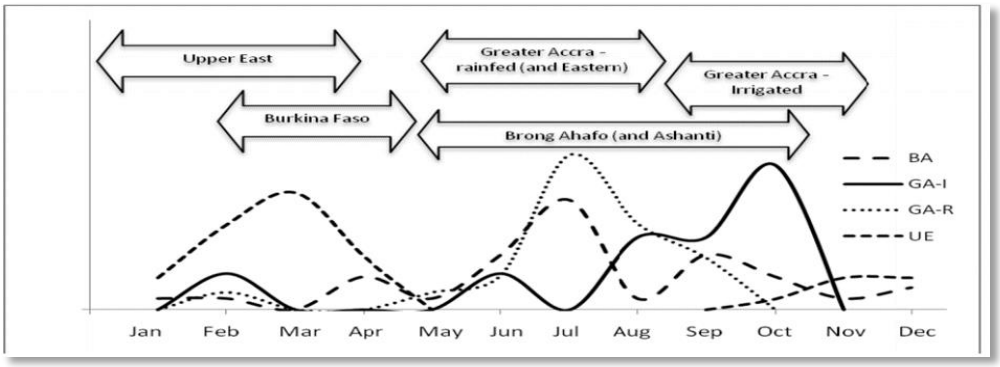
The other part will focus on monitoring the processing part and ensure that the quality of the product. Lastly the final products will be distributed to the shops, supermarkets and market places (Darkwah, 2014).

6.1.4 Harvesting period in Ghana

The seasonality of tomatoes in Ghana are different in each region. As we can see on figure 5 there five regions where they produce tomatoes at different times within a calendar year.

Between December and April/May, Upper East region and Burkina Faso supply fresh tomatoes at this time period for the whole country. Since June till the end of the year harvesting continues in the rained areas (Greater Accra – rain-fed), together with longer period in Brong Ahafo and Ashanti regions and finished by the Greater Accra – irrigated region in a calendar year. The Greater Accra region has an advantage of dominating the market later at the end of the year (Darkwah, 2014).

Fig. 5 Seasonality among tomato farming – peak harvest seasons



Source: Three-Region Survey 2009 (100 farmers); Trader Report to IFPRI.

6.1.5 Selected regions of growing periods in Ghana

According to the project, the most suitable importers of fresh tomatoes are from these regions: Upper East and Brong Ahafo region. There are several reasons why are these regions more suitable than others:

1. Distance of importing fresh tomatoes
2. Availability of fresh tomatoes during the whole calendar year
3. Ability to start a second season of growing tomatoes in Brong Ahafo region
4. The amount of production to fill the capacity of Northern Star Co (Darkwah, 2014).

Tab. 4 Growing and harvesting period in selected regions in Ghana

Harvesting period	**U-E**											
					B-A, 1. season							
									B-A, 2. season			
Calendar period	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Nursing and Transplanting										**U-E**		
		B-A, 1. season										
							B-A, 2. season					
Calendar period	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

Source: Authors work

As you can see in table 4 there are presented two regions Upper East (U-E) and Brong Ahafo region, which is divided into two season parts (B-A, 1. Season and B-A, 2. Season).

The reason for two seasons, is based on the interview with manager, who claims that Brong Ahafo region is capable to produce tomatoes in two seasons. The reason why they don't produce it now is that they wouldn't find enough customers and in fact they would experience additional post-harvested losses. On the other hand, if the company is revitalize, than the farmers would start another season. Based on this table, the Northern Star Co. shouldn't have a problem with filling the capacity, if we do not include any other circumstances that will be discussed further in the text (Darkwah, 2014).

6.1.6 Human resource plan

The company should be administered along functional management lines. The governance structure and lines of reporting and authority should be as shown in the organizational figure below, figure 5, according to the manager.

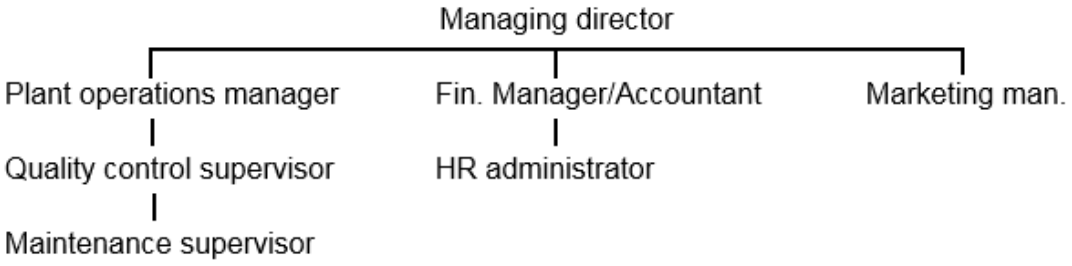
Moreover, the company should also employ 70 casual workers for a daily process. This gives us an approximately 85 employees in the company. The number of employees can increase in the future, but it depends on other circumstances, such as profit, storage capacities, machinery daily consumption of tomatoes to produce tomato paste, etc (Darkwah, 2014).

6.1.7 Employees of the company

- 7 skilled labourers
    - The function of skilled labourers are distributed in figure 5
- 70 casual labourers
    - Their function are mainly distributed in the processing part, but they will also have other functions, such as maintenance (machinery, storages,…), security, loading trucks, control of quality of the product, etc

- 7 drivers
    - Their main function will be transport of the product from farmers to the company and then to the market. They will also have to provide maintenance of their vehicles (Darkwah, 2014).

Fig. 6 Board staff



Source: Author's correction

6.1.8 Financial plan

The cost of the project (both start up and operative) are required from the discussion with the former manager of the NSTC during the surveyed time in Ghana as a part of the SID project.

Start-up costs

In the following table you can see the necessary expenses to start the project. The costs also includes net working capital for the operations before the company starts generating revenue (Darkwah, 2014).

Tab. 5 Start-up costs

Investment	GHc
Vacuum pump	3750000
Canning equipment	75000
Trucks	30625000
Plastic crates	225000
Uniform for workers	2240000
Net working capital	2197720,8
Total investment	39112720,8

Source: Author's calculations

Operating costs

Operating costs are related to operations of the company. The operations costs are divided into two sub-costs: Fixed costs and Variable costs. The following table shows the total costs of the company for a one year 70 % capacity of production (Darkwah, 2014).

Tab. 6 Operating costs

Variable cost	GHc
Fresh tomatoes	2065236
Salt	92400
Cans	11272500
Transport	1062936
Maintenance	2400
Fixed cost	
Water usage	45000
Energy	102000
Casual labourers	2400
Skilled labourers	3900
Drivers	2700
Total	14651472

Source: Author's calculations

Cash flow

Cash flow is the movement of money in/out of the project. All monetary units are expressed in Ghana cedis. Table 7 below shows the ten year cash flow projection, starting with capacity production at 75 % to 100 % in ten years.

Total revenue was calculated as $TR = \frac{price}{unit} * quantity$, where the estimated price is 4.8 GHC/kg. For the first year the price is 3.60 GHC/kg at 75 % capacity. Revenues are assumed to increase by 3 % every year.

Depreciation was calculated by using straight line depreciation method, that means the cost of equipment including freight and installation which amounted to 34 675 000 GHC was divided by 8 which is the number of years the asset is to be depreciated and the result is 4334375 GHC/year for 8 years.

The operating cost is estimated to be 64.98 % (calculated from the first year: (operating cots/revenues)*100)) of revenues as it increases for 3 % every year.

The tax for the cash flow is 25 % of the Earnings before taxes (Darkwah, 2014).

Tab. 7 Cash flow

Item/year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenues	22545000	23221350	23917990,5	24635530,22	25374596,12	26135834,01	26919909,03	27727506,3	28559331,48	29416111,43
Operating cost	14651472	15091016	15543747	16010059	16490361	16985072	17494624	18019463	18560046	19116848
Depreciation	4334375	4334375	4334375	4334375	4334375	4334375	4334375	4334375		
EBT	6966966	7203772	7447681	7698909	7957673	8224200	8498723	8781481	9999285	10299263
Tax (25 %)	1741741	1800943	1861920	1924727	1989418	2056050	2124681	2195370	2499821	2574816
Earnings after taxes	5225224	5402829	5585761	5774182	5968254	6168150	6374042	6586111	7499464	7724448
Depreciation	4334375	4334375	4334375	4334375	4334375	4334375	4334375	4334375		
Net working Capital										2197720,8
Net Cash flow	7003740	7181344	7364276	7552697	7746770	7946665	8152558	8364626	7499464	9922168
Cumulative	7003740	14185084	21549361	29102058	36848828	44795493	52948051	61312677	68812141	78734309

Source: Authors work

6.1.9 Indicators of investment efficiency

Payback period

Payback period is the time needed for the return on an investment to pay back the original investment.

The payback period was calculated by the following formula:

$$PB = t + \frac{b - c}{d - c}$$

t……the year when the initial investment exceeds the cumulative cash flow

b……..initial investment

c……cumulative cash flow in year (t)

d……..cumulative cash flow in year (t+1)

The payback period of this developing project is 5,28 years. It is due to high start-up costs and operating costs in relation with high revenues. The company will be able to pay back the investment in 5,28 years.

PP = 5.28 years

Net present value

Net present value (NPV) determines the current value of an investment by discounting all cash flows. If NPV>0 than the project is acceptable. The formula for NPV is:

$$NPV = \sum_{t=1}^{n} \frac{NCF_t}{(1+k)^t} - IN = PVCF - IN$$

t……..time period (1 to n)

NCF……..net cash flow

k……..discount rate

IN……..cost of investment

PVCF……present value of cash flow

The discount rate (k) for this project is estimated at 7,5 %, that was based on the discussion of the former manager.

NPV = 13546092.53 GHC

Internal rate of return

IRR is the discount rate where the present value of all future cash flow is equal to the investment or in other words if the IRR is higher than the discount rate (7.5 %) than it is desirable to undertake the project.

$$IRR = \sum_{t=1}^{n} \frac{NCF_t}{(1+k)^t} - IN = 0$$

t……time period (1 to n)

NCF……..net cash flow

k……..discount rate

IN……..cost of investment

IRR = 18.06 %

It is shown that the IRR is higher than the discount rate, which can be suggested that this project is acceptable. The minimum rate of return (18.06 %) is greater than the cost of capital (7.5 %).

Profitability index

PI is the ratio that determines the effect of investment. If PI is higher than 1, the project can be accepted. As the ratio of profitability index increases, the financial attractiveness of the proposed project also increases.

$$PI = \frac{\sum_{t=1}^{n} \frac{NCF_t}{(1+k)^t}}{IN}$$

t……time period (1 to n)

NCF……..net cash flow

k……..discount rate

IN……..cost of investment

PI = 1.34

As you can see the PI is higher than 1, which indicates that the project is attractive.

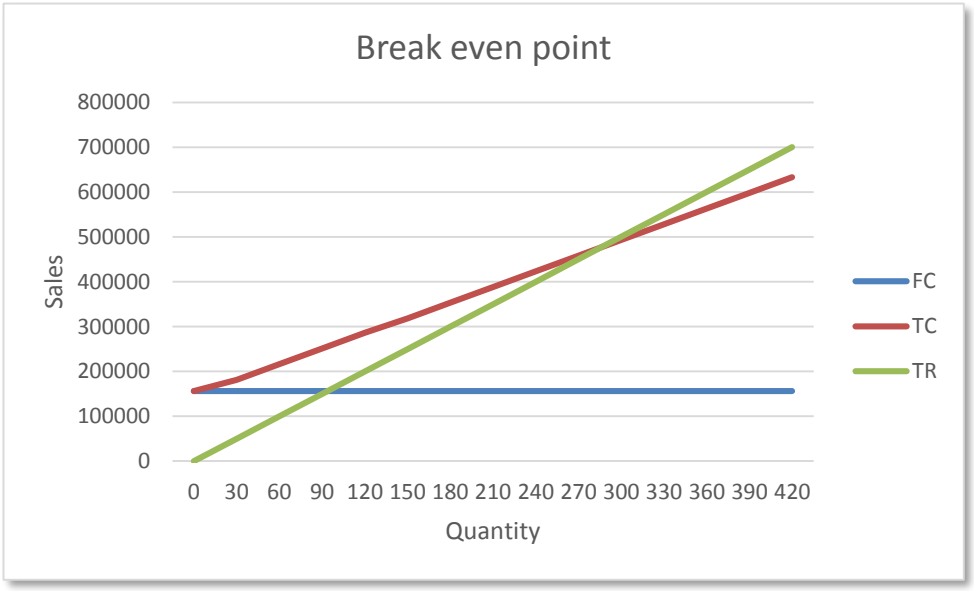
Break-even point

The break-even point represents the sales amount (unit or revenue terms) that is necessary to cover the total costs.

The volume of production in which costs and revenues are equal expressed in sales is 433 333,33 GHc.

The volume of production in which costs and revenues are equal expressed in quantity is 290.7 tonnes.

Fig. 7 Break-even point



Source: Author's calculation

As you may see on figure 7, the company must produce at least 290.7 tonnes of tomato paste to equal profit and loss. After producing more than 290.7 tonnes of tomato paste, it will be able to generate profit (Darkwah, 2014).

6.1.10 SWOT analysis

Tab. 8 SWOT analysis

Strength	Opportunities
Availability of water	Government support for business
Availability of energy source (Electricity)	Contracts with suppliers
Availability of labour	Great desire for area farmers to engage in tomato farming could drive raw material prices down
	Creation of jobs
Weakness	Threats
High administrative cost	High interest charges by local banks
High transport cost	Competition for raw materials with local market women who may be ready to offer higher prices.
Dependence on farmers for raw materials	Growing competition from importers.
The machine can process only tomatoes	Competition from subsidized tomato paste imported into the Ghanaian market

Source: Author's own work and corrections

Above in table 8 can see the challenges of the company, which they must face and take into account. According to situation of the company and the report from the manager, during the survey time in Ghana, there are more advantages (strength) to operate the company.

One of the main strength of the company are for example availability of energy source (electricity), government support and availability of water. The electricity is the main power source for operating a company. At the time being in Ghana the electricity was running on water power plant, just about 200 metres. Another strength of the company is the government support, which will ensure to offload shares to investors. Part of the processing in the company is the need of water supply, which is also available to the company. The availability of labour is a great advantage for the company where the company might not have difficulties to fill the capacity of the company in order to be at an operative level.

On the other hand company may find it difficult to cover the expense of hiring qualified and labour personnel. That is why one of the weakness part is the high administrative cost. Another weakened part of the company is the high dependency on farmers for raw materials, which is the basic for processing final products. Inadequate storage facilities may cause a problem to sustain tomatoes fresh due to the high temperature.

The government support could be a helpful relief for the company, like for example tax free for the first five years, additional subsidies or renting qualified personnel for a low cost. The company can also grant new jobs for the locals, which will make the region economically active.

The Northern Star Tomato Company can face some external problems that may threaten the very existence of the company. One of the threat is the high interest charges of the local banks or even worse that none of the banks will allow any loans to the company, because banks need to ensure themselves that the company is able to be creditworthy (Darkwah, 2014).

6.1.11 Risk management

The risk management can show us the probability of an upcoming risk of the project and also how to overcome the risk and find the best possible solution. The table below identifies the main risks of the project (Darkwah, 2014).

Tab. 9 Risk management

Risk	Impact of the risk	Elimination of the risk/possible solution	Probability of occurrence of the risk
High competitiveness	The project will not sustain long	Monitor the market situation	4
Incorporation with the farmers	Project wouldn't be successful	Maintain a good relationship or create a contract	3
Problems with installation of the machine	Project wouldn't be successful	Check the blueprints if every part fits	1
Non-approval of the loan from the bank	Inability of implementation	Find another bank with better conditions	3

Source: author's own work

Note: The numbers are probability of the occurrence risk – 1 –very low, 2 – low, 3 – medium, 4 – high, 5 – very high

6.2 Partial Conclusion

Ghana is one of the leading countries in consumption of tomatoes. It is part of their diet. Ghanaian farmers still experience post harvested losses and they often hardly find a buyer who would be able to buy all their products.

In the Upper East region the main economic activity is farming. For the Northern Star Company is a great opportunity to enhance these farmers to supply the company with their tomatoes. According to the financial analysis the company will be able at that point to revitalize itself at an operative level. Furthermore, this financial plan can sustain for many years, where their investment will return in 4 – 5 years. Another advantage of opening the company, that may work on a 75 % capacity and they will be still able to compete with current market. The company may provide jobs and steady income for farmers based on contracts. On the other hand there are threats and risks as mentioned in the project.

NSTC can also decrease the import of tomato paste. For example in 2011 the import of tomato paste was over 90 000 tonnes and it still increasing.

The company can expand and provide many other opportunities in the future. Moreover the company can share its knowledge and experience, in order to open other closed factories across Ghana to help poor farmers and increase their income through value addition (Darkwah, 2014).

7 Research Analysis of value addition to tomatoes

The research of this work will be analysed in two parts. In the first will be used comparative analysis of macroeconomic variables, such as production of tomatoes, import/export of tomato paste and raw tomatoes, consumption of tomato paste in Ghana, measured in years 2000 – 2011. Furthermore, it will follow with arguments and discussion and lastly to determine a comparison of imported tomato paste and domestic processed tomato to answer if domestic processed tomato production is cheaper than import of that product.

7.1 Production of tomatoes

The production of raw tomatoes' is measured in the period of 2000 to 2011 in quantity (tons). Table 10 describes the amount of produced tomatoes in a given time period, where it shows an average increase by 4.04 %.

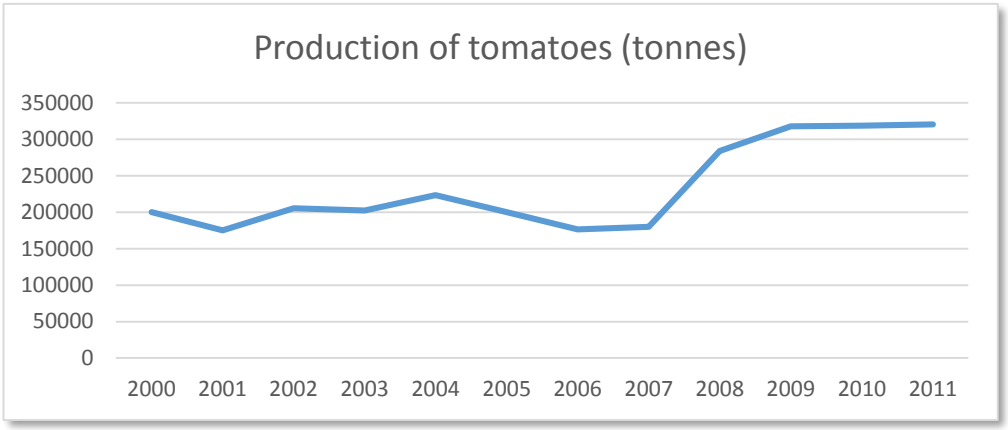
Tab. 10 Production of domestic tomatoes in Ghana (tonnes)

Years	Production of tomatoes (tonnes)
2011	320.500
2010	318.520
2009	317.520
2008	284.000
2007	180.000
2006	176.264
2005	200.300
2004	223.516
2003	202.136
2002	205.178
2001	175.076
2000	200.000

Source: FAOSTAT

For a better view we may look at figure 3 where you can see since 2000 to 2006 the productivity of tomatoes was stagnating at that time. Between 2007 and 2008 was a rapid increase up to 300.000 tonnes, which was caused by an increase in export of processed tomato products, but after 4 years there has been only a slight increase in the production of tomatoes.

Fig. 8 Production of tomatoes in Ghana (tons)



Source: FAOSTAT

7.2 Import and Export of tomato paste

Import and export plays a crucial role in the economic growth. Basically, if exports exceeds import the income to the government's budget is higher and in the opposite it increases revenues of the country. On table 11 and 12 you can see the total import and export of tomato paste in Ghana in the years 2000 – 2011 in tonnes.

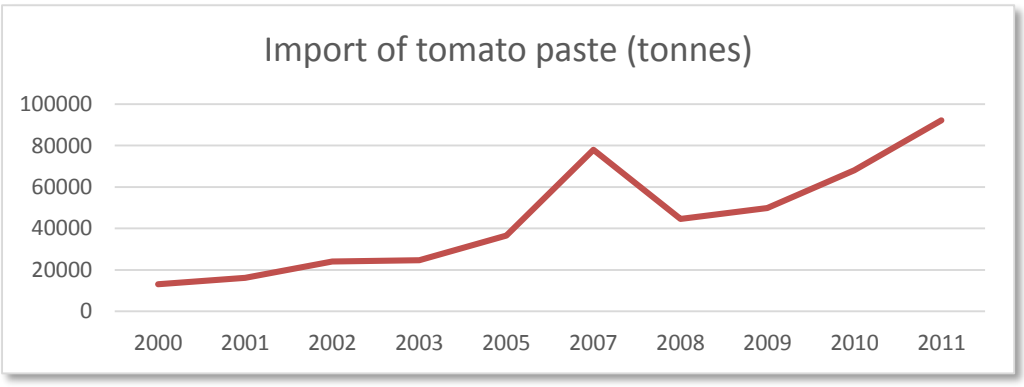
Tab. 11 Import of tomato paste (tonnes)

Years	Total import of tomato paste (tonnes)
2000	13049
2001	16151
2002	24078
2003	24655
2005	36540
2007	78006
2008	44652
2009	49831
2010	68044
2011	92121

Source: FAOSTAT

What describes the reason of high dependency on import shows figure 9, where you can see in year 2007 the demand for tomato paste has jump up to almost 80.000 tonnes. The reason was the increase of urbanization and closure of domestic processing companies. Since 2008 the demand for tomato paste was increasing rapidly. The government finds easier to import tomato paste, rather than focusing on domestic processing of fresh tomatoes.

Fig. 9 Total import of tomato paste (tonnes)



Source: FAOSTAT

Export of tomato paste in Ghana has been a long term obstacle on the international market. On table 12 we may see that export lacks the strength and amount to conquer import and therefore reduce it. Again year 2007 in Ghana was a success and was able to export more than 11.000 tonnes of tomato paste, which is due to processing companies that ran at that time.

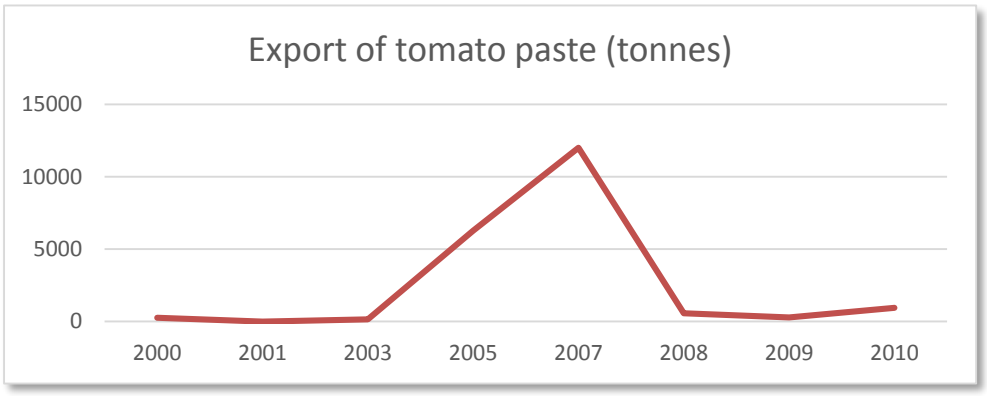
Tab. 12 Export of tomato paste (tonnes)

Years	Export of tomato paste (tonnes)
2000	261
2001	2
2003	164
2005	6264
2007	11989
2008	583
2009	276
2010	946

Source: FAOSTAT

As you can see on figure 10 the country was able to export, which means that there is evidence that the processing companies where able to produce tomato paste, but if we compare with the import from table 11 it is still higher than export. In general, the processing companies produced a certain amount of tomato paste in 2007, where the demand for tomato paste was covered by cheaper imported tomato paste, which in fact the processing companies had to find another market to sell tomato paste, in this case even abroad.

Fig. 10 Export of tomato paste (tonnes)



Source: FAOSTAT

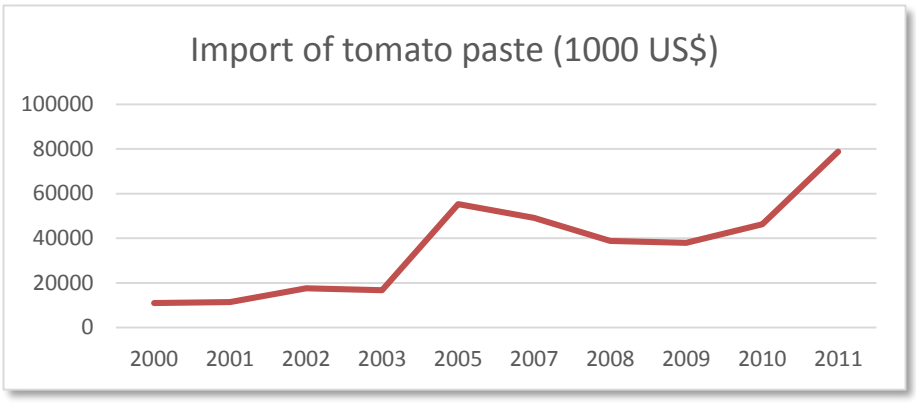
According to this work it is necessary to know, what the cost of imported tomato paste is. Based on the cost of imported tomato paste we can compare in the next chapter if domestic processing of tomatoes is cheaper than import. In table 13 we can see in an 11 year period of imported cost of tomato paste to Ghana. Probably the highest change was estimated 2003 to 2004 and 2010 to 2011. Both had approximately increased about 40 mil $US due to increased demand and high landed cost.

Tab. 13 Import of tomato paste ($US 1000)

Years	Import of tomato paste (1000 US$)
2000	11059
2001	11468
2002	17552
2003	16674
2005	55282
2007	49197
2008	38879
2009	38004
2010	46220
2011	78826

Source: FAOSTAT

Fig. 11 Import of tomato paste ($US 1000)



Source: FAOSTAT

The export of tomato paste proves that Ghana is able to compete with international prices of tomato paste. Again in year 2007 they were able to achieve 12.5 mil $US to their budget. Unfortunately, the closure of processing companies and changes in policies forced the Government to increase the import of tomato paste to meet demand of that product.

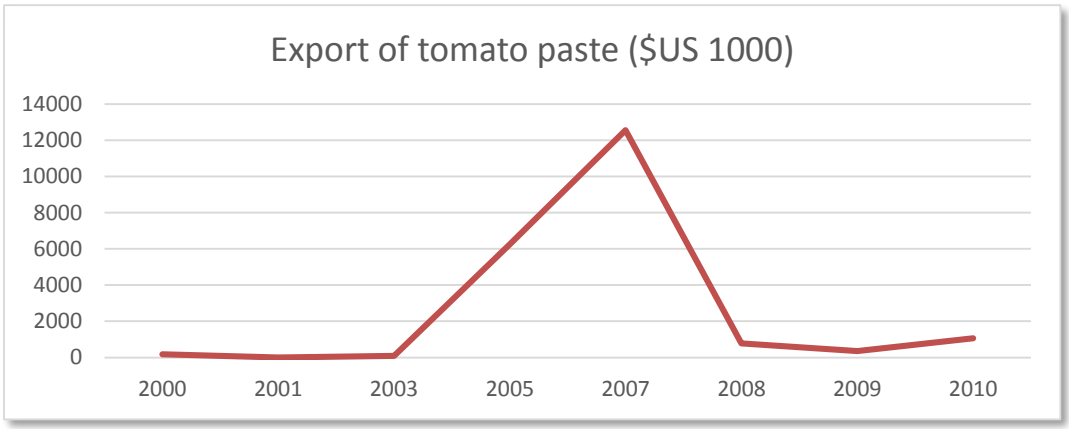
Tab. 14 Export of tomato paste ($US 1000)

Years	Export of tomato paste ($US 1000)
2000	185
2001	1
2003	88
2005	6261
2007	12555
2008	785
2009	351
2010	1057

Source: FAOSTAT

The value of exported tomato paste has reached its maximum in 2007, where the income was estimated about 12.5 mil $US. This amount of money could be used for lowering the cost of import or used for financing other sectors.

Fig. 12 Export of tomato paste ($US 1000)



Source: FAOSTAT

7.3 Cost of imported tomato paste and domestic production of tomato paste

To determine if imported tomato paste is cheaper than domestic processing of tomatoes we can see in the following two tables (15 and 16) that show us the total cost of tomato paste in $US.

Tab. 15 Cost of processing tomatoes in Ghana

Items	GHC/tonnes
Fresh tomatoes	108750
Fuel	190
Electricity	425
Water	150
Labour cost	30
Maintenance of equipment	200
Transport	3543,12
Total cost (GHC)	113288,1
Total cost ($US)	**29376.42**

Source: Author's calculations

Note: The total cost in $US is used for comparative analysis and the currency rate 0,25931 $US = 1 GHC

The source of calculations are part of the research of the Northern Star Tomato Company (NSTC). For processing 1 ton of tomato paste we need 8 tonnes of fresh tomatoes, where the cost of tomato is 0.2175 GHC/Kg. The machinery capacity of NSTC is 500 metric tonnes, which can process 62.5 tonnes of tomato paste/day. The total price of fresh tomatoes we need for processing is 108 750 GHC. It was estimated that the company will need about 100 l of fuel for processing at 1.9 GHC/l. The company has a monthly fee of electricity calculated in days (425 GHC). Labour cost includes all participants in the company. Maintenance equipment is for sustaining the vital of machinery and other equipment. The cost of transport includes the delivery of fresh tomatoes to the company and out to the market according to the number of trucks and distance.

We must take in concern that there are included variable cost and fixed cost in table 15. Variable costs can change in time which may affect the total cost from a longer-time-period view. In the following table 16 we will compare with the value of imported tomato paste to Ghana.

Tab. 16 Comparison of imported tomato paste and domestic production of tomato paste

Cost and amount of import	value
Import of tomato paste ($US)	78826000
Import of tomato paste (tonnes)	92121
Comparison of import and domestic production	value
Cost of imported tomato paste for 1 ton ($US)	855,7
Cost of domestic processed tomatoes for 1 ton ($US)	470
Difference	385,7

Source: Author's calculations

Note: Surveyed year is for 2011

As you can see on table 16 the data used for import was taken from table 10 and 12 from the last column of the year 2011. The cost of domestic production is calculated from table 14 from the column of total cost 29376.42 $US where the daily production of NSTC is 62.5 tonnes of tomato paste. Therefore, by dividing these two numbers we get 470 $US. It is clear that domestic production is cheaper than imported tomato paste. Difference between them is almost 385,7 $US/ton. If we take a look how much can the government lower the value of imported tomato paste it will be in the following way:

Savings = 92 121 x 385.7 = 35 531 069.7 $US/year

This means that the country is able to reduce the imported value of tomato paste. Unfortunately, the company's capacity is 500 metric tonnes for processing fresh tomatoes where we get 62.5 tonnes of tomato paste a day. In other words the company (NSTC) is able to produce 15 000 tonnes of tomato paste, which may cover only 16.11 % of the total consumption. Nevertheless, there are many opportunities for the country to benefit from domestic production of tomato paste, which will be mentioned in the following chapters.

The break-even point on figure 5 may show us clearly that the company will be able to make profit after producing more than 290.7 tonnes of tomato paste. It means that after 5 days of processing tomatoes the company will stop showing losses. Furthermore, the payback period of NTSC is another feature that can encourage investors to start running this company, because the return of investment is 2.16 years, which indicates it is worth investment.

8 Benefits

There is a whole scale of benefits of using domestic processing of raw tomatoes. In this chapter there will be discussed the benefits from certain point of views. First it will be aimed on the company, than at the local place of the company including farmers and the society living in that area, therefore there will be shown the advantages of domestic production of tomato paste and disadvantages of import. Lastly, will be viewed the benefits of domestic production for the government.

8.1 Benefits for the NSTC and farmers

The manufacturing processing company is the only processing company in the country. The company is able to cover the post-harvested losses of farmers and has the advantage of producing tomato paste at full capacity. NSTC has a machinery that is able to process other vegetables (cashew, shear nut, groundnut, pepper, beans and mango) growing in that country.

There will be open job opportunities for the youth in NSTC, which may have a positive effect on employment rate and crime rate. A possibility of expanding the industry, which will enlarge the production capacity that can generate higher profit. The government can support the company by free duty tax for the first five years.

As mentioned farmers will reduce their post-harvested losses. The farmers will have the opportunity to supply the company with fresh tomatoes, which they can ensure a steady income from the company. A steady income for the farmers can be used for further investments, such as irrigation, fertilizers or enlarging their agricultural lands. On the other hand a steady income can improve their living standard such as housing improvements, clothing, education for children, health care[1] and encouraging youth to start a business in agriculture.

[1] Health care is meant as an access and afordability of treatment in a hospital or medicines

The NSTC is located in the Upper-East region of Ghana, which belongs to the poorest region of the country. The main activity in this region is agriculture. The region can be seen as a core of agricultural sector to lower the dependency of the supply of tomatoes from Brong Ahafo Region and therefore the Upper-East region will be capable to supply enough tomatoes to fill the capacity of NSTC and thus, lower the cost of transport.

8.2 Benefits of domestic production and disadvantages of imported tomato paste

Domestic production has a main aim to lower the cost and dependency of imported tomato paste. According to the results of this work, the consumption of tomato paste is higher than the production of tomato paste from NSTC.

At this moment the country will still need to import to meet demand of tomato paste, but in time the company is able to increase its capacity of production, therefore if there will be other processing companies involved it may produce enough for the consumers and therefore to exceed import and create a surplus to export to neighbouring countries.

Thus, the income from export can be used for further investment in agriculture or other sectors.

8.3 Benefits of domestic production for the government

It is well known that the main income for the government is income tax. By revitalizing the company (NSTC) the government will receive a tax income from the company and also from the labourers as part of the company. As mentioned above the text it can decrease the number of imported tomato paste.

9 Regression and correlation analysis

The aim of the study is to analyse the impact of value added to tomatoes on poverty of Ghana. This section describes the data and analysis employed in the study. In this chapter will be used Human development index (HDI) to estimate in Ghana. The data are limited from 2000 to 2011, because newer data were not available for the research.

9.1 Data sources and variable definitions

9.1.1 Data sources

The study employed both primary secondary data sources (time series data) for its analysis over a 12 year period (2000-2011). Data sources include official publications of the World Bank, statistics and publications from the Ghana statistical services (GSS), journals and other important internet sources.

9.2 Definition of variables

Export of value added tomato

Export of value added tomato would be measured by the year value of exported tomato paste in $US. Export is a volume of goods and services that a country is able to produce and export it abroad. It is a benefit for each country, if the value of export is higher than the value of imports. A higher value of export increases the GDP of the exported country.

Agricultural growth rate

Agricultural growth rate is defined as the percentage change of the total production of each measured year. A positive agricultural growth rate indicates that the production in agriculture has increased.

Human Development

Human Development in this study would be measured using the Human Development Index (HDI). HDI measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, knowledge and a decent standard of living. These dimensions are derived from three basic indicators, namely, life expectancy, adult literacy rate and GDP per capita in purchasing power parity (PPP). It should be noted however that, HDI is not the only measure of Human development.

Economic Growth

Economic growth is defined as the rate of increase of the Gross Domestic Product (GDP) of a country. Positive economic growth is an indication that the economy is producing more goods and services.

9.3 Model Specification and Estimation

9.3.1 Estimating the impact of value addition to economic development in Ghana

In order to test for the impact of value addition to tomatoes in Ghana, there was made a use of a multiple regression analysis as given below:

VAT =f (AGR, ECG, HPI) where,

VAT is the Value addition to Tomatoes, ECG is economic growth and HDI is the Human development Index of Ghana as defined above.

The base econometric model is given as;

$$VAT = \beta_0 + \beta_1 AGR_{it} + \beta_2 ECG_{it} + \beta_3 HDI_{it} + \varepsilon_{ti} \quad \ldots\ldots (1)$$

Where all variables are as previously defined except ε, which represents the usual error term, t, is time.

Theoretically it has been argued that, value addition to tomatoes in Ghana has the potential to boost the agricultural sector and improve human development and enhance economic and social growth in Ghana. With this notion in mind, we do expect a negative correlation between poverty and export of value added tomato products in Ghana. However, it is expected a positive correlation between export of value added tomato products and overall economic growth in Ghana.

9.3.2 Data analysis tool

Qualitative and Quantitative techniques were used to analyse the data, and computer programmes such as SPSS and Excel was employed to help in the analysis of the data obtained. In addition, tables and figures were used as when and wherever appropriate in the presentation and analysis of the data.

9.4 Empirical Results, Analysis and Discussion

9.4.1 Impact of value addition to tomato on economic development in Ghana.

The table 17 below gives a descriptive statistics of the variables employed in this study. Employing the rule of thumb which says normal distributed variables used in a regression model should have a Z score of either skewness or kurtosis falling into the range of -1.96 to 1.96. From the table, it can be seen that Z scores when calculated for all variables fall within the expected range as per the rule of thumb. This therefore suggests that, our variables are normally distributed.

Tab. 17 Descriptive statistics of variables employed in the study

Descriptive Statistics

	N	Mean	Std. Deviation	Skewness		Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
exportx	12	5.5072	1.01738	-.995	.637	3.159
Agric growth rate (%)	12	4.3013	4.14896	.751	.637	-.404
economicgrowthx	12	.7735	.17178	1.086	.637	1.563
HPIX	12	-.4725	.02548	.589	.637	.404
Valid N (listwise)	12					

Source: Author's own

9.4.2 Regression model analysis of impact of value addition to tomato on economic development of Ghana

In order to analyse the impact of value addition to tomatoes on economic development in Ghana and therefore answer the proposed hypothesis of the study, we set the following null and alternative hypothesis as well as the decision rule;

Hypothesis 1

H_o: $a_1=0$ There is no significant relationship between value addition to tomatoes and human development

H_1: $a_1 \neq 0$ There is significant relationship between value addition to tomatoes and human development.

Hypothesis 2

H_o: $a_1=0$ There is no significant relationship between value addition to tomatoes and economic growth of Ghana

H_1: $a_1 \neq 0$ There is significant relationship between value addition to tomatoes and economic growth

Hypothesis 3

H_o: a_1=0 There is no significant relationship between value addition to tomatoes and agriculture sector growth of Ghana

H_1: $a_1 \neq 0$ There is significant relationship between value addition to tomatoes and agriculture sector growth of Ghana.

Decision Rule:

If p calculated < p at 0.05 significance level, we reject the null hypothesis (H_o) and accept the alternative hypothesis, otherwise, we accept it.

Table 18 below gives a summary of the multiple regression analysis of the impact of value addition to tomatoes on economic development at significance level $p< 0.05$.

The table shows the linear functional form for the regression analysis as it best fits the regression model employed and the best explains the variables in the study. The multiple coefficient of determination (R^2) for the regression model is 0.609 which shows that, 60.9 percent of the variations in the determinants of poverty reduction in Ghana were explained by the variables included in the model. Also the F statistics given is (15.227) and this is significant at 1 percent significant level. This shows that, the regression is significant and as such the data best fits the model used.

Tab. 18 Multiple regression analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Esti-mate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.639[a]	.609	.481	.91733	.409	15.227	3	8	.217

a. Predictors: (Constant), HDI, Agric growth rate (%), Economic Growth

b. Dependent Variable: export

Source: Authors work

The regression analysis showed in table 19 below shows the impact of export of value added tomato products to the variables used in the study with particular reference to Human Development and growth of the agricultural sector.

Based on the null and alternative hypothesis proposed and the decision rule stated above, it can be seen that, export of value added tomato products was not significant at p< 0.05 for all the economic indicators selected for the study. Significant p values obtained for export were 0.077, 0.418, and 0.394 for Agriculture growth rate, economic growth and Human development respectively which is greater than significant level 0.05. This implies that, we cannot reject the null hypothesis but to accept it and therefore conclude that, there is no significant relationship between export and agricultural growth, economic growth and Human development in Ghana.

Tab. 19 Regression analysis showing the impact of export of value added tomato products to economic development of Ghana.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.537	6.931		1.520	.167
	Agric growth rate (%)	.137	.068	.559	2.029	.077
	Economic Growth	.079	.092	.239	.854	.418
	HDI	-11.496	12.753	-.256	-.901	.394

a. Dependent Variable: exportx

Source: Authors own work

However, looking at the coefficient of correlation between the variables, the study showed there was a positive correlation between export and agricultural growth rate, economic growth and human development.

Tab. 20 Correlation matrix between variables

Correlations

		exportx	Agric growth rate (%)	Economic Growth	HDI
Pearson Correlation	exportx	1.000	.508	.280	.226
	Agric growth rate (%)	.508	1.000	-.041	.160
	Economic Growth	.280	-.041	1.000	-.247
	HDI	.226	.160	-.247	1.000
Sig. (1-tailed)	exportx	.	.046	.189	.240
	Agric growth rate (%)	.046	.	.450	.309
	Economic Growth	.189	.450	.	.219
	HDI	.240	.309	.219	.
N	exportx	12	12	12	12
	Agric growth rate (%)	12	12	12	12
	Economic Growth	12	12	12	12
	HDI	12	12	12	12

Source: Authors own work

The correlation therefore implies that as the export of value added tomato product increases, there would be a reciprocal increase in agricultural growth and as such as the agricultural sector is known to be the backbone of Ghana's economy contributing 40% to GDP, an increase in the growth of the sector would enhance economic growth and development of the country. Also, there was a positive correlation between export and human development which proves that export of value added tomato products would increase human development in the country. The reason for using Pearson correlation in the correlation matrix was that the previous data was standardized.

9.5 Summary and Discussion

To sum up the practical part, at first there was a brief description of the background problem of poverty in Ghana, where it is discussed the importance of agriculture and importance of value added which is able to reduce the dependency and cost of import. Furthermore, it describes the situation of processing factories, where during the surveyed time in Ghana there was no factory at an operative level.

The practical part continues with the description of Ghana from the view of economic, social and agriculture. Agriculture is the backbone of economic growth in Ghana, but unfortunately its importance is slowly decreasing.

Next to the Ghana profile was shown the reason and importance of tomatoes in Ghana. Tomato is an important cash crop and diet for the Ghanaians. It was estimated that Ghana is the second largest importer of tomato paste after Germany and it is expected that the import will grow due to increasing consumption. The following chapter continues with the problematic of post-harvested losses where farmers have experienced 30 % of their loss in 2011. Therefore the importance of tomatoes finishes with steps of processing tomatoes, meaning by the origin of raw tomatoes (domestic or imported) and final consumers (export tomato paste or local market sale) with explanation of which tomato product is tradable (tomato paste) and non-tradable (fresh tomato).

The main research was done in Ghana in 2014 as part of SID project in association with Mendel university, where starts with the problematic situation of processing tomatoes in Ghana. The main research tool was the discussion with the former manager of the Northern Star Tomato Company (NSTC), where the information was used for further research in the project. The aim of the project was to set up a developing project plan to revitalize NSTC by selected project tools.

The project was divided in selected parts starting with executive summary and brief description of the company. Therefore there was proposed a strategy and activities of the project.

The following chapter continues with the harvesting period of tomatoes in Ghana, where there were chosen selected regions (Upper-East region and Brong Ahafo region) for harvesting and supplying the capacity (NSTC). As part of function of the company is the human resource management to show the number of employed laboured and skilled people at the company and their function.

The main of the project was the proposal of a financial plan by determining the start-up and operation costs of NSTC. Therefore, there was used cash flow to determine indicators of investment efficiency, such as payback period (5.28 years), Net present value (13.546.092,53 GHC), Internal rate of return (18.06 %) and Profitability index (1.34). These indicators can show us that the project has a high potential of implementation in practice. The financial plan finishes with the break-even point and partial conclusion.

The research continues with macroeconomic trading records (2000 – 2011) including production of raw tomatoes, import and export of tomato paste (both in tonnes and international prices ($US)). The research follows with comparative analysis to compare the cost of domestic production of tomato paste and imported tomato paste. The result was that domestic production is cheaper than import. The saving is the difference between them (35 531 069.7 $US/year). The year is recorded for 2011. This part of research finishes with benefits for the NSTC, farmers and the government.

The last part of the research contains the analysis of the impact of value added to tomatoes on poverty in Ghana by using regression and correlative analysis. The variables are export of value added tomato, agricultural growth rate, human development using Human development index (HDI) and economic growth. Based on the null hypothesis there was decided that it was accepted according to the significant level, which is higher than the significant level 0.05.

Therefore there is no significant relationship between value addition to tomatoes and poverty reduction, together with agricultural growth and economic growth. The R^2 of the model has explained that 60.9 percent of the percent of the variations in the determinants of poverty reduction in Ghana were explained by the variables included in the model.

In the correlation matrix was used Pearson correlation according to the standardized origin data and time period of those data. Therefore, the coefficient of correlation between the variables, the study showed there was a positive correlation between export and agricultural growth rate, economic growth and human development.

9.5.1 Discussion

The advantage of the project shows that by revitalizing the NSTC can bring many opportunities for both Upper-East region and Ghana. NSTC has an advantage of employing more than 70 people in the factory that also has an impact on their income. The employed people can improve their standard of living such as improved housing, health care, and clothing, afford higher education for their children and themselves. These one of the many factors that can reduce poverty. Another advantage reducing or eradicating the post-harvested losses of tomatoes in the Upper-East region. Over 30 % of their losses can be supplied to the company and increase their income.

As mentioned above, the farmers can improve their standard of living, but also they can increase their production and harvested land area, which at the same time can reduce the cost of transport of the company that will be at the beginning of the planned project relied on the supply of tomatoes from Brong Ahafo region to fill the daily capacity of the company.

Moreover domestic production can reduce the amount and value of imported tomato paste. Therefore the government can save each year more than 35 mil $US. These savings can be used for further investment such as education (building schools, improved quality of education), health (expand hospitals), agriculture (invest into other processing companies, support farmers with inputs) and many more. By reopening the NSTC the government will receive an income tax and indirect tax from domestic sales of tomato paste that will increase their budget.

Disadvantages can also occur in the project which can affect the survival and sustainability of the project. For instance farmers won't be willing to cooperate with the company and supply the amount of tomatoes to that company. The reason can be low offered price of buying tomatoes from the farmers. The climate condition can lower the production of tomatoes in the Upper-East region which will force the company to look for more tomatoes in other regions in Ghana that will lead to higher transportation cost.

The government will not support domestic production of tomato paste (for instance free taxes for the first 5 years), which will lead to higher dependency on import and lower margin for the company.

The high competition at the market may force the company to decrease their price of tomato paste which may lower the company's profit.

9.6 Recommendation

The research of this work has shown a potential to enhance the project to go in practice. Therefore there has been mentioned advantages and disadvantages of the project in the discussion. Nevertheless, I would recommend further field research in the Upper-East region to ensure that the project has all known limitations and obstacles that can be overcome or reduced. Even though the project seems acceptable I would recommend at least a 2 year monitoring of the developing project plan. Lastly the NSTC is relied on the supply and cooperation of the farmers. In this case, I would recommend to recognize their needs, not just financial, but also socio-economic needs (for instance health service, education, etc.)

As it is shown in the risk management in (table 9) the high probability of incorporation with farmers has potential to occur and threaten the developing project plan. It would be recommended to motivate the farmers by supporting them with inputs (fertilizers) or offer them contribution to their children's education. The market is already filled with low prices of tomato paste from abroad. In this case, Ghanaians are a proud nation and would prefer domestic tomato paste, but the price must be bearable or lower than the market offers.

The SWOT analysis (table 8) has shown that it is necessary to reduce the transport cost of the NSTC. The Upper-East region is able to supply only for four months in the year, which forces the NSTC to transport tomatoes from Brong Ahafo region which is approximately 4 times further than transporting it from the Upper-East region. In order to lower the cost of transport, the NSTC would have to invest into inputs for farmers in the Upper-East region to fill the capacity of the company.

The growing competition from importers can force the company to lower the price of tomato paste, even beneath profit. A possible solution would be to apply to the government to set a free tax for the NSTC at least for five years before the amount of investment returns calculated in the payback period.

Conclusion

The aim of this work was to analyse the impact of value added to tomato on poverty in Ghana. The research provides a potential project plan that can be used in practice and show benefits that can lead to poverty reduction. The methods used in the research cannot determine if it has a high or low impact, but only a slight effect on the reduction on poverty. There must be taken in note that there are other intervenes which can affect the process from value added to poverty.

The main contribution of this thesis is to show, that a well prepared project plan can show the investor that it is possible to benefit from processing business. Therefore governments can also see advantages from reopening the NSTC where the company can positively contribute to the agricultural and economic sector. Furthermore, the farmers growing tomatoes may reduce their post-harvested losses and improve their standard of living.

I've chosen this topic, because tomato and its processed products are very imported as a diet and cash crop. Another reason was emerging increase of post-harvested losses of tomatoes every year in Ghana. There came the idea to join the SID project and show a possible way to increase the wealth of Ghana.

This work can be applied as a sustainable model for government policy to improve the standard of living of farmers in the Upper-East region. The work contains a project plan that can be implemented in practice use and therefore to reduce post-harvested losses of farmers and at the same time to reopen the NSTC to process tomato paste. The thesis also shows a prediction for the NSTC that the it can process other vegetables or fruits.

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Appendix

List of shortcuts

AICD	the Africa Infrastructure Country Diagnostic
GDP	Gross Domestic Product
GNI	Gross National Income
HDI	Human Development Index
ICA	Infrastructure Consortium for Africa
OAU	the Organization of African Unity
PRSP	Poverty Reduction Strategy Papers
PPP	Purchasing Power Parity
SID	Scholarly Internship Development
NSTC	Northern Star Tomato Company
UN	United Nations
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNICEF	United Nations International Children's Emergency Fund
WB	World Bank

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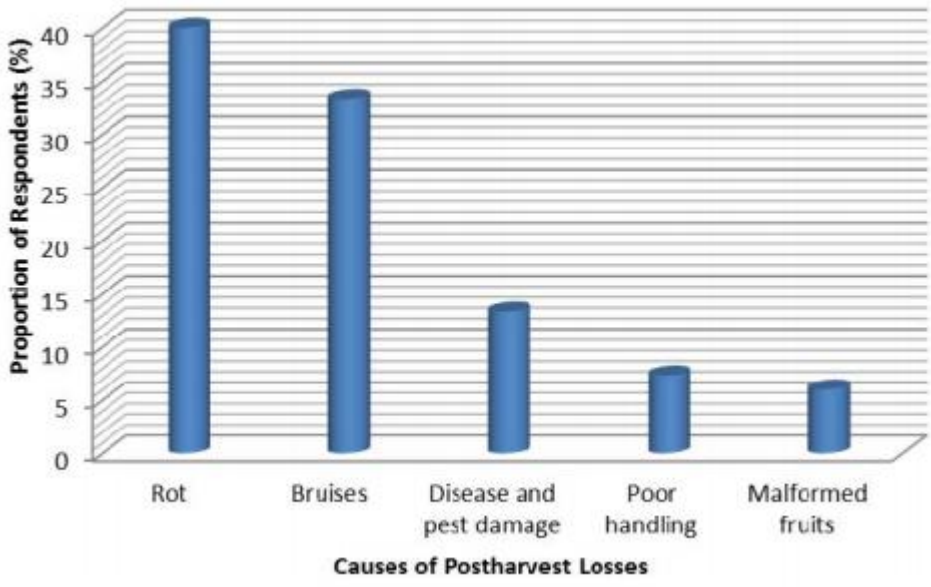
Project plan

Acitivity	2014												2015												2016											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Preparatory phase																																				
Gathering information																																				
Contact the participants																																				
Analysis of the problem																																				
Contract with the participants																																				
Approve a loan																																				
Preparation for the realization phase																																				
Realization phase																																				
Purchasing trucks																																				
Purchasing and launching canning machine																																				
Purchasing and launching vacuum pump																																				
Cooperation between farmers and the company																																				
Production of canned tomato paste																																				
Monitoring market situation																																				
Monitoring and evaluation																																				

Source: Authors own work

Causes of post-harvested losses



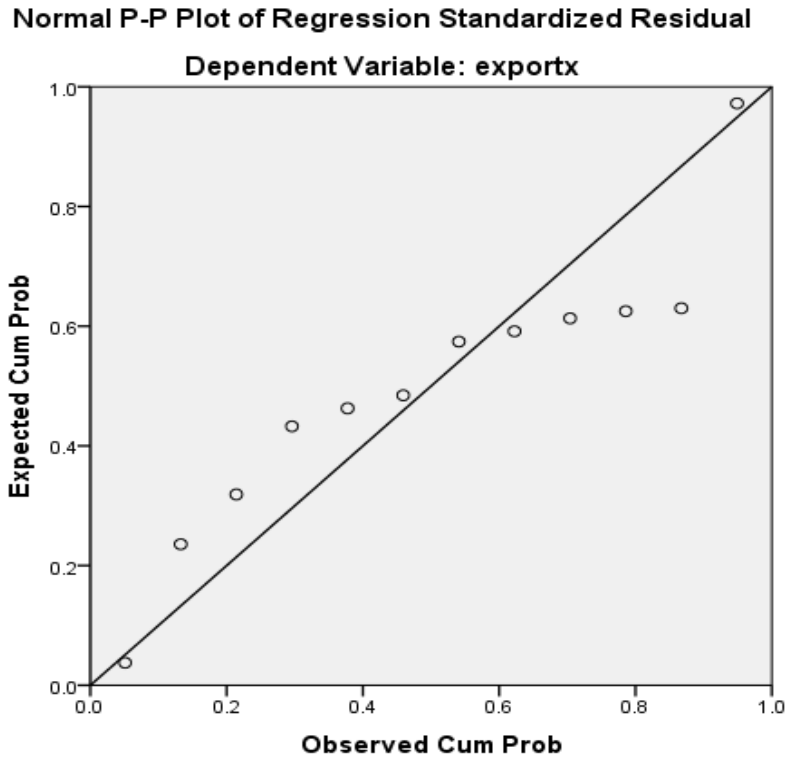
Source: Authors work (SID project)

Data source for regression and correlation analysis

year	export of tomato	HDI	GDP growth rate (%)	Agric growth rate (%)	Economic Growth (%)
2000	185000	0.57	4.00	4.76	3.70
2001	175076	0.57	4.50	11.54	4.00
2002	205178	0.52	5.20	1.66	4.50
2003	1000	0.53	6.40	-1.44	5.20
2004	88000	0.54	8.40	2.07	5.60
2005	6261000	0.54	4.00	1.79	5.90
2006	284000	0.49	8.00	0.68	6.40
2007	12555000	0.50	6.40	11.30	6.46
2008	785000	0.52	6.50	8.31	8.43
2009	351000	0.54	8.40	5.28	3.99
2010	320500	0.54	4.00	1.85	8.01
2011	1057000	0.53	8.00	3.79	15.01

Source: Faostat

Normal P-P Plot of Regression Standardized Residual



Source: Authors own work