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Institute of Tropics and Subtropics

Department of Economic Development in TS

Impact Evaluation of the Development project to local farmers (case study in Bié province, Angola)

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Declaration

I hereby declare and confirm that this thesis entitled "Impact Evaluation of the Development project to local farmers (case study in Bié province, Angola) is entirely the result of my own work under the supervision and guidance of Ing. Petra Chaloupková Ph.D of the Institute of Tropics and Subtropics and further declare that this thesis is not used as part of any other examination and has not yet been published.

Prague, 16. 4. 2012 Signature

Ermelinda Dolores N. Urbano

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Abbreviations

ADiM – Aquaculture Development in Malawi

ADRA – Adventist Development and Relief Agency

AECID – Spanish Agency for Development Cooperation

AET – Agricultural Education and Training in Africa

AU – African Union

AusAID – Australian Agency for Development

BDA – Development Bank of Angola/Banco de Desenvolvimento de Angola

CMI Report – CHR Michelsen Institute

CTA – Technical Centre for Agricultural and Rural Cooperation

CULS – Czech University of Life Science Prague

E&M – Evaluation and Monitoring

EU – European Union

FAO – Food and Agriculture Organization of the United Nations

FAOSTAT – Food and Agriculture Organization Corporate Statistical Database

GDP – Gross Domestic Product

HDR – Human Development Index

ICLARM – International Centre for Living Aquatic Resource Management

IDA – Institute for Development of Agriculture/Instituto do Desenvolvimento Agrario

IMF – International Monetary Fund

IPA –Institute of Artisanal Fisheries/ Instituto de Pesca Artesanal

ITS – Institute of Tropics and Subtropics

JICA – Japan International Cooperation Agency

KWZ – Angolan Currency

MDGs – Millennium Development Goals

MINADERP – Ministry of Agriculture, Rural Development and Fisheries

ND – Newcastle Disease

NEPAD – New Partnership for Africa's Development

NGOs – Non-government Organization

OECD – Organization for Economic Co-operation and Development

PCM – Project Cycle Management

PIN – People in Need

PNUD – United Nations Development Programme

RRSP – Poverty Reduction Strategy Paper

SADC – Southern African Development Community

SENAC – Strengthening Emergency Needs Assessment Capacity

SSA – Sub Saharan Africa

UN – United Nation

UNDP – United Nations Development Programme

UNICEF – United Nations Children's Fund

USD – United States dollar

USDA – United States Department of Agriculture

WESGRO – Western Cape Investment and Trade Promotion Agency

Abstract

The impact evaluation of the development project "Consultancy in area of fish and poultry production" shortly "Fish & Chicken" was carried out in Bié province (Angola) with the objective (i) to evaluate the socio-economic situation of local farmers who implemented the project activities in Bié province; (ii) to evaluate the profitability of fish and poultry production as well as (iii) to identify the constraints faced by small scale farmers in the implementation of fish and poultry production and (iv) point possible ways to solve these problems. Primary data were collected through focus group interviews, observation, structured questionnaire distributed to local farmers linked to the project, interview with members of the Ministry of Agriculture, Rural Development and Fishery (MINADERP) and members of FAO. Presently 25 fish ponds were identified in 16 villages of the Bié province which were constructed as follow up of the project. We can underline the following results: the impact of the development project oriented to integrated system of aquaculture is positive however, the efficiency of the development will take long period; in the socio-economic situation was taken in consideration the classification of farmers in Angola which has been found that 87% of farmers are small peasants and this group is the most interested to practice integrated system of aquaculture. The socio-economic situation of these farmers was measured by the increase of fish consumption as well as the increase in number of fish pond; the remaining 2 groups which are comprised by 8% in the classes of small scale farmers and 5% of medium scale farmers have better standard of living. These classes of farmers are employees of different state department and entrepreneurs. To measure the socio-economic situation of these farmers was difficult due to the fact that they do not depend on farming to generate income however they always have available fish for consumption. The estimation of profitability in the integrated system of aquaculture offer an opportunity to make business and finally improve the living standard of farmers however, was not possible to determine the profitability of farmers linked with the project due to the lack of records and poor management. Farmers recognise that integrated system of aquaculture is profitable but they face several constraints thus: 49% of farmers responded that lack of initial capital discourage them to engage strongly in activity; 31%

responded that birth disease made difficult for them to increase poultry production and the remaining 20% said that without government support it is difficult to move forward. The way to solve the lack of capital is to provide credit to farmers through building a serious association of farmers linked with integrated system of aquaculture.

The main recommendation for the Ministry of Agriculture Rural Development and Fishery are related to (i) capacity building of a core research staff together with providing adequate extension services, (ii) creation of banks or institution to provide microcredit and other financial services, (iii) promotion of suitable action against diseases, (iv) investment in research centre to analyze the efficiency of local herbs and (v) establishment of veterinary school.

Key words: Agriculture, Development project, Farmers, Fish and poultry production, Bié province, Angola

Abstrakt

Hodnocení dopadu rozvojového projektu "Poradenství v oblasti produkce ryb a drůbeže" (krátce "Fish & Chicken") bylo provedeno v provincii Bié (Angola) s cílem (i) analyzovat sociálně-ekonomickou situaci místních zemědělců, kteří byli zapojeni do tohoto projektu, (ii) zhodnotit ziskovost produkce ryb a drůbeže, (iii) identifikovat problémy, kterým čelí místní farmáři, kteří chovají ryby a drůbež (iv) a navrhnout řešení těchto problémů. Primární data byla získána během rozhovorů s cílovými skupinami, pozorováním, strukturovanými dotazníky distribuovanými místním zemědělcům zapojených do projektu, rozhovory s členy Ministerstva zemědělství a rozvoje venkova pro rybářství a od členů FAO. V současné době je funkčních 25 rybníků, které byly vybudovány v 16 obcích v provincii Bié, kde byl projekt implementován. Tento výzkum došel k následujícím výsledkům: dopad projektu v integrovaném systému akvakultury v provincii Bié je pozitivní, avšak prokazatelná efektivita samotného projektu bude zřejmá až v dlouhodobém horizontu. Zmapováním sociálně-ekonomické situace zemědělců v provicii bylo zjištěno: 87 % zemědělců jsou drobní rolníci žijící na úrovni životního

minima a ti mají největší zájem o tento projekt. Sociálně-ekonomická situace těchto zemědělců byla měřena pomocí následujících faktorů: spotřeba ryb, která se zvýšila za dobu realizace projektu a dále se navýšil i počet založených rybníků. Zbývající 2 skupiny jsou tvořeny z drobných farmářů (8 %) a středně velkých farmářů (5 %). Tyto dvě třídy farmářů jsou současně zaměstnanci různých státních oddělení nebo jsou podnikatelé. Měření sociálně ekonomické situace těchto dvou skupin bylo obtížné vzhledem k tomu, že nejsou závislí na zisku z chovu ryb a tudíž tyto faktory nejsou pro ně relevantní. Odhad přesných zisků z produkce ryb nebylo možné určit kvůli nedostatečné evidenci a špatnému managementu. 49 % zemědělců se domnívá, že by integrovaný systém akvakultury mohl být ziskový, kdyby byla vyšší počáteční imvestice. 31 % dotazovaných si myslí, že hlavním problémem je vysoká úmrtnost drůbeže z důvodu šíření nemocí a zbývajících 20 % uvedlo, že bez navazující vládní podpory je těžké v projektu pokračovat. Tyto nedostatky lze vyřešit pomocí poskytování úvěru kooperativám, zavedením plošného očkování drůbeže a zlepšením strategie vládní podpory.

Hlavní doporučení pro Ministerstvo zemědělství, rozvoj venkova a rybářství se týkají i) budování kapacit a zajištění základního výzkumu spolu s poskytnutím adekvátního rozšíření služeb, (ii) vytváření bank a institucí, které mohou poskytovat mikroúvěry a ostatní finanční služby především pro kooperativy (iii) zavedení systému plošného očkování drůbeže, či (iv) zřízení veterinární školy.

Klíčová slova: Zemědělství, rozvojový projekt, farmáři, chov ryb a drůbeže, provincie Bié, Angola.

Contents

1. Introduction

After almost three decades of armed conflict, followed by nine years of peace and stability, the main task of Angolan government is to improve the living standard of the population, poverty and hungry eradication through concrete policy. Amongst these policies we can underline the openness to the development project cooperation. In the frame of the development cooperation between Angola and the Czech Republic, the project in consultancy in the area of fish and poultry shortly named "Fish and Chicken", centre of agriculture education, Promoting vocational school of Agriculture in Catabola municipality" was implemented by the Czech University of Life Sciences Prague in Bié province. The project "Fish and Chicken" used the integrated farming system of fish and poultry production; it was some new for small scale farmers in Bié province because in that region the habitual fishery is artisanal. In accordance with the declaration of Little and Edwards (2003) integrated farming system was defined as concurrent or sequential linkage between two or more activities, of which at least one is aquaculture. These may occur directly on-site or indirectly through off-site needs and opportunities, or both (Little and Edwards, 2003). Many farmers in developing countries fight to make a living from small-scale extensive farms and are susceptible to food insecurity. The intensification of farm production often depends on the availability of external inputs such as mineral fertilizer, feed, credit or pesticides (Jahan and Pemsl, 2011).

Poultry and fish give meat, eggs and manure. In Angola poultry and fish production have great importance to small scale farmers because this activity represent an appropriate system for supplying the fast growing human population with high quality protein and providing additional income to resources-poor farmers, especially women because they are more involved in business with meat and eggs. Poultry and fish production are also appreciated in socio-cultural lives of rural communities; but small scale farmers are facing with some constraints such as: high mortality (mainly through disease), feeding, breeding, marketing, management, credit, lack of knowledge mainly in field of integrated fish pond and training. The production of poultry is already habitual or cultural in Bié province even

with constraint the small scale farmer never stop to practise this activity but in the field of fishery the small scale farmers are dependent on artisanal fishing.

The thesis is focused to evaluating the impact of development project named "Consultancy in area of fish and poultry production in Bié province (Angola)" to the local farmers who participated when the project was running in Bié province. The main objective of the development project shortly named "Fish and Chicken" was to create specific methodology of fish and poultry production and its integrated system and set up conditions of its implementation in the local communities (Chaloupková et al., 2009).

According to Baker, the impact evaluation is intended to determine more broadly whether the program had the desired effects on individuals, households, and institutions and whether those effects are attributable to the program intervention. Impact evaluation can also explore unintended consequences, whether positive or negative, on beneficiaries (Baker, 2000).

Evaluating the project "Fish and Chicken" in Bié province is one important form to investigate the recent situation of small scale farmers who had participated in the integrated farming of fish and poultry production ; to know in which level of knowledge they are regarding to increase the production and the profit. In the other hand to know if the farmers continue to follow what they had learned from the system applied by the project Fish and Chicken after the project has finished in 2009 and also to know if the cooperation with the project brought some changes in their lives.

1.1. General aspect of development projects

Attempt to develop permanent organization often takes place in project organization. These development projects are carried out at the same time as regular operations, and the projects are supposed to be dissolved when their results have been implemented. Examples of results from development projects include new methods for administrative control or new work routines. The label “project” indicates a beginning and an end, and includes innovation, experimentation, and entrepreneurship (Johansson et al., 2007).

According to Tuner, project is an undertaking in which human; financial and material resources are organized in novel way to carry out a unique scope of work, of given specification within constraints of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objectives (Turner, 1998). Projects represent the commitment of human and physical resources to produce specific outputs in a given time and budget framework. Projects vary in scale, purpose and duration; they may be initiated within a community, requiring modest inputs and producing tangible outputs within a relatively short timeframe. At the other extreme, project may require substantial financial resources and only generate benefits in long term. For instance, the former could be an adult literacy project in a village; the latter may be the provision of universal primary education for children of school age in country. Whilst the former needs one trainer and a few teaching materials, the latter requires numerous schools, teachers, equipment and administration. Project may stand-alone or be integrated into a programme, with several projects contributing to one overall goal. Despite the difference in scale and nature of projects, there are aspects of sound project management that are universal (FAO, 2001).

Project management “wraps all project management processes that are related to planning, controlling, and coordinating project (Caniels and Bakens, 2011).

Project Cycle Management

The Project Cycle is a way of viewing the main elements that projects have in common, and how they relate to each other in sequence. The precise formulation of the cycle and its vary from one agency to another (Benson and Twigg, 2007). The figure below illustrates the Project Cycle Management (PCM)

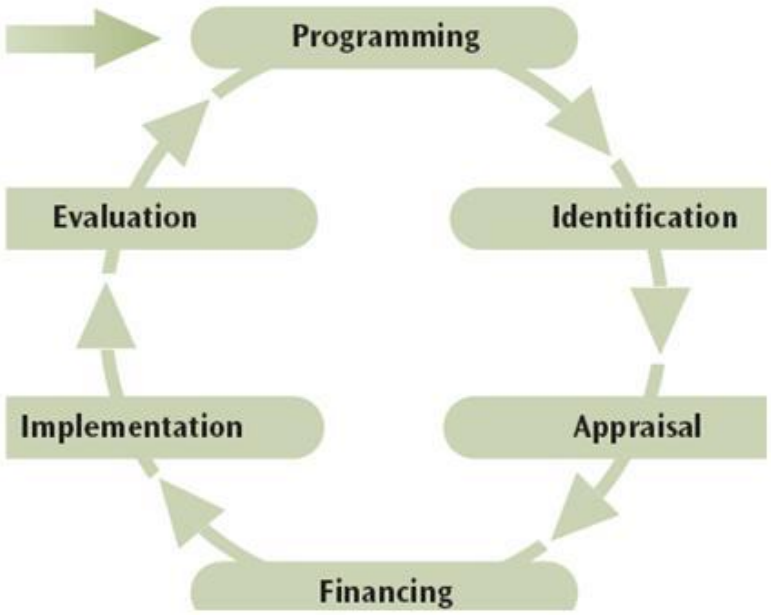


Figure 1: Project Cycle Management, Source: Benson et al., 2007

There are several literatures that try to find better way to define a PCM. According to Biggs and Smith (2003) argues that the project cycle consist of a number of progressive phases that, broadly speaking, lead from identification of needs and objectives, through planning and implementation of activities to address these needs and objectives, to assessment of outcomes. It serves to provide structure and direction to development activities at the same time as allowing for key objectives and issues to remain in focus. Though the exact numbers of stages in the cycle varies somewhat between organization as do the names given to each stage (Biggs and Smith, 2003).

1.1.1. Definition of development projects

Development project is a special kind of investment. The term connotes purposefulness, some minimum size, a specific location, the introduction of something qualitatively new, and the expectation that a sequence of further development moves will be set in motion. In public sector, project development is the units or aggregate of public investment that however small, still evoke direct involvement by high, usually the highest, political authorities (Hirschman and Gordon, 1967). Development project is the project that has been designed to develop or support activities. It is the main type of projects implemented by UN or EU bodies (agencies, offices, funds or program) this kind of project is frequently formulated for developing countries. Development project cannot be considered as investment projects because they provide especially technical expertise and know-how transfer. Their investment components are quite limited to demonstration material and pilot units to demonstrate priorities of, for instance new advanced technologies. None the less, their outcomes can eventually be material because they usually focus on production or social life. But such outcomes are rather expected in a long-term horizon (Havrland, 2003). Development project is the process that takes a transportation improvement from concept through construction. There are several goals for this process:

- To ensure context sensitivity though an open, consensus - building dialog among project proponents, reviewers, the public, and other parties.
- To encourage early planning, public outreach, and evaluation so that project needs, goals and objectives, issues, and impacts can be identified before significant resources are expended.
- To achieve consistent expectations and understanding between project proponents and those individual who evaluate, prioritize, and fund project.
- To ensure allocation of resources to projects that addresses local, regional, and state-wide priorities and needs (MassHighway, 2006).

1.1.2. Evaluation and Monitoring

During the implementation of some project the managers and stakeholders expect some result from this project no matter if the results are positive or negative. To make this assessment it is important to use appropriates tools that enable to do this study such as: evaluation and monitoring.

Evaluation and Monitoring (E&M) of development activities provides government officials, development managers, and civil society with better means for learning from past experience, improving service delivery, planning and allocating resources, and demonstrating as part of accountability to key stakeholders (World Bank, 2004). The OECD (2009) define E & M as an ongoing process of collecting and assessing quantitative and qualitative information on the inputs, process, and outputs of programmes and policies, and the outcomes they aim to address. Monitoring can be distinguished from evaluation in part by its objectives. Whereas monitoring aims to track continuous progress, evaluation aims to assess if particular objectives have been changes in outcomes to programme activities. Thus assessing the impact of agricultural policies on rural economic outcomes, on reduction of rural disparities, and competitiveness generally falls under the domain of evaluation (OECD, 2009). The table below shows the main component of monitoring and evaluation.

Table 1: The main component of project monitoring and evaluation

	INPUT/OUTPUT MONITORING	BENEFIT MONITORING	EVALUATION	
Hierarchy of objectives			**Type of evaluation**	**Time after project completion**
Goal		Impact survey Sustainability monitoring	Impact evaluation (project impact)	5 years
Purpose (objective)		Benefit monitoring	Post-evaluation (effectiveness)	1-2 years
Project outputs	Management reports Project reporting Line agency monitoring activities/ achievements	Implementation survey	Project completion report (efficiency) Mid-term review On-going evaluation	At completion
Activities	Activity recording and reporting	Baseline survey (pre-project)		
Inputs	Procurement recording Auditing			

Source: OECD, 2009

Monitoring is the routine tracking of the key elements of the programme/project performance, usually inputs and outputs, through record-keeping, regular of reporting and surveillance system. It is used to track changes in programme performance over the time and is an ongoing, continuous process. It requires the collection of data at multiple points throughout the programme cycle, including at the beginning to provide a baseline; and can be used to determine if activities need adjustment during the intervention to improve desired outcomes. Monitoring should be conducted at every stage of the program, with data collected, analyzed and used on a continuous basis. Evaluations are usually conducted at the end of program. However, they should be planned for at start because they rely on data collected throughout the programme, with baseline data being especially important (FAO, 2010).

There are various reasons that make the monitoring activities important and the progress report necessary. The monitoring is a crucial part of the project management as it is carried out to observe the progress of the project implementation in order to ensure if

inputs, activities, outputs and project assumptions are proceeding according to the plan and if they are progressing forwards achieving the project objective. Monitoring is also a tool to identify problems that may occur during the project implementation, therefore adversely. Moreover as a result of the monitoring, the progress reports provide a major information input to the project reviews (Chinnanon, 2002).

Evaluation is the methodical and objective assessment of an ongoing or completed project, program, or policy, including its design, implementation, and results. The aim is to determine the significance and fulfilment of objectives, development efficiency, effectiveness, impact, and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation recipients and donors (Kusek and Rist, 2004). According to FAO (2010) evaluation also refers to the process of determining the worth or significance of an activity, policy or program. The difference in the outcome of interest between participating or not in the programme is known as its "impact and measuring this difference and is commonly referred to as "impact evaluation" (FAO, 2010). Cook (1997) argues that a time-bound assessment that systematically and objectively assesses the relevance, performance and successes/effectiveness of ongoing and completed programs and projects. The main aim of evaluation is to provide lessons which are incorporated into the decision-making processes of government and donors (Cook, 1997).

On-going evaluation has the purpose of providing early feed-back to project managers and implementing agencies concerning:

- The policies affecting the project;
- Attainment of sectoral goals and objectives;
- Adequacy of institutional arrangements; and
- The appropriateness of project design and the level of resources applied (Cook, 1997).

Types of Evaluation

On the basis of the time dimension, evaluation may be classified as: formative evaluation and summative evaluation. Formative evaluation involves the collection of relevant and useful data while the training programme is being conducted. This information can identify the disadvantages and unintended outcomes and is helpful in revising the plan and structure of training programmes to suit the needs of the situation. Summative evaluation is done at the end of the programme and makes an overall assessment of its effectiveness in relation to achieving the objectives and goals (Swanson et al., 1997).

1.2. Angola Overview

The Republic of Angola covers an area of 1.246.700 million km^2 and is located on the Atlantic coast of south-western Africa (Kuedikuema et al., 2009). It became independent from Portugal in 1975 after years of fighting and was immediately engulfed in a devastating civil war, which only ended in 2002. Angola is one of Africa's most resources-rich countries, with tremendous economic potential, endowed with many mineral resources and vast fertile lands. Yet it is considered a low income country under stress, mainly because of the after-effects of the civil war. At the end of the war, Angola was left with a devastated physical and social infrastructure, some of the world's worst human development indicators, weak governance, and fragile human and institutional capacity (World Bank, 2008). While the war has unquestionably been the single most important constraint on development, as well as the immediate cause of the humanitarian emergency, other factors, of an institutional cause and policy-related nature; have exacerbated the serious situation experienced by Angola's people. Currently there is an urgent need for policy reforms and institutional measures, including measures regarding the management and allocation of public resources, in order to address the other deep-seated problems that have contributed to the situation of economic depression, widespread poverty, high mortality and social exclusion (UN, 2002).

Since 2002 the government of Angola has initiated a wide range of policy, legislative and institutional reforms aimed at ensuring national reconciliation and peace,

poverty reduction and economic growth, good governance and effective administration of justice, and the integration of the country into regional and international organizations such as SADC, AU, and UN system. The country is experiencing a change from a state of war and emergency to political stability and peace. There are major efforts at reintegrating people into their communities, strengthening institutions that safeguard the rule of law, reconstructing infrastructure, and diversifying the economy as well as promoting productive livelihoods. Despite these efforts Angola is still confronted by many challenges. Poverty, illiteracy, diseases, malnutrition unemployment, corruption, crime, and poor infrastructure are persistent problems in the country. The Government has designed and adopted a national Poverty Reduction Strategy Paper (RRSP) and a Medium-Term Development plan 2009-2013 (Republic of Angola – European Community, 2008). It has also subscribed to the Millennium Development Goals (MDGs). There are many national programmes for reconstruction and economic transformation of the country. They are being implemented by the Government through its various ministries and other public institutions. However Angola's Government has an acute lack of skilled administrators in central government, provinces and municipalities (Mugabe and Washington, 2010). In spite of abundant natural resources and rising per capita GDP, it was ranked 146 out of 169 countries on the 2010 UN Development Program's (UNDP) Human Development Index (HDR, 2011). Agriculture primarily subsistence accounts 80% of the work force (U.S. Department of State, 2011).

1.2.1. Brief description of Angola

Angola is the fourth largest country in Africa, lying between latitudes 4°22' S and 18°03' S along the western coast of Africa, Angola is bordered by the Republic of Congo and the Democratic republic of Congo to the north, Namibia to the south and Zambia to the East (UNDP, 2007). The capital of Angola is Luanda, the total population of Angola in 2011 was estimated at 18 million inhabitants; Angola has not had a census since 1970, annual population growth rate (2011) is of about 2.034 % (U.S. Department of State, 2011). The official language is Portuguese and other national languages widely spoken are:

Umbundu 37%, Kimbundu 25%, Kikongo13% and others Bantu languages which include Chokwe, Lunda, Ganguela, Nhaneca-Humbe, Ambo, Herero, and Xindunga (Albala, 2011). Total literacy population over 15 that can read and write, estimated at 2011 was 64.4% (female 54.2%, male 82%), the average life expectancy is very low (2011 est.) 51.1 years, infant mortality rate estimated in 2011 is extremely high at 175.9/1,000, than was estimated in 2007 158/1,000 (HDR, 2011). The work force in 2010 was estimated around 7.9 million that means in agriculture primarily subsistence 80%; commerce, industry, mining, informal, and other 20% (U.S. department of State, 2011). Administratively, Angola is composed of 18 provinces, 164 municipalities and 547 communes. Moco Mountain in Huambo province is the highest at approximately 2.620 m, the climate in Angola is tropical, with wet and dry seasons that vary little in maximum and minimum temperatures. In the northern half of the central plateau there are humid tropical conditions and in the high regions of the south, a dry tropical climate prevails. The northern part of the coastal plain is humid, while the centre and the southern part are affected by the relatively cold Benguela current and gives a temperate character to the coastal regions. In the interior highlands, the rainy season lasts from November to April followed by a cool dry season from May to October. Rainfall is high in the north and in the central highlands (average 1,250-1,750 mm) and decrease rapidly along the coastal plain (average 250-1000 mm) (FAO, 2004).

Economic situation

Even considering the occurrence of some gaps in several areas like for example: poor ability to handle the strong growth, low productivity, low-skill labour force, weaknesses in some institutions and so on, which may become difficult to maintain the high growth in future. In spite of all these negative factors, the route of Angolan economy has been extraordinary very positive. In 2005, Angola's real GDP rate was 14.1% and, since then, growth has averaged close to 20% in last three years, with this growth was driven mainly by the expansion of the country's oil sector together with record highs in oil prices and rising production. Oil production contributes with about 56% to GDP and account for approximately 90% of the country's total exports (WESGRO, 2010).

The global economic crisis and the resulting sharp of commodity prices have severely affected Angola's economy. The spot price for crude oil in 2008 cut down from an average of USD 97 a barrel to USD 44 in first quarter of 2009 (IMF, 2009). According to International Monetary Fund IMF (2011) GDP was expected to rise by 2.3% in 2010, a combination of a 1.3% drop in oil production. GDP growth in 2011 is projected around 7.8%, with oil sector growth (from temporarily deflated levels in 2010) amounting to 3.8% and non-oil sector activity set to rise by 8.1 % - much closer trend growth rates. Inflation is expected to decline gradually in 2011, reflecting continued tight control of monetary growth and the eventual dropping out of the large 2010 fuel price increases from the index (IMF, 2011).

Agricultural production

The agriculture sector remains the main locomotive for economic growth for most Sub-Saharan Africa (SSA) countries; contributing with around 40% to their Gross Domestic Product (GDP) (Barrios et al., 2008). About 70% of the population depends on agriculture for food, income and employment. Agriculture is also a major source of exports in several countries, contributing average about 13% to total export earnings and about 66% to the value of intra-regional trade. For this reason, the performance of agriculture has strong influence on the rate of economic growth, the level of employment, demand for other goods, economic stability, food security and in general poverty eradication (SADC, 2011). In Angola, the subsistence agriculture provides the main livelihood for most of the population, but half of the country's food is still imported. Additionally, 80% of the labour force is engaged in agricultural production. The contribution of Angola's agriculture to the GDP is only about 10% (USDA Foreign Agriculture Service, 2009).

The major production systems existing in Angola are divided in 4 classes and each class has its characteristic:

- **Peasants** – subsistence production with no resort to technology, manual instruments, seeds devoid of technical norms, low level farming activity, family manpower, need of assistance, very low productivity levels and no agricultural inputs;

- **Small-Scale farmers** – minimal production surplus, limited use of technology, manual farm implements + animal draught, seeds with or no technical norms, low productivity and eventually resort to some resources of agricultural inputs ;
- **Medium-Scale Farmers** – production surplus, resort to wide range of technology, use of animal draught and tractors, preferably improved seeds, adequate farming density, temporary workforce and use of other farm implements;
- **Major Producers** – commercial production, reasonable use of technology, and use of improved seeds, adequate farming density, and wage earning workers, always use other farm implement, and constant technological innovation (SADC, 2011).

Crop Production

Diverse climatic conditions favour a wide range of crops, and there is also considerable irrigation potential. Coffee, primarily of the robust variety, at one time made Angola the world's fourth-largest producer, but during the civil war almost all the main plantations were abandoned (AET Africa, 2011). Among cereals, maize, millet, sorghum, beans, coffee and rice are the main crops. Cassava, Irish and sweet potatoes are the main roots and tubers. These crops comprise the basic food diet of the population (USDA Foreign Agriculture Service, 2009).The table below shows the main crop production in tones and its respective years.

Table 2: Main crop production (tonnes)

year	2005	2006	2007	2008	2009
Beans,dry	109284	85081	103701	124464	247314
Cassava	8815010	9037020	9730260	10057400	12827600
Coffee,grenn	1890*	2100*	2160*	2280*	780*
Maize	734372	526084	615894	702387	970231
Millet	137864	144390	156434	27153	40348
Sugar cane	345000 F	360000 F	360000 F	360000 F	360000 F
Sweet potatoes	663787	684756	949104	819772	982588

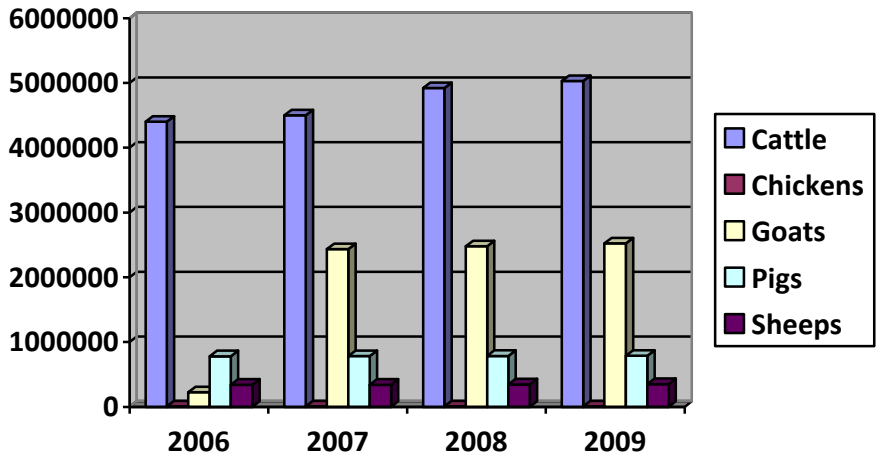
Source: FAOSTAT, 2011

The table number 2 shows the main crop production in Angola. According to the numbers it shows that de production is increasing every year. The numbers with asterisk * represent the unofficial date and the numbers with letter F represent the estimates from FAO.

Animal production

Animal production plays an important role in country's socio-economic activities, not just because of the percentage of people who develop this activity but, it also helps in land preparation for agriculture activities. In Angola the main animal production is; cattle, goats, sheep, pigs, and chickens. According to the 1970 census, Angola had over 6 million head of livestock, comprised of 3,160,000 cattle; 1667,000 goats; 227,000 sheep and 1,108,000 pigs. Since then, there has been no livestock census, so there is no dependable data on numbers. Nowadays, most of the cattle herd is concentrated in the southern and southwest provinces of Huila, Cunene, Namibe and Benguela which also have more than 60 percent of the small ruminants (FAO and NEPAD, 2005). The graph below shows the numbers of main livestock production in Angola.

Graph 1: Main livestock production in Angola



Source: FAOSTAT, 2011

According to FAOSTAT (2011) only the numbers of cattle are official other numbers of the animals are FAO estimations.

Aquaculture production

Aquaculture production in Africa has increased by 60% over the previous decade and contributes about 0.4% to the world's total production (Gupta et al., 2004). Aquaculture production in Angola largely consists of small scale farmers and focused mostly on inland freshwater both by rural communities and private sector. Lack of investment, knowledge and the impact of the civil war have however seriously limited the development of these activities. Rural fish farming with native species has been developed in some provinces of Angola. Aquaculture in Angola started in 2002 on Bengo River in Kifangondo, Luanda province using the specie *Orechromis niloticus* introduced from Brazil. A second aquaculture farm on Kuanza River started in 2005 but it is still in development (FAO, 2005).

1.2.2. Bié province

Bié province is located in the eastern Central plateau of Angola. Its capital is Kuito. It has an area of 70.413 km^2 and a population of approximately 2 million inhabitants. The form of the province is similar of the heart and lying in the geographical centre of Angola between 10º34' – 14º18' a 15º42' – 19º13' E. The province borders with the following provinces: Malange to the north, Lunda – Sul to the northeast, Moxico to the east, Kuando Kubango to the south, Huila to the southwest, Huambo to the west and Kuanza – Sul to the northwest (Boletim Informativo do Bié, /Informative bulletin of Bié, 2011). The temperature of Bié province is humid and hot with an altitude between 1600 m; average temperature is 26°C degrees (Chaloupková at al., 2009). There is two season the rainy season from October to April and the dry season from May to September (SENAC, 2005).

The population of the Bié province is very heterogeneous. There are different ethno – linguistic groups inhabited the province such as; Umbundu (in all municipalities, traditionally focused on agriculture and livestock farming as well as artisanal fishing), the Kioco located in the east and south of the province and, Ganguela located in south of the province. Bié was one of Angola's provinces most affected by the civil war. The province is divided into 9 municipalities and 30 communes (Tomlinson et al., 2010). According to Porto et al., (2007) Bié province is mainly rural, with the majority of its population depending on agricultural system that turn around the production of maize, bean, cassava etc. The province in general has good agricultural potential and is expected to become main grain suppliers in the country – in fact that before independence, the province was the largest producer of rice in Angola. The abundance of water and large flood plains make agriculture a possible alternative in province (Porto et al., 2007). In spite of appropriate climate condition, agriculture is still considered as subsistence in this region. The population of this region obtain its income primarily from agricultural and commerce (trading mainly agricultural product, and also variety of consumer goods using the local formal and informal market (Porto et al., 2007). The prices of the product vary from region to region.

1.2.3. Development Projects running in Angola

The majority of Sub-Saharan Africa's population live in rural areas, where poverty and deprivation are most severe. Since almost all rural households depend directly or indirectly on agriculture, and given the large contribution of the sector to the overall economy, one might expect agriculture to be a key component of growth and development (Diao et al., 2007). Like most African countries, Angola has a huge sector of small-holder agriculture and the great majority of the population in rural areas totally depends on this activity for their livelihood and their survival (Larsen and Bertelsen, 2011). Global initiatives to improve health and well-being in the developing world are quantified relying on data to reveal trends and assess progress toward development goals. Recent initiatives such as the poverty reduction strategy papers one of the point of Millennium Development Goals (MDGs) are requiring major data collection efforts, which are effectively increasing demand (Baldwin and Diers, 2009).

The government of Angolan is looking forward to make living standards of their inhabitants better through a wide range of development projects and policy; carried out in cooperation with several NGOs and development agencies to strengthen Angola's rural and urban development. Currently, there are running a lot of development projects in which some of them are implemented by NGOs and others by Angolan government among these projects stand out:

From the part of Czech Development Projects, currently there are some ongoing projects implemented by People in Need (PIN) and the Czech University of Life Science Prague (CULS). The projects implemented by PIN involve and combines component of three sectors and approaches; capacity building of local authorities, agriculture (access to livelihood) and education sectors;

- The project of Improving Livelihoods through Increased Capacity of Local actors, is implemented in Bié province in Cuemba and Nharea municipalities from 2010-2014. The aim of this project is to improve food and income security of the population of

Cuemba region through better access to governmental and non-governmental agricultural extension services, practical skills training, credit and markets.

- Establishment of the methodology of "School Cluster Resource Center" in Bié province in municipality of Cuemba; the project is running from 2010-2014.
- The project of improving quality of basic education: implemented of the national education reform also in Bié Province in Cuemba region from 2010-2012. The aim of the project is to support rural teachers in the field of diffusion of educational reform, with set of textbooks that will be produced in cooperation with national institute of educational research and evaluation and help them implement active teaching child-centred methods in rural conditions with the lack of pedagogical support material.
- Expansion of school network- construction of 2 primary schools; in Cuemba region since 2010 and will end in 2012.
- The project of Distance Teachers in-service training in Cuemba and Naharea regions in Bié province. The project was started in 2010 and finished in 2011.
- Literacy courses for adults in the district communes Catabola, Kamacupa, Andulo, Cuemba, Kunhinga, Kuito and Nharea starting in 2009 and ended in 2011.

PIN has been working in Angola since 2006 in the most war affected regions of Bié. The main partners of PIN are: Czech Development Agency, UNICEF, Concern, Ministry of Agriculture of the Czech Republic, Spanish Agency for Development Cooperation (AECID), Ministry of Agriculture of Angola, Caritas of Angola (People in Need, 2010).

The Development Project which is carried out by the Czech University of Life Science Prague in Angola has illustrated in the following table 3:

Table 3: Development projects carried out by the Czech University of Life Science Prague in Angola

Name of the Project and duration.	Partners	Donors	Objective of the project
• Support of the Agricultural training school in Catabola 2009-2011	ADRA, o.s., Ministry of agricultural and Rural Development, Fishery and Environment of Angola, Concern and Red Cross Angola	Ministry of Agriculture of the Czech Republic	To support the agricultural school and develop training and extension services for local farmers in Bié province. Besides the secondary-school courses including general and agriculture subjects, the project focuses on applied research and consultant services.
• Capacity Building in the Area of Fish and Poultry Production, 2008-2009	Government of Bié Province	Czech Development Agency	To provide capacity building and training of experts in the area of fish and poultry production and its integrated system. Trained experts should be able to support extension of the integrated system in the province and through the implementation help to stabilized socioeconomic conditions of the local farmers.
• Consultancy in Fish and Poultry Production shortly named" Fish & Chicken" 2006-2009	Government of Bié Province	Ministry of Agriculture of the Czech Republic	Creating specific methodology of the fish and poultry production and its integrated system and establishing conditions of its implementation in the local communities.
• Centre of Agricultural Education in Bié Province, 2004-2009	Ministry of Agriculture and Rural Development, Fishery and Environment of Angola; Ministry of Education and Culture of Angola; CARE International Angola	Czech Development Agency, Ministry of Agriculture of the Czech Republic	To establish Centre of agricultural education and develop training and extension services for local farmers in Bié Province. Besides the secondary-school courses including general and agriculture subjects, an applied research and consultant services complement the integral part.

Source: ITS, 2009.

Currently, Angolan's Ministry of Agriculture, Rural Development and Fisheries (MINADERP), based on national program poverty reduction strategy paper has implemented several kinds of development projects. In the field of fish production the

MINADERP through the Institute of Artisanal Fisheries (IPA) has lunched the national project called Promotion and Development Program of Artisanal Fisheries. This project is divided into three parts: Organization of fishing communities, Creation of infrastructures and production support to artisanal fishing, and Management of natural resources for sustainable development.

The main objectives of the project are to promote and carrying out social campaigns aimed to create and develop artisanal fishing communities, expand technical support to artisanal and subsistence marine fishing, and as well as to develop aquaculture with supervising their implementation and sustainability. Join forces with communities in integrated fishing system through elaboration of technical studies and attracting national and foreign financial funds to promote aquaculture in the country. Finally the Ministry should come out with appropriate materials which will help artisanal and integrated system of fisheries for the future researcher and study (IPA, 2011).

1.2.4. Development Project "Fish & Chicken"

The development project Consultancy in the area of Fish and Poultry Production, shortly named "Fish & Chicken" had been implemented in cooperation between the Ministry of Agriculture, Rural Development and Fisheries of Bié province (Angola) and Ministry of agriculture of the Czech Republic. This project had been implemented in order to develop the integrated system of fish and poultry production and, establishing conditions of its implementation in the local communities. The project "Fish & Chicken" was implemented in Bié province from 2006 – 2009. The purpose of the project was to boost agricultural production and productivity of small scale farmers in Bié province. The main objective of the project was to create specific methodology of fish and poultry production and its integrated system and establishing conditions of its implementation in the local communities. The project was localized in the community of Nequilo lying in the south of the city of Kuito. Before the project Fish & Chicken came in Nequilo there were already two duck farms and one poultry farm operating in the responsibility of Care international but, it has not been integrated system and was not linked with small scale farmers. Then the

managers of the project Fish & Chicken came up with special type of chicken coop using merely locally available materials.

Figure 2: Integrated system of fish and poultry production in Nequilo community, Source: Chaloupková et al, 2009

Selection of fish species

The implementers had conducted different studies with local species of fish such as: *Marcusenius cf. Angolensis*, *Doumea cf. Angolensis*, *Schilbe intermedius*, *Synodontis sp.*, *Chiloglanis sp.*, *Parauchenoglanis cf. Ngamensis*, *Clarias cf. Theodorae*, *Parakneria sp.*, *Labeo cf. Ansorgii*, *Barbus sp.*, *Hepsetus odoe*, *Brycinus cf. Lateralis*, *Hemigrammocharax cf. Lineostriatus*, *Tilapia cf. Sparrmanii*, *Tilapia rendalli*, *Serranochromis macrocephalus*, *Serranochromis sp.*, *Ctenopoma multispine*, *Aplocheilichthys cf. Myaposae* and, *Aplocheilichthys cf. Myaposae.* Between these species the implementers came to the conclusion that tilapia was the best specie for integrated aquaculture system in Bié province. Thus, the implementers have chosen *Tilapia rendalli* and *Tilapia sparmani* because of its fast reproduction and adaption in climate conditions.

The community of Nequilo was considered the main Centre of delivery of fingerling and poultry to small scale farmers who were linked with the project nearby of Kuito city. The project mentioned above also provided for small scale farmers seminaries and training. Those farmers who attended all seminaries classes received certificate. The integrated aquaculture system adopted by the project implementers was extensive because was the best way to start in rural area. The ponds size recommended by implementers was 10 x 10, 15 x 10 or 20 x 10 m of width and, the depth should not exceed 1.5 m. The Centre of distribution of fingerling and poultry in village Nequilo had had 4 fish ponds of size 200 m^2 with a capacity of 360 or 400 tilapias, around the ponds had poultry houses and vegetable gardens. In one pond with size of 20 x 10 m is possible to breed 20 ducks and 100 chickens in maximum.

Feed requirements of tilapia

The best way to feed tilapias in extensive production according to the implementers is not direct. It must be improved through the fertilization of the ponds. The suitable way to fertilize the ponds is utilize manure from pigs and poultry. The daily feed for pond with an average of 400 tilapias with 5 g of weight should be approximately 90 g/day. However, 30% of these feed come from nature. In one pond with size of 200 m^2 with 400 tilapias the average yield in 1 year could be 200 kg/ha. The graph below illustrated the feed requirement for fish.

Table 4: Feed requirement of tilapia

Weight/1 g	Feed coefficient (%)	Weight/1 g	Feed coefficient (%)
1	11,0	30	3,6
2	9,0	60	3,0
5	6,5	100	2,5
10	5,2	175	2,5
15	4,6	300	2,1
20	4,2	400 +	1,5

Source: Chaloupková et al., 2009

Selection of poultry species

The selection of poultry was done as following: for ducks the implementers has selected the specie *cairina moschata f.* domestic. This species has its origin in South America. The reproduction of this specie is very fast and Angolan farmers breed them long time ago. Its reproduction is natural and there is no problem with fecundation. For chickens they have selected local specie *Gallus domesticus*. The reproduction of this species is also natural without a problem of fecundation.

Feed requirements for ducks and chicken

The feed requirement adopted by the implementers was the mixture of maize, limestone and soybean. These mixtures consist of 70% of maize + 23% of soybean + 7% of ground limestone. The growth rate of ducks with a good balanced feed, into 5 – 6 months will be the following: the female 2.5 kg and 3.5 kg the male. One duck, hatch in average 20 – 30 eggs per year in normal conditions.

For chicken the implementers have adopted the mixture of 38 % corn ground, 19% of soybean, 8% limestone, and 10% of cassava. The remaining 25% consists of other food depending on the conditions of each farmer. The content of mixture above mentioned

should be 100 g/1 chicken/day. The growth rate of chickens with a good balanced feed, into 21 weeks is 1.2 kg for both sexes. In normal condition one chicken hatch an average of 130 eggs per year.

After three years of hard work of managers of the project, it was expanding in 13 small areas, such as in the municipality of Katabola was controlled (Wongo, Catchaca, Catapi and Lombombo) and, in Kuito (Nequilo, Yeyele, Jimba, Ngaye, Kaluapanda, São José, Chiuyo, Ngalanga and Chimboto). The main partners of the project were: Ministry of Agriculture, Rural Development, Fisheries and the Environment of Bié province (MINADER). The project had also cooperated with some national and international organization such as: the Institute for Development of Agriculture (IDA), Concern, Africare, Care international, Cruz Roja and FAO. During the ongoing of the project in Bié province, the implementers of the project achieved several results such as:

- Trained agricultural producers in the area of fish and poultry production and its integrated system;
- Trained students of the Centre of Agricultural Education in Bié province in the area of fish and poultry production and its integrated system;
- Establishment of websites, which includes information about the project, fish and poultry production in Angola available in Czech and Portuguese (www.angola.czu.cz);
- Implementation of the integrated system of fish and poultry production in the selected communities in Bié province;
- Publishing of scientific study (methodology and practical manual) of fish and poultry production and its integrated system useful for local farmers, students of agriculture, provincial government and non – governmental organizations.

The implementers also faced several constraints such as: lack of incentive and credibility by the side of co-operators to implement the project and, difficulty on transportation of the fish from the reproduction Centrum of Nequilo to others areas (Chaloupková et al., 2009; ITS, 2010).

2. Objectives

The main objective of this thesis is to evaluate the impact of the development project "Consultancy in the area of fish and poultry production" shortly named "Fish & Chicken" in Bié province – Angola to the local farmers. The development project implemented by the Czech University of Life Science Prague, has started in 2006 and finished in 2009. The purpose of the project was to improve agricultural production and, productivity in Bié province. The project focused in the integrated system of fish and poultry production; because the implementers found that the environmental conditions were favourable to create this system with local species of fish and duck in the region. The project was implemented in Bié province because was one of the most devastated by civil war and the region is considered as a great potential in agriculture production and also artisanal fishery in Angola.

The specific objectives comprise:

- To evaluate the outputs of development project "Fish & Chicken".
- To analyze socio – economic situation of local farmers who implemented the project activities in Bié province.
- To evaluate the profitability of fish and poultry production
- To identify the constraints those face small farmers in the implementation of fish and poultry production and point possible ways to solve these problems.

The main hypotheses:

- Investment in integrated system of fish and poultry production offers an opportunity to increase farm productivity for small scale farmers through to improve efficiency and, finally higher income of farmers; on the other hand there are problems which constraint the economic sustainability of this activity.

- There are a number of reasons to increase fish and poultry production such as: economic, nutritional and cultural aspects. But the economic reason is one of the most significant due to amplify the income of farmers and improving standard of living.
- Analyzing socio – economic situation of local farmers who implemented the project in Bié province offer a chance to evaluate the efficiency of small scale farmer with respect to the integrated farming system of fish and chicken.

3. Methodology

In this study the methodology has been submitted by the following requirements:

- Evaluate the impact of implementation of the development project shortly called "Fish & Chicken" in the region of Bié.
- Evaluate/design/investigate the importance of increasing fish and poultry production for the small farmers.
- Make out the main constraint that delays the expansion of integrated system of fish and poultry production in Bié province.
- Provide recommendations how farmers can improve the production of fish and chicken using integrated system of fish and poultry production.

3.1. Data collection and approaches

A. Secondary data collection

Secondary data has been collected from report documents of the project „ Consultancy in the area of fish and poultry production" shortly Fish & Chicken, Ministry of Agriculture, Rural Development and Fisheries (MINADERP), and available Portuguese Literature, FAO statistic and Internet sources mentioned in the references of the thesis and available scientific journals.

B. Primary data collection

Primary data were collected during interviews with focus group, observation, structured questionnaires delivered to local farmers who had participated in project "Fish & Chicken" and some farmers who have not participated. A personal interview was also done with representatives of the Ministry of Agricultural, Rural development and Fishery in Bié and FAO representatives. In the survey to gather the primary data, structured and semi – structured questionnaire with close - end and open – end questions were also used. The numbers of selected farmers and methodology of selection is described below.

3.2. Data processing

The results were analyzed and compiled by means of excel tables, graphics illustrations and expressive statistical tools such as ratios, proportions and, percentage. During the explanation and processing of questionnaire were done effort to keep the statistical rigor and the study was conducted to be representative for entire province. Saunders et al., (2007) argue that the purposes of research can be classified as explanatory and descriptive (Saunders et al., 2007). In this study has been used the combination of these three categories.

3.3. Study area

The study was carried out in the Bie province, in municipality of Kuito capital city of Bié province and in the municipality of Catabola which is located 75 km of the Kuito. In municipality of Kuito the study was conducted in the following small villages: Nequilo, Yelele, Jimba, Tramangolo, Kaluapanda, São Jose, Chiuyo, Ngalanga, Chimboto, Chicava, Cambundi, Camundongo and, Mukumba. In the Catabola municipality the study was carried out in next villages: Wongo Catchaca, Catapi and Lombombo. The surveyed villages have a similar live standard and village structure. The head of village is "soba" who drive almost all activities in village. The houses are built from argyle and grass without energy, canalization and water. There are no public services as hospital and transport; the school is so far from the village. In the empty space, the numbers of distance

and families of some villages were not available. The table below demonstrates the village where the study was carried out.

Table 5: The name of village where the study was done

Municipality	Village	Distance from Kuito	Family number
Kuito	Nequilo	40 km	50
	Yelele	32 km	150
	Jimba	25 km	75
	Tramangolo		
	Kaluapanda		
	São Jose	7 km	1000
	Chiuyo	9 km	
	Ngalanga		
	Chimboto		
	Chicava	31 km	
New	Cambumdi	37 km	220
New	Camundongo	29 km	410
New	Mukumba	17 km	180
Catabola	Wongo	32	
	Catchaca		
	Catapi	57 km	
	Lombombo	28 km	

Source: Survey

3.4. Selection criteria

In this thesis were used the following selection criteria:

- **Choice of the country**

Angola is a country with great potential regarding to research. The lack of investment in area of research, unfavourable political situation in the past decades, and lack of human potential does not permitted to carry out researches in several branches of knowledge. The need of investment in this area is urgent because there are a lot to find out and study.

- **The choice of the province**

The Bié province is considered an agricultural potential due to its fertile lands, good environmental condition and its rich rivers. Spite its natural resources the economic growth of the province goes slowly. The province was one of the most affected by the civil war. The rebuilding of the Bié province has been made in all spheres of society. The agriculture sector is one of the priorities in this region because most of the population works in this field. Poultry production is considered as traditional practice long time ago; the traditional fishery in this region is artisanal due to its rich rivers. The introduction of integrated system of fish and poultry production is a way to increase the production of meat, eggs and farmers profitability and also the rapid economic growth of the province. To create alternative source is still a big problematic in rural areas of the region.

- **Choice of the villages**

The choice of the village mentioned above is justified by the fact that there was implemented the project "Fish & Chicken" for this reason it is necessary to know the current situation of the farmers. No one better than farmers can talk about what is going on because they work on it and they know the situation.

❖ **Focus group interview**

According to Hennink (2007), focus group interview, though not new as a sociological research way has achieved popularity in recent epoch as a tool to inform policy and practice (Hennink, 2007). For better understating in this thesis the interviewers were chosen from three groups and each group has different point of view. The first group were small scale farmers, because they had implemented the project, they are continuing to work on this thus they know better than anybody the current situation. Second group was the Ministry of Agricultural, Rural Development and Fishery; they were one of the main partners of the project "Fish & Chicken", they had/have an overview about the situation and looking forward to find ways to make better the situation. The third group was FAO, because they also were one of the partners of the project and they continue to follow the activities until today with one community.

❖ **Qualitative assessment**

The interviews have been carried out in two moths and half, from July to September 2011. It was in dry season; usually in this season the poultry production go down because it is exactly the period that the bird's diseases manifest and the fish are in phase of drying and selling. Spite of the short period of time to collecting data, was done a big effort to make this study relevant and understanding. The statistical rigor was kept during elaboration and processing of questionnaire.

❖ **Team of interviewer**

The team of interviewer was composed of two specialists of the Ministry of Agriculture, Rural Development and Fishery of Bié province and by the author. The experts of the Ministry of agriculture are well trained in extension services and have different experience in field of some research.

❖ **Quantitative assessment**

The respondents were divided in different groups; there are actually three co-operative and 9 individual small and medium scale farmers working in fish ponds. In

cooperative of the community Cambundi there are 24 small-scale farmers linked with the production of fish in combination with poultry and the interview was done with the head of cooperative. In community Katapi the cooperative named “Elavoko Liwa” controlled by FAO has 20 farmers and the interview was also done with the head of the cooperative. The last community named “Okutalavaya”; there are 19 small-scale farmers and the interview was also done with the head of the cooperative. The reasons which lead to interview the head of cooperative was because the majority of small-scale farmers who are linked with this activity are not educated enough to understand the questionnaire even with simple question. The total farmers that are engaged in this activity in Bié province are 75. Other respondents were 3 members of MINADERP and 1 member of FAO. Thus were collected primary data through structured questionnaire. The results were analyzed and compiled through excel tables and graphics illustrations and the second data has been studied. This second data were provided by the MINADERP in Angola and available Portuguese literature, FAO statistic, web science direct and other internet sources mentioned in the references of the thesis.

3.5. Significance of the study

In the thesis the study was conducted to make concrete recommendation for MINADERP, NGOs and other development agencies in the province looking forward to improve the integrated fish ponds or other development projects. The results of the thesis can provide information how to make better the policy of integrated system of aquaculture production in Angola and how to generate alternative source. The study carries out the economic meaning of the mentioned activity at the regional and national levels; providing recommendations for government and farmers to think about diversifying the revenues source and giving steps forward for poverty alleviation and future business. The results of the thesis can be also helping for future research in field of fish and poultry production.

Difficulty in accessing relevant data, literature and government documents

Some information of the research was drawn from literature and material obtained from the Ministry of Agricultural, Rural Development and Fishery of Angola and the

department of fishery in Bié province. In this case study was very difficult to get significant data due to the lack of available literature related with this topic and as result the primary data were limited.

The limited availability information on social structures and data for Angola was also highlighted in Bowen and Steinberg (2003) and the lasted UNDP Human Development Report for Angola (PNUD, 2005) for instance.

4. Results

This chapter presents the impact evaluation of the development project "Fish & Chicken" in communities where the project has been implemented. It is oriented to (i) Evaluation of profitability of fish and poultry production; (ii) the socio-economic situation of local farmers linked to the fish and poultry production; (iii) identification of the constraints that face small-scale farmers during implementation of integrated system of fish and chicken and (iv) possible ways to solve these problems are mentioned in this chapter.

4.1. Characterization of farmers

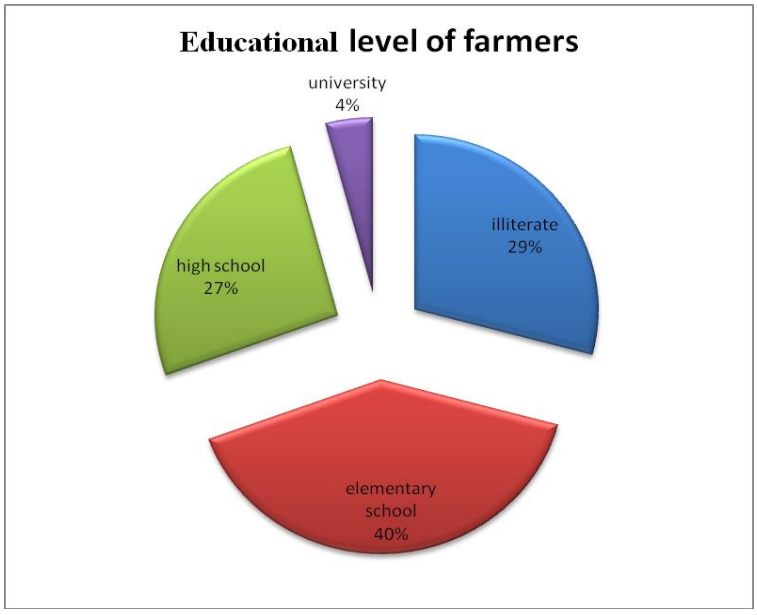
The survey carried out in 16 small villages of two municipalities of the Bié province (Kuito and Catabola) has been oriented on evaluation of the impact of the development project to the local farmers. The total number of farmers was 75; the age structure of the farmers varies from 18 – 57 years. The majority of respondents were male which forms 65% and female remain 35%. Generally women are more engaged to keeping poultry production than fishery activities due to the hard work on construction of ponds, for this reason the percentage of men is higher.

The group of respondents has been comprised as follows: 56% were individual small and medium scale farmers, 19% were members of MINADERP including the director of this ministry; then 19% has been the main head of the 3 existing co-operative. The last 6% were members of FAO. We have to underline that the main head of the co-operative of Cambundi is a woman which is rare to find in rural areas.

The survey shows that majority of farmers which are 87% who are working on fish and poultry production or fish ponds are small peasants with small pieces of land. Most of these small lands ranging from 0.5 to 3 hectares have been inherited from family (come from generation to generation) and, from 87% of the farmers, 12% also work in hired land to increase their production. Peasant farmers depend chiefly on family manpower. Then 8% of the farmers are considered in class of small scale farmers with 4 - 15 hectares of own land. The farmers belonging on this class also work in several state departments. Only 5%

of farmers are in the class of medium – scale farmers with land up to 20 hectares, this class includes some government members and entrepreneurs. Some of the small scale farmers and medium scale farmers have for instance 1 or 2 permanent workers and when there is need they hire extra workers just to help which include some with machinery. All the farmers are involved in crop production and animal production. The main crops production cultivated by the farmers is maize, beans, cassava and some vegetables. Animal production includes chicken, duck, pig, goat and cattle. 41% of farmers keep chicken, 19% ducks, 17% goats, 15% pigs and only 8% keep cattle. It is evident that education level of the farmers is very low which can bring negative impact on the development of integrated system of fish and poultry production. The low educational level is justified by the fact that in rural areas of Bié province the access to school is still difficult. Graph 2 shows for instance that 40% of farmers have elementary school, this means from 1^{st} – 4^{th} class in educational system of Angola but, most of these farmers cannot read. In many poor, tropical countries, a lot of farmers have little or no education and are not comfortable with mathematical analyses or explanations of soil chemistry (Brummett, 1999). The graph number 2 explains the educational level of farmers.

Graph 2: Educational level of farmers



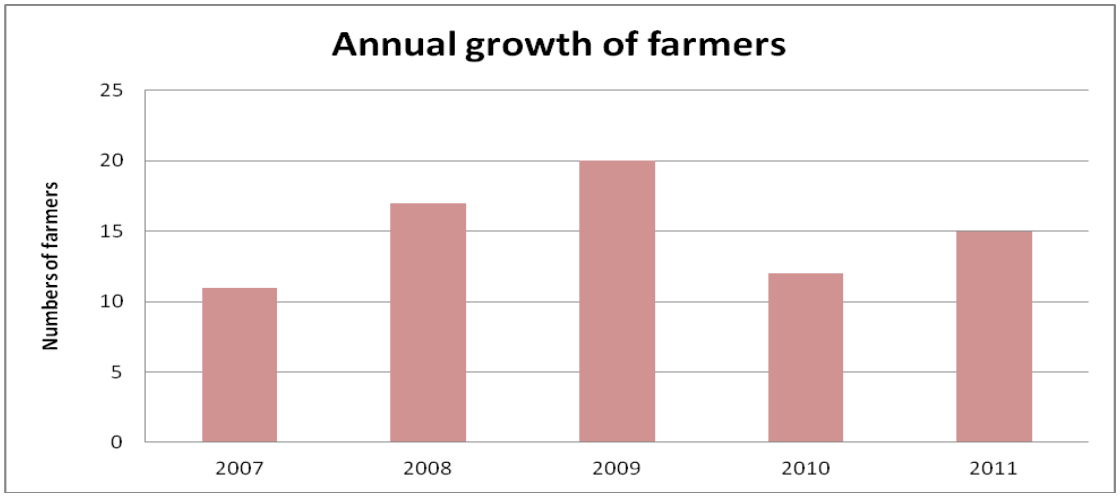
4.1.1. Current situation of the development project "Fish & Chicken"

Farmers were asked if they had any knowledge with integrated system of fish and poultry production before the implementation of the project mentioned above in Bié province. Only 8% of the farmers responded that they had breed fish in tanks but not in integration with chicken or duck and the fish breed in these ponds were for fun and sometimes for consumption. 25% out of the three existing cooperatives never breed fish in ponds (this 25% represent the answer of the 3 main heads of each cooperative) but, they use the traditional method of fishing in river to generate some extra income and for consumption. The other 67% never breed fish; they obtain fish from local market. El-Sayed (2006) found out that in spite of the fact that tilapias are African fish, culture in Africa is relatively new with a low contribution to the world tilapia production, being 12.8% in 2002 (El-Sayed, 2006). This situation has been seen in Angola where the environmental conditions are suitable to breed tilapia and other local species but there is no any contribution to the world production because of the insignificant investment in integrated aquaculture production and by the fact that it is a non traditional practise in the country. Looking from this point of view, it is obvious that the project "Fish & Chicken" was implemented in a right place where the integrated system was not known.

At the start of the project "Consultancy in the area of fish and poultry production in Bié province (Angola)" in 2006, it was discovered that the adherence farmers were little due to the lack of credibility and confidence, seeing that integrated aquaculture was completely new in Bié province. The adherence farmers started growing with the support of the project managers with appropriate knowledge and needed equipments. The number of farmers involved in aquaculture was growing every year despite decline in some years. Graph 3 does not show the growth of the farmers from 2006 because this year was the starting of the project. The survey shows that from 2007 to 2009 the number of farmers increased significantly, the reason of this growth was the presence of the managers of the project. Two years after the end of the project, the result shows a steeply declined in the number of farmers in 2010 and an increase again in 2011.

The graph below shows the annual growth of farmer's adherence in integrated aquaculture production in Bié province.

Graph 3: Annual growth of farmers



4.1.2. Present and past number of constructed pond on integrated system of fish and poultry

The project "Fish & Chicken" achieved several results. One of them was the implementation of the integrated system of fish and poultry production in the selected communities in Bié province. The table below shows the name of the area, municipalities, villages, owners name and number of ponds constructed from 2006 – 2009.

Table 6: Localities and number of ponds built by the project "Fish & Chicken"

	Area	**Village**	**Location**	**Owner name**	**N. of pond**
1	Kuito	Kunje	Chimboto	Co - opetativa Okutalavaya	1
2	Kuito	Kunje	Ngalala	Filipe Sitack	1
3	Kuito	Bairro S. José	Sao Jose	Mr Enoque Pedro	3
4	Katabola	Chipeta	Catchacha	Mr Texeira	4
5	Katabola	Chipeta	Wongo	MINADER	2
6	Katabola	Katapi	Katapi	Co - operativa Elavoko Liwa	1
7	Katabola	Chipeta	Lumbombo	Mr Victor Rafael	1
8	Kuito	Embala Yelele	Sabricassa	Mr Sabino Salongue	2
9	Kuito	Jimba	Jimba	Mr Tony Amaral	1
10	Kuito	Kunje	Chiuyo	Mr Capitao More	1
11	Kuito	Kaluapanda	Kaluapanda	Mr Fernando	1
12	Kuito	Chicava	Chicava	Mr Cassoma	1
13	Kuito	Chicala	Nequilo	Fish & Chicken	4
			Total		**23**

Source: Chaloupková, 2009 (Final project report)

Table 6 demonstrate that during the permanence of the project "Fish & Chicken," a total of 23 fish ponds were built in 13 areas of Bié province. Presently, some of these farmers do not continue in this activity due to some environmental and financial problems (see table 7). On the other hand there is an increase in number of ponds. The table below show the number of ponds constructed from 2010 – 2011.

Table 7: Localities and number of fish ponds built after the end of the project "Fish & Chicken"

N.	Area	Village	Location	Owner name	N. of pond
1	Kuito	Kunje	Chimboto	Co - operative Okutalavaya	2
2	Kuito	Kunje	Ngalanga	Filipe Sitack	2
3	Kuito	Bairro S. José	Sao Jose	Mr Enoque Pedro	0
4	Katabola	Chipeta	Catchacha	Mr Texeira	0
5	**Katabola**	**Chipeta**	**Wongo**	**MINADER**	**2**
6	Katabola	Katapi	Katapi	Co - operative Elavoko Liwa	3
7	Katabola	Chipeta	Lumbombo	Mr Victor Rafael	1
8	Kuito	Embala Yelele	Sabricassa	Mr Sabino Salongue	3
9	Kuito	Jimba	Jimba	Mr Tony Amaral	2
10	Kuito	Kunje	Chiuyo	Mr Capitao More	2
11	Kuito	Kaluapanda	Kaluapanda	Mr Fernando	1
12	Kuito	Chicava	Chicava	Mr Cassoma	1
13	**Kuito**	**Chicala**	**Nequilo**	**Fish & Chicken**	**0**
14	Kuito	Cambumdi	Cambumdi	Promaica	3
15	Kuito	Camudongo	Camundogo	Mr Dumba	1
16	Kuito	Mukumba	Mukumba	Mr Pedro Siloca	2
			Total		**25**

Source: Survey

As shown, in table 6 the total number of fish pond constructed were 23. At the end of the project the survey demonstrate that 11 out of the 23 fish ponds do not exist anymore. However, table 7 shows a growth in the number of fish pond. Those farmers, who had had 1 fish pond in the time when the project was running, now have between 2 – 3 fish ponds. Table 7 also shows that the project was expanded into three additional areas. Total amount of constructed fish ponds now is 25.

Nequilo – was the starting point of the project "Fish & Chicken" because it had been considered the centre of distribution of fingerling, ducks and chicken for the small farmers who implemented the integrated system of aquaculture. When the above mentioned project finished in 2009, the responsibility of the Nequilo centre was given to the Ministry of Agricultural, Rural Development and Fishery of Bié province. Currently the place is abandoned, and the arguments of the MINADERP were that there are no funds to continue to invest on the project. **Wongo** – this farm is owned by the Ministry of Agriculture, Rural Development and Fishery. There are two fish ponds of 100 m^2 with a capacity of 250 tilapias and around it is a poultry houses and vegetable gardens. It became the new centre of distribution of fingerling for farmers after the destruction of Nequilo. However, the survey found out that, there had neither fish nor ducks or chickens, which means that the MINADERP does not pay attention on integrated system of aquaculture. Comparing both centre, it gives the impression that there is no difference between them, because the first centre Nequilo has been destroyed and the second which seems to have necessary requirements to breed fish to support the farmers involved in integrated system of aquaculture does not work.

Despite all the difficulties, some farmers are not discouraged and there are some that seek information about integrated system of aquaculture mainly for creation of new cooperatives. Table 8 illustrate the new communities that start to implement the integrated system of aquaculture. These communities are in initial phase of the construction of ponds, for this reason the number of farmers linked to the activities was not reported by the interviewed farmers.

Table 8: New communities on integrated system of aquaculture

Area	**Village**	**Number of ponds**
Katabola	Ngode	1
Katabola	Samambelo	1
Katabola	Tchicumbi	1
Katabola	Sangenpele	2
Andulo	Chilesso	1
Total		6

Source: Survey

4.1.3. Motivation of farmers to continue in the integrated system of Aquaculture in Bié province

Farmers were interviewed about the main reason for holding the project "Fish & Chicken". There were different reasons that led farmers to engage in integrated system of aquaculture. 42% of farmers responded strongly that the reasons were to improve economy and family diet, 33% for social and cultural reasons, 14% for diversification of their sources of revenue and 11% was to reduce the dependence on artisanal fishing. However, the main reasons we can divide as following:

- Economic
- Nutritional
- Social and Cultural

Economic reason

Poultry production is a traditional practice in rural area of Bié province. For small-scale farmers it is one of the main alternatives of gaining capital. The research survey found out that all farmers keep poultry. Small scale farmers have a custom to sell eggs, chicken and duck on local market. The money gained from the sales is intended for essential needs such as, purchase of agriculture inputs, and family expenses.

Nutritional reason

Meat and fish are sustainable source of protein and vitamins. Fish is a part of daily diet of most farmers but for poultry products such as duck and chicken, farmers have a tradition of eating them only on relevant occasion such as New Year, Easter and Christmas or during wedding, or reception for visitors. On the other hand, eggs are consumed more than meat. Otherwise the normal diet of some farmers is based on maize, beans, cassava, and vegetable.

Cultural and social reasons

Despite the fact that poultry production and artisanal fishery are considered as a traditional practice, the integrated system of aquaculture came to strengthen and boost farmer's productivity. There are no rituals for fish except its consumption and income generation. But chickens are used for fine in certain cases. According to one of the community head, if there is problem in the community and the solution of this problem needs the intervention of the main head of the community called "Soba" the parties involved in the problem must pay chickens for the "Soba" to leave his home to the place where the problem will be solved called "Embala". The number of chickens to be paid is determined by the seriousness of the problem. Another example is the eggs, when you visit someone in community and he/she offers you eggs, no matter the amount this means that you are pure. All these rituals make poultry production as daily practice for small communities in Bié province.

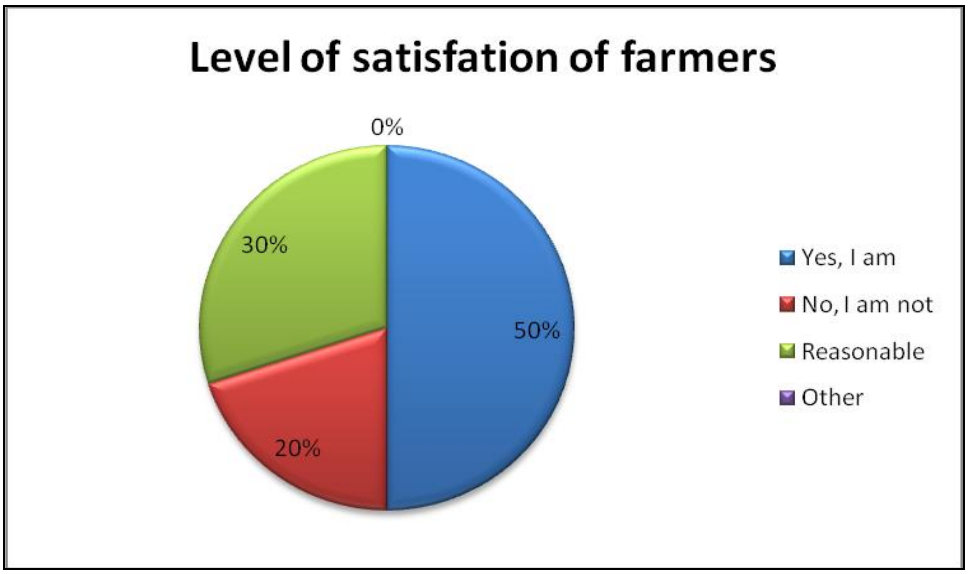
4.1.4. Attendance of farmers on seminars and training

Training and seminars are one of the most important parts in the development projects, mainly when the project is new for the target group. The research survey demonstrates that 71% of farmers had participated in seminars and training, 29% had never attended any seminar. These 29% are those farmers who implemented the integrated system of fish and poultry production after the end of the project "Fish & Chicken". The only way

of orientation for these farmers is the use of practical manual of Methodology on integrated poultry and fish production published by the project in 2009.

The level of satisfaction for those farmers who had participated on seminars and training was also evaluated. The survey shows that 50% of farmers were satisfied, 30% were reasonably satisfied and the remaining 20% were not satisfied. The result from satisfaction of farmers can be considered positive.

Graph 4: Level of satisfaction of farmer's attendance on seminars and training



4.1.5. Source of acquirement of fingerling, ducks and chickens

The acquiring of fingerlings, ducks and chickens has become a little bit difficult for some farmers because the Centre for distribution of fingerling, ducks and chickens does not exist. The survey shows the following 30% of farmers continue with those fish given by the project "Fish & Chicken", 45% get fish from the rivers and the remain 25% buy in Luanda. Certainly those farmers who catch fish from the river have difficulties to select the adequate species for breeding which can delay the growth of the fish. Regarding poultry, all the farmers, including those who breed ducks, chicken, pig, goat and, cattle long time ago answered strongly that there is no other source of acquisition of these products than on the market.

4.1.6. Market prices of poultry products feed and fish price in Bié province

The prices of the products in the market of Bié province varies from region to region and also according to the season. The prices of products in small villages are very low due to the lack of transport, poor roads and sometimes farmers are obliged to lower the prices for immediate needs (disease, buy fertilizers etc). The table below shows the current prices of market, as a result of the survey conducted in 2011.

Table 9: Price of poultry products feed and fish price in Bié in 2011

Products	**Price in KWZ**	**Price in USD**
Adult chicken (1 piece)	900 - 1400	9 - 14
Duck (1 piece)	1500 – 1800	15 - 18
Egg (1)	35 - 50	0.35 – 0.5
Maize (1 kg)	25 - 40	0.25 – 0.4
Ground maize - bran (1 kg)	10 - 15	0.1 – 0.15
Cabbage seed (1 kg)	100 - 130	1 – 1.3
Beans (1 kg)	100 - 150	1 – 1.5
Soybean (1 Kg)	170 - 200	1.7 - 2
Fresh tilapia (3 piece, 25 - 40 cm)	200 - 300	2.5 - 3
Dry tilapia (3 piece, 25 - 40 cm)	350 - 500	3.5 - 5

Source: Survey

4.2. Main constraints in implementation of integrated system of aquaculture in Bié province

The survey reveals that the main problem in the implementation of integrated system of aquaculture is as follows: lack of initial capital, bird disease and no government support.

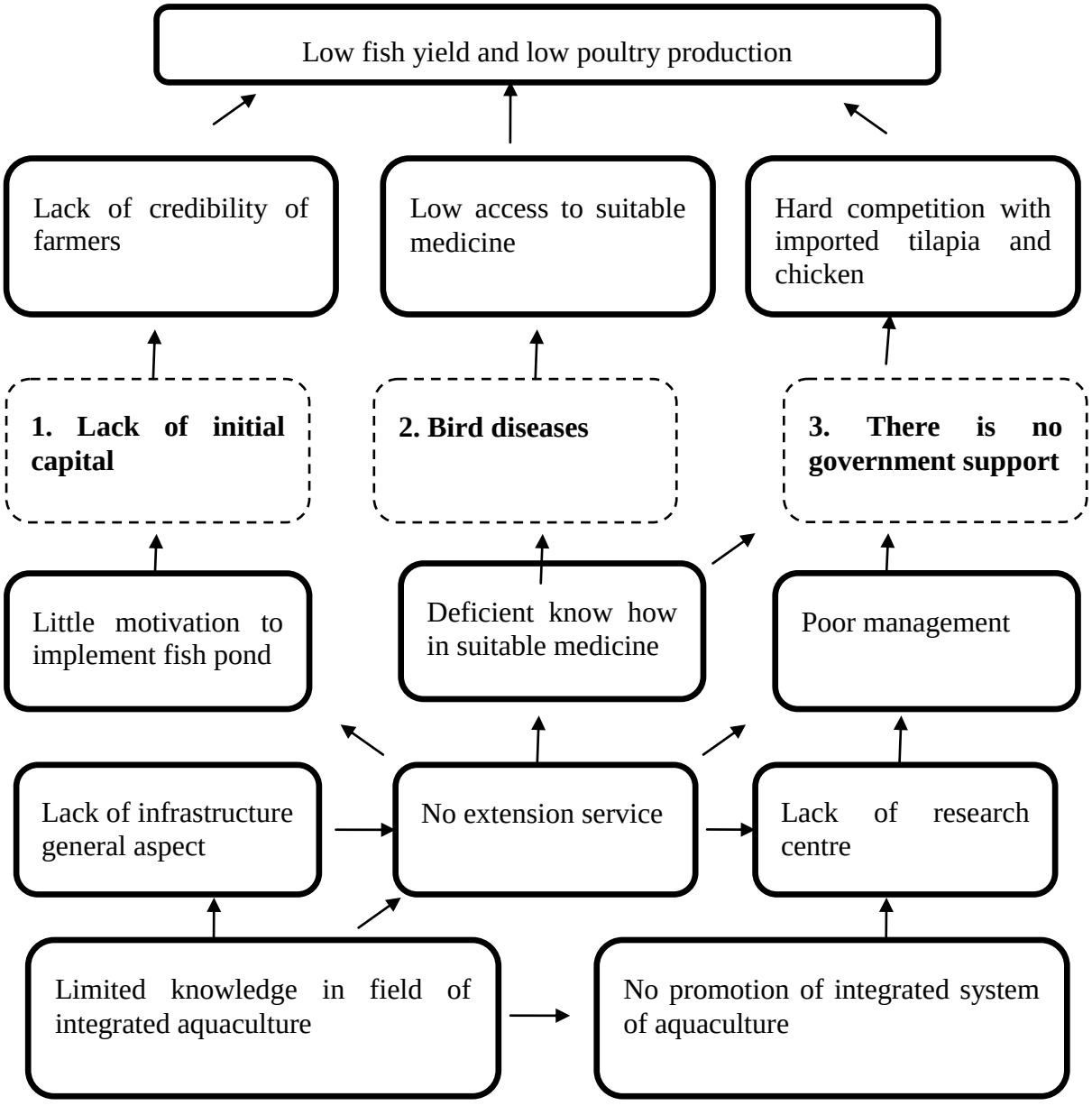


Figure 3: Main constraints of integrated system of aquaculture in Bié province

In figure 3 the highlighted part shows the main constraints in the implementation of integrated system of aquaculture for farmers linked with these activities. The survey demonstrates that 49% of farmers responded that lack of initial capital discourages them to engage strongly in this activity. Then 31 % responded that bird diseases made it difficult for them to increase poultry production. The remaining 20% also said that without government support, it is difficult for them to move forward. The survey also found out that all farmers agreed that integrated system of aquaculture needs to be improved in many ways also and farmers need to be given more assistance such as workshops.

4.2.1. Management and labour profile

In integrated system of aquaculture the labour force is divided between men, women, and children. Women and Children are more involved in poultry production however; men are involved in the construction of ponds and shelters also helping women in poultry production as part of their task.

Table 10: Management and labour profile

Activities	***Member***	***Frequency (%)***
Construction of ponds	Men	22
Construction of shelters	Men	18,6
Maintenance	men and women	6
Feeding birds	women and child	8,4
feeding birds	Men	5
Feeding fish	women and child	7,7
Selling eggs and chicken	women and men	28
Selling fish	Women and men	4,3

Source: Survey

4.2.2. Importance of integrated aquaculture production

Despite the fact that, poultry production and artisanal fishery are a traditional practise in the region of Bié, farmers argued that the project which is mentioned above was important because fish farming mainly when integrated with poultry can improve food security, nutritional condition and income levels of the rural population. Thus, 40% of farmers responded that, they have gained some experience in the field of integrated system of aquaculture. 38% responded that there are opportunities for business, while the remaining 22% responded that they can use local material from the forest to construct shelter in order to save money.

The table 11 below shows the numbers of ponds, ducks, and chickens in each farm. The low numbers of chickens were justified by the fact that the survey was carried out in months that bird diseases affect almost all communities. The most common diseases reported by the farmers were Newcastle and respiratory disease. Usually in rural areas farmers use some local herbs to prevent bird diseases such as *Aloe Vera, Capsicum frutescens and, Chenopodium Ambrosioides*. The survey did not find any information if there was any detail studies on the herbs but farmers believe that these herbs help in preventing these diseases. This problem does not affect only those who have no access to vaccination against disease, however it sometimes affect also farmers who have access to vaccination. In addition to that, bird disease affects poultry production mainly from the end of July until the end of September. According to farmers, poultry production has been much higher than the given numbers but, because of bird disease and some robberies, farmers were not able to respond to the real number of poultry production in a given year nor the number of poultry or eggs sold. In the case of fish, only farmers belonging to Cooperative Elavoko Liwa controlled by FAO reported the amount of fish yield in 2011 which was 207 pieces with an average size of 30 – 40 cm. The other farmer who reported the amount of fish caught was Mr. Cassoma an individual farmer belonging to the class of medium-scale-farmers. His total yield in 2011 was 25 kg of fish with average size of 35 – 50 cm. Other farmers did not report the amount of fish they produce because they have no record of their production.

Table 11: Number of ponds, ducks and chicken in each farm

Location	Farm name	Number of pond	Size of ponds	Number of ducks	Number o chickens
Chimboto	Cooperative Okutalavaya	2	200 m^2	8	12
Ngalanga	Filipe Sitack	2	200 m^2	4	8
Wongo	**MINADER**	**2**	**100 m^2**	**No**	**No**
Katapi	Cooperative Elavoko Liwa	3	200 m^2	10	16
Lumbombo	Mr Victor Rafael	1	100 m^2	13	23
Sabricassa	Mr Sabino Salongue	3	150 m^2	14	12
Jimba	Mr Tony Amaral	2	1000 m^2	46	36
Chiuyo	Mr Capitao More	2	150- 200 m^2	20	30
Kaluapanda	Mr Fernando	1	64 m^2	12	15
Chicava	Mr Cassoma	1	1000 m^2	20	35
Cambumdi	Cooperative Promaica	3	250 m^2	8	13
Camundogo	Mr Dumba	1	150 m^2	10	18
Mukumba	Mr Pedro Siloca	2	200m^2	8	26
Total		**25**		**173**	**244**

Source: Survey

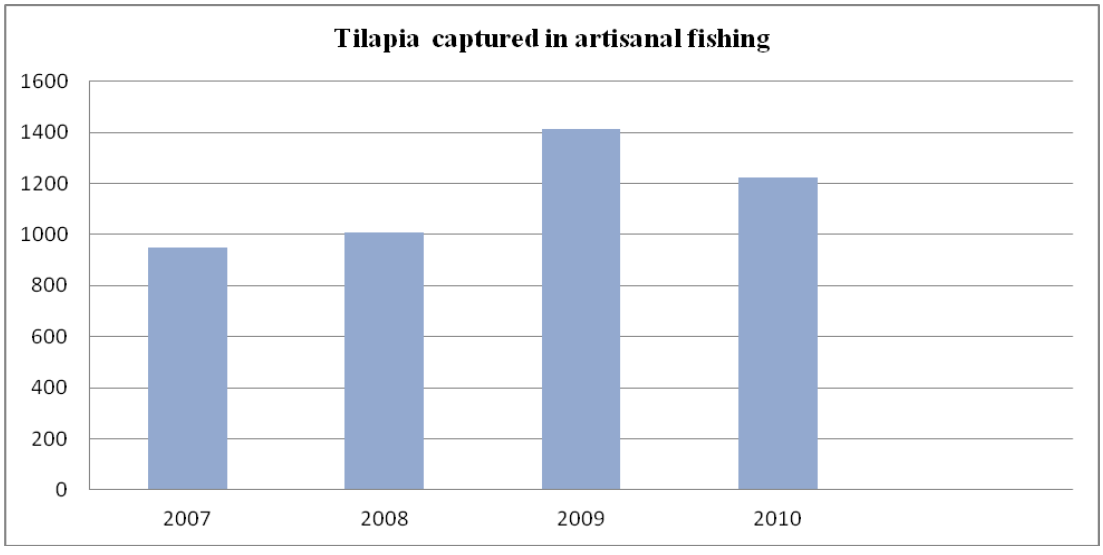
4.2.3. Artisanal fishery

Currently, Angolan's Ministry of Agriculture, Rural Development and Fisheries (MINADERP), based on national program for poverty reduction strategy paper has invested in artisanal fishery. In Bié province a high number of small scale farmers are linked to this program. The MINADERP of the province mentioned through the Institute of Artisanal Fishery is working in way to organize groups of small scale farmers and create association of fishermen. The MINADERP has provided to small scale farmers' kits

comprises of speed boat, fishing nets and providing them with seminars as well. The MINADERP has created from 2007 – 2010 at average 141 associations. The number of farmers linked with these activities is 3,641. This number includes all the 9 municipalities of Bié province (MINADERP Bié, 2011). The graph below shows the amount of tilapia captured from 2007 – 2010. The graph shows only the number of tilapia due to the fact that the project "Fish & Chicken" was focused on tilapia specie.

There is a big difference between small scale farmers linked with artisanal fishing and those who are linked with integrated system of aquaculture in Bié province. However, both groups have some common constraints such as lack of infrastructure, difficulties in competition with imported products. The farmers linked with artisanal fishing have government support but, this support is limited. The kits given by the government do not include for example energy supply for small scale farmers to freeze fish, which lead to farmers selling their products in the same price as those without government support. The idea to improve the living standard of small scale farmers is good but, Angolan government should work hard to break down the persistent weaknesses in policies strategy.

Graph 5: Amount of tilapia captured in artisanal fishing from 2007 - 2010



Source: MINADERP Bié, 2011

Imported frozen tilapia, chicken and eggs in Angola

Angola imports most part of their poultry products from the EU and Brazil. The Angolan government also imports Tilapia from China. In 2010 Angola imports from EU 16,798 tonnes of poultry meat (Agritrade, 2012). In 2009 Angola imported 33,000 tonnes of poultry products from Brazil (Macaubub, 2012). The amount of eggs and tilapia were not available. The price of imported chicken and eggs are very low in local market. Small scale farmers in Bié province have no capacity to compete with the low price of imported poultry. But this does not happen with imported tilapia. The price of frozen tilapia in the market is very high. Farmers have chance to compete in terms of prices, but the only problem is how to maintain the state of the product to keep it frozen for a long time. As shown in table 12 the price of local fresh tilapia (table 9) has no comparison with the price of imported tilapia. There is an urgent need to invest in the field of energy supply not only in rural areas but in the country in general to facilitate the development.

Table 12: Price of imported poultry, eggs and tilapia

Product	**Price in KWZ**	**Price in USD**
1 piece chicken 500 - 600 g	500	5
1 piece egg	25	0,25
3 piece tilapia 25 - 30 cm	1200	12

Source: Survey

4.3. Profitability of fish and poultry production

Brummett et al. (2008) argued that, the key significant profitability of integrated system is the level of management and production intensity, which is the number of fish that the system produce per unit are or volume (Brummett et al, 2008).

The evaluation of profitability of integrated system of aquaculture was based on the first calculation of the implementers of the project “Fish & Chicken”. It is necessary to take into account the following aspect: price of fish, eggs, chickens and ducks, feed and family labour. The feed requirements for duck adopted by the implementers of the project mentioned above were comprised by 3 mixture 70% of bran, 23% of soybean and 8% of limestone. However, due to the lack of limestone in the region the mixture comprises only

bran and soybean. The mixture requirement recommended per 1 duckling per day was 50 g converted into kg it is 0.05 kg per bird/day. The price of bran is 0.125 USD per kg and for soybean is 1.85 USD kg. The calculation of the total feed for duckling was done as follows: quantity of feed/per bird/day X price/kg X 6 months to find the cost for duckling feed in 6 months. Then the calculation for total income for duckling after 6 months was done by the price of 1 adult duck plus the price of 25 eggs produced in 6 months/ 1 duck minus feed cost.

Table 13: Cost for duck production and income

Cost for duck production and income			
Feed	Quantity per day/bird	Price/ kg	Cost of feed in 6 months in USD
Bran	0.035 kg	0.125	0.7875
Soybean	0.015 kg	1.85	4.995
Vaccination		0	
Transport		0	
Hired labour force		0	
Total cost of feed/6 months			**5.7825**
	Income of duck after 6 months		
Adult duck 1 piece		16.5	16.5
Quantity of eggs produced/6	25	0.43	10.75
Total Income/ duck in 6 months			**21.4675 USD**

Source: Survey

The cost of feed and income for chicken was calculated in the same way as duck the only difference is that chicken has a mixture of cassava. The calculation for income of fish was done as follow: in one pond with size of 200m^2 is possible to introduce an average of 360 fingerlings which weight 5 g = 1.8 kg after 6 months the pond will have an average of 360 fish weighing 50 g = 18 kg. In market the price of 5 pieces of fish is 5 USD, dividing the number of fish which is 360 by the number of piece X the price sold, as obtained by the total income of fish in 1 pond.

Table 14: Feed cost and income for chicken and fish

	Feed cost for chicken		
Feed	Quantity per day/bird	Price/kg	Cost of feed in 6 months in USD
Bran	0.021 kg	0.125	0.4725
Soybean	0.009 kg	1.85	2.997
Cassava	0.003 kg	0.35	0.189
Vaccination		0	
Transport		0	
Hired labour force		0	
Total cost of feed/6 months			**3.6585 USD**
	Income of chicken after 6 months		
Adult chicken 1 piece		11.5	11.5
Quantity of eggs produced/6	70	0.43	30.1
Total income/chicken in 6 months			**37.9415 USD**
	Cost of fish in 1 pond		
Quantity of fingerlings in 1 pond with 200 m^2	360 - 5 g = 1.8 kg		
Quantity of fish in 6 months	360 - 50 g = 18 kg – 16.2	5 piece = 5	5
Total income in 1 pond with 200 m^2/6 months			**360 USD**

Source: Survey

As shown in table 14 the profitability in the integrated system of aquaculture is quite relevant. At the time of the survey, it was not possible to make sure the profitability of farmers linked with the activity due to lack of management. As was described in first chapter of the results farmers in Angola are distinguished in 3 classes. However, the problem of management affects all classes of farmers. During the survey it was also observed that, farmers do not follow the recommended feed requirement for poultry mainly due to the food competition between people and animal as well as the size of ponds because of misunderstand. Thus, poultry production goes slowly and the return on investment also becomes slow.

The majority of small peasants argued that the fishing is done according to their necessity because it is much better for them fish than to eat one chicken. Thus, they never have a control of how much fish they catch per week or per month. For small peasant to eat one full chicken in normal day is considered a big loss. The other class argued that they do not care about how much increase in the production, because they do it for family consumption and one important thing is that they always have available fish. The integrated system of aquaculture at the moment does not generate relevant financial profits but is an important source of food for farmers. Some farmers still do not realize that the farm management is one important key for economic development.

4.4. Possible ways to solve the constraints of integrated system of aquaculture

The first constraint focused by the farmers was lack of initial capital. It can be solved with credit. However, talking about credit for small peasants which is the most interested group in implementation of integrated system of aquaculture is quite difficult. First of all farmers do not have a background about the requirement of banks to get credit, and then farmers do not produce enough to grant the payment of credit. One of the way to make known polices of bank is to create opportunities for farmers through extension services and create a serious association of farmers linked with integrated aquaculture. For those farmers who know the requirement of credit, there is a fear to take credit and invest in aquaculture because the costs of interest rates are too high.

In 2006, Angola created, “Development Bank of Angola (BDA)” one of the objectives of this bank is to provide credit for farmers in all classes. In Bié province this project is far to be fulfilled because this institution has not arrived yet.

The second problem reported were bird diseases, which can be solved by vaccination. The cost of one vaccine was not reported by the members of MINADERP or by the farmers. The only way to solve this constraint is to create an institute of veterinary and laboratories to analyze the local herbs and another way is provide vaccination without restriction to all farmers.

Lack of government support was also considered as one of the constraints. The role of government in all spheres of development is indispensable. To solve this problem is necessary to adopt better policies strategy that will benefit not only farmers but all the population in the country. The policies adopted by Angolan government are still weak because they do not benefit everyone. The need to create efficient extension service through monitoring of all kind of activities will help to solve the problem of farming management and also help farmers to understand the real objective of integrated system of aquaculture and the concept of development.

4.5. Socio-economic situation of local farmers linked to the project fish and poultry production

Evaluating the socio-economic situation of farmers linked with the project mentioned above is needed to take into consideration the classification of farmers in Angola. Small peasants are the most interested group to the integrated system of aquaculture being an average of 87%. The socio-economic situation of these farmers can be measured by the consumption of fish per day, week or month. But during the survey it was not possible to ensure how many times they have fish but, they responded that the consumption of fish in their diet has increased, at which level no one knows. This activity still does not generate employment except for those who are linked to this activity. However, there are hopes that the situation will become better. This class of farmers have not enough land to extend their production level. Otherwise these farmers are depending on subsistence agriculture.

Other 2 groups comprised by 8% in the classes of small scale farmers and 5% of medium scale farmers have better living standard. These classes of farmers are employees of different state departments and entrepreneurs. To measure the socio-economic situation of these farmers was very difficult due to the fact that they do not depend on farming to generate income. Some of them practise this activity as fun. However, some have great plans on how to increase production and create job. The difference in socio-economic situation of these farmers is linked to the fact that in Angola the distribution of resource is

quite unequal. Small peasants in whole country face great problem regarding socio-economic situation.

The impact of the development project shortly named “Fish & Chicken” can be considered positive because despite all constraints faced by the farmers, they believe that the situation will become better. In one hand, it seem like the integrated system of aquaculture do not generate any income to farmers, due to the lack of management, low production among others things but, the willingness of farmers to fight and strengthen this activity is high and perceptible. The impact also can be seen in the increase in number of small scale farmers seeking information to integrate into groups of cooperative. The increase of fish ponds can ensure food supplies for farmers. Another important point to be highlighted is the fact that most farmers involved in this activity stand alone they have no any other outside help.

5. Discussion

The purpose of this thesis was to evaluate the impact of the development project in consultancy in the area of fish and poultry production by local farmers (case study in Bié province, Angola). The result of the study carried out in 16 small villages of Bié province has some similarity with some study carried out by different authors in some parts of Africa. The result of the thesis can be compared with the study conducted by Brummett in Malawi where the International Centre for Living Aquatic Resource Management (ICLARM) has invested in the integrated system of aquaculture and the increase of productivity of small-scale farmers has been improved considerably. The size of pond has increased from 64 to 88 m^2. The Malawian small scale farmers breed also *Tilapia rendalli* and the productivity of integrated aquaculture in that time was 1,950 kg/ha/year (Brummett, 1999). Malawi belongs to the Southern African Development Community where Angola is part of. One similar project like "Fish & Chicken" has been also implemented in Malawi in the Mchinji district. This project was implemented by the government of Japan through Japan International Cooperation Agency (JICA) with the government of Malawi and the project is called Aquaculture Development in Malawi (ADiM). The increase in fish farming from 2000-2003 was attributed to the presence of some NGOs and the initiative of local government extension service who encouraged farmers to diversify their farming practices and look for alternative sources of food. From 1987 to 2005 the district above mentioned had had a total number of 232 fish farmers owning 316 fishponds. The average size of the pond was 321.9m^2 and one of the specie breed in the pond had been *Tilapia rendalli* which had achieved a record production of about 20,000 kg in 1 year (JICA, 2005). Despite the increase in production, small scale farmers who were linked to the project mentioned had faced several constraints such as; lack of capital, limited knowledge in the field of aquaculture, shortage of fingerling (JICA, 2005).

In Bié province the development of integrated system of aquaculture started in 2006 with the objective to boost agricultural production and productivity of small scale farmers. From the period of 2006-2009 the managers of the project shortly called "Fish & Chicken" had supported to built 23 fish ponds. The result of this thesis shows that during this period

11 out of 23 ponds do not work due to several constraints faced by the farmers. Despite this decline currently the numbers of ponds is 25. The increase of production of small scale farmers linked to this activity in Bié province was considered very low due to lack of records and bad management which is not the case with small scale farmers in Malawi. However, the constraints faced by the small scale farmers in District Mchinji in Malawi are confirming those faced by the small scale farmers linked with integrated system of aquaculture in Bié province. The difference between them is the increase in production and the Malawian farmers have a control of their production which does not happen in Angola. In addition, the Malawian government has invested for long time in aquaculture for this reason the increase on the productivity of small scale farmers in Malawi is high. The development of aquaculture in Angola and in most part of Africa is still pioneer. However, despite all constraint faced by the farmers in Bié province this activity is continuing to develop although very slowly. Farmers involved in this project "Fish & Chicken" are aware of the importance of improving farm management to increase productivity and finally generate income. Despite all difficulties the impact of the development project "Fish & Chicken" is positive. The only important thing is that Angolan government should pay attention in field of aquaculture and also take the example of those African countries that invest on integrated aquaculture and develop it in the whole country.

In SADC community extensive small-scale fish farming has been expanded also in Mozambique, Tanzania and Zimbabwe. In 2003 the number of ponds was estimated at about 25,000 and the production was about 5,000 tons per year (Chimatiro, 2003). Aquaculture for rural development involves production systems operated by small-scale farmers and based on locally available pond inputs and species that are easily grown and reproduced. The common constraints faced by small scale farmers are almost similar in all rural Africa. The main constraints are lack of cash, shortage of labour force, and quality of government extension services (Brummett and Williams, 2000). Mudenda et al. (2005) on their study of aquaculture in Zambia identify almost the same constraints such as; inadequate quality fingerlings, poor rural infrastructure, lack of extension service, lack of market strategy and lack of cash (Mudenda et al., 2005).

Integrated production with poultry and fish leads to improve production, diversifying food and income generation and resources for poor household farmers. The integrated poultry and fish can also be economically viable (Alam et al., 2009). According to Miller (2009) aquaculture has been recognized as an important component of rural development strategies aimed at improving food supply and generating more income for poor farming households (Miller, 2009). The result of the study can be compared with the argument done by the mentioned authors. Farmers linked to the integrated system of fish and poultry production practices this activity with different reasons but, the main reasons are economic, nutritional and socio-cultural aspects. However, the economic reason is one of the most significant due to the strength of farmer's income and how it can improve standard of living. The study also shows that the reason for the increase in poultry production for small scale farmers in Bié province is socio-cultural. But women and children are mostly involved in keeping poultry than men. This finding can be compare with the study carried out in Central Highland of Ethiopia and in other part of Africa (Tadelle and Ogle, 2001; FAO, 2004).

The significance of socio-cultural aspect of poultry production in the life of the small scale farmers in Bié province is quite similar with some part of Africa. Moreki (2006), on its review of poultry in Botswana found out that, in Botswana white and black chicken are used in healing rituals; in Cameroon the strains with white plumage and the black one, are used in traditional medicine and magical practices (Moreki, 2006). This proofs that, the importance in poultry production goes beyond generating income, it is part of history of the rural population in Africa, the only difference is the way it is being use in each region of Africa and according to culture or tradition.

Newcastle disease was pointed by the farmers as one of the constraints that make poultry production decrease. According to Alders and Spradbrow (2001) chicken are the most vulnerable to be infected by ND. Ducks are also at risk to the infection but, these species do not often give way to the disease. The study shows that ND affect chicken in dry season between July and September. In Uganda, ND also is spread throughout dry season and poultry production also reduces in this season (Alders and Spradbrow, 2001). The

damage of pest and diseases can be economic (through lost of output, income and investment) as well as psychological - manifested in shock and panic (FAO, 2001). Majority of farmers involved in the project "Fish & Chicken" have no access to vaccine to prevent bird disease for this reason, they use local herbs. In Zimbabwe 98.9% of small scale farmers also use herbs for poultry health management, the most herbs used are *Aloe vera* and *Aloe spicata* (Mwale et al., 2005). However, like was found in Bié province, in Zimbabwe also was not found a detailed study which can confirm the efficiency of these herbs with respect to the diseases.

The socio-economic situation of farmers involved with integrated system of aquaculture in Bié province, are not much different from some Africans countries where the government and NGOs has invested on research for long to evaluate the efficiency of farmers linked to the mentioned activity. The research conducted by CTA (1999) in Zambia, Zimbabwe, Malawi, Tanzania Kenya, Uganda and Nigeria showed that, it is difficult to provide precise estimation of fish production from aquaculture, particularly from small-scale farmers. Fish are usually sold by numbers rather than by weight in rural situations, most farmers do not keep good records and many carry out partial harvesting for home consumption. Official statistics often end up being no more than rough estimates derived by multiplying an estimated pond area by an assumed production factor (CTA, 1999; Brummett and Williams, 2000). According to Brummett et al. (2008) in the last 20 years several reviews have been conducted on the African integrated system of aquaculture and all of these have come to more or less the same conclusion that: aquaculture is a viable economic and livelihood alternative to several rural farmers at many levels, however African government and international donors have failed as primary motivators in its sustainable development. Part of this is due to the general incompetence and corruption of many African governments, which fail in their responsible to their citizens, and have neither the knowledge nor financial assets to implement meaningful intervention (Brummett et al). This argument is similar to the result of the survey where the majority of the farmers had complained about the negligence of the government of Bié province in respect to the integrated system of aquaculture. Regarding the donor, the only complain

made by the farmers was about the time frame of the project which they consider too short. This complains can be understood due to the low level of education of some farmers and the misunderstanding of the concept of development project.

Criticism of the development project "Fish & Chicken" in Bié province

At the time of the survey, there were some criticisms done by farmers and also by some members of MINADERP. Farmers criticize that the time frame of the project was too short and they had not enough time to be familiarized with the project although they have attended the seminar classes. In the opinion of the author this criticism was not relevant. Work in development project with rural people mainly in Angola is a very difficult task, because they have a chronic problem. This chronic problem is the way they see the external aid to develop the communities. Some farmers, even those with reasonable education still think that the implementers of the project should hand over everything to them and for free.

The criticism of the members of MINADERP Bié was about funding. Members of MINADERP argued that the project provided all the necessary equipment for the project but did not leave funds to continue the project, putting them on the same way of thinking like the farmers. However, the author concludes that it was one indirect way to justify the collapse of the centre Nequilo. In addition the author, reveal that to develop the communities it is necessary to fight against this chronic problem.

6. Conclusion and recommendations

The success of development project is based on the efficiency of farmers and the support of national or regional governments. The impact of the development project in integrated system of aquaculture in Bié province at the present is positive. As the results shows, the efficiency of the development of integrated system of fish and poultry production will take a long time not only due to several constraints faced by the farmers but also due to the lack of government investment. The thesis reveals the main constraints that delay the production but, on the other hand the willingness of farmers to strengthen these activities is also visible. The lack of capital, bird diseases and lack of government support are among the main constraints.

The socio economic situation of the farmers was analyzed and it was found that there are differences between small peasants, small scale farmers and medium scale farmers. Small peasants are the most interested group involved in the activity above mentioned and they depend directly or indirectly on farm activities while the other classes of farmers have other sources of generating income and their living standard is much better than small peasants. Despite this, the consumption of fish according to small peasants has been at increase.

The main reasons to continue to practise integrated system of aquaculture in Bié province are similar to the other parts of Africa. It was found that economic, nutritional and socio-cultural has led farmers to be linked with the activity. The estimation of the profitability of integrated system of aquaculture was analyzed and it shows that there is a great opportunity to make business. However, determining the profitability of majority of farmers at the moment is totally impossible due to lack of records and uncontrolled fishing. The production of poultry was also low due to bird diseases. The majority of farmers have no access to vaccine hence they resort in use of local herbs such as *Aloe Vera, Capsicum frutescens and, Chenopodium Ambrosioides* to prevent the diseases even without a detailed study of the efficiency of the herbs.

Looking at all the arguments done by some authors regarding integrated system of aquaculture in Africa and the result of the thesis it is fair to say that, the point of intersection of these problems are linked with lack of adoption of effective policies strategy that can help government to develop not only aquaculture but also other development activities. There is a need to create a suitable extension services that will support farmers through monitoring all kind of activities.

Recommendations

This study analyzes the impact of the integrated system of fish and poultry production in Bié province and it was found that several constraints made the fast growth of this activity difficult. The integrated system of aquaculture nowadays is one of the most recognized ways to improve food security and alleviate poverty due to the increase in world population especially in developing countries. It is known that to ensure food security and sustainability depend on several factors such as; a set of adequate policies and strategy and the political stability of the countries among others. The study reveals that, the potential in the above mentioned activity is great and the investment on it can improve the production and finally contribute to food security and increase the economy of both rural and urban population. For this reason the author's recommendations are directed mainly to the MINADERP, NGOs, small scale farmers at all levels. The recommendations are as following:

- The government of Angola through the Ministry of Agriculture, Rural Development and Fishery should create a core research staff with adequate extension services that will provide farmers with seminars and observation training in field of integrated system of aquaculture.
- Creation of banks or institutions that will provide microcredit and services with moderate interest rate to farmers at all levels to help them expands their activities.
- It is important to promote suitable bird diseases control in rural area in way to avoid the expansion of the disease throughout the region and, it is also necessary to invest in research centre to analyze the efficiency of local herbs.

- Investment on human potential through the establishment of veterinary school that will provide tutorials for farmers with low level of education could also help in development of the activity.
- The change of experience with other countries that have advanced experience in the field of integrated system aquaculture is also important.
- The reconstruction of roads and investment in transport for those farmers in rural area will facilitate the selling of their products in good price.
- Investment in the centre of distribution of fingerlings is essential because it can help farmers to breed fish with high quality.

The recommendations of the author for the farmers are the following:

- Farmers should be united and create small associations that enable them to exchange experiences with each other like in some parts of the world, like in Vietnam for instance.
- Farmers must collaborate positively with the government and NGOs and make effort to understand the objective of development projects.
- For those farmers who practise the activity as fun it is time to wake up and invest seriously in commercial level and help those farmers with certain vulnerability.

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8. Appendixes

Appendix 1: Farm Nequilo centre of distribution of fingerlings and poultry in 2006-2009


Appendix 2: Farm Nequilo 2 years after the end of the project “Fish & Chicken”


Appendix 3: Fish pond in Wongo new centre of distribution of fingerlings and poultry

Appendix 4: Interview with farmers of co-operative Elavoko Liwa in village Katapi

Appendix 5: The road from municipality of Katabola to village Katapi

Appendix 6: Interview in farm owned by Mr Tony Amaral in Jimba village

Appendix 7: Tilapia from Kwanza River sold in municipality of Katabola

Appendix 8: Eggs and vegetable sold in market of municipality of Kuito

Appendix 9: Map of Angola

Source: Ghiapereira, March 2012

Source: Mapas de Angola

Appendix 10: African Farmed Tilapia Production by Major Producers (tonnes)

Country	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Egypt	152 515	167 735	199 557	199 038	217 019	258 925	265 862	386 186	390 300
Uganda	1 550	1 957	2 200	1 660	4 239	11 388	16 891	17 130	21 573
Nigeria	2 626	4 496	3 948	4 176	6 144	9 216	9 272	3 233	10 218
Zambia	4 370	4 530	4 455	5 080	5 080	5 173	5 839	5 604	8 437
Ghana	4 400	4 400	285	760	954	2 000	3 500	5 100	6 676
Kenya	412	421	600	614	622	609	2 965	3 113	3 424
Congo	2 738	2 959	2 959	2 959	2 959	2 960	2 960	2 960	2 960
Zimbabwe	2 165	2 213	2 600	2 950	2 450	2 450	2 500	2 600	2 650
Sudan	1 000	1 000	1 000	1 000	1 000	1 000	1 350	1 400	2 000
Malawi	532	620	630	697	767	1 445	1 445	1 565	1 500
Others	2 851	3 663	3 612	3 008	3 630	3 717	3 758	4 439	4 578
Total	**175 159**	**193 994**	**221 846**	**221 942**	**244 864**	**298 883**	**316 342**	**433 330**	**454 316**

Source: Infofish International, 2011

Appendix 11: Sample of questionnaire

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Institute of Tropics and Subtropics

Evaluation the impact of development project Consultancy in area of fish and poultry production shortly named "Fish & Chicken" in Bié province (Angola).

Questionnaire

Designed to small scale farmers who joined the project “Fish and Chicken” in Bié province from the beginning of the project to date?

Locality: Source: Education: Age:

1- Sex
   a) Male
   b) Female
2- Which year did you join the project “Fish & Chicken: implemented by the Czech University of life science?
   a) At the beginning of the project in 2006
   b) In the middle of the project 2007- 2008
   c) At the end of the project 2009
   d) After the end of the project 2010- 2011
3- What were the reasons that led you to join the integrated system of fish and poultry production?
   a) Improve the economy and the family diet
   b) Social and Cultural reasons
   c) Diversify the revenue sources
   d) Reduce the dependence on artisanal fishing
   e) Others……
   …….
   .

4- As the integrated system of fish and chicken is new for small farmers in Bié province; does the fish and chicken project provide training classes to small scale farmers?

a) Yes
b) No
c) Maybe
d) Others……..

5- How many times per week or per month did you attend lessons or seminars?

a) Once per week
b) 2-3 times a month
c) Never
d) Others

6- Were the conditions of learning provided by the managers of the project satisfactory and enough for small farmers?

a) Yes
b) No
c) Reasonable
d) Others……..

7- What were the major problems for small scale farmers in joining integrated farming system of fish and poultry production?

a) Lack of experience in this area
b) The objectives of the project were not clear
c) The fear of investing in new business without the certainty if there will be some profits
d) Others……..

8- What were the limitations that the farmers noticed by managers of the project during the implementation?

a) Insufficient time to be completely familiarized with the project
b) Lack of deep knowledge of some training agents
c) Limited fund
d) Difficulties in providing information to the farmers
e) Others……
……
……...

9- Did you have some experience of breed fish in combination with poultry before the mentioned project arrive in Bié province?

a) Yes
b) No
c) May be
d) Others

10- What was the importance for small scale farmers to cooperate with the project Fish & Chicken?

a) I gained experiences
b) There are opportunity for business
c) Learning the way how to reduce costs by using local materials
d) It was no important
e) Others……
……
……...

11- Is Fish and Poultry farming your only business and source of income?

a) Yes
b) No

c) Others……
……
……

12- The project “Fish & Chicken” provides to small scale farmers some fish and ducks. Do you had access to this and do you continue to grow fish and ducks provided by the project or do you get it in other sources?

a) Yes
b) Not
c) Others

13- Do the Small scale farmers continue to follow the instructions given by the instructors for the construction of new ponds and pass this knowledge to news farmers?

a) Yes
b) No
c) Others……
……
……

14- Do you know some small scale farmers who joined the project after the end?

a) Yes
b) No
c) Others

15- Currently, what are the problems affecting small scales farmers in the area of fish and poultry production in Bié province?

a) Lack of initial capital
b) Bird disease make difficult to increase the production of poultry
c) No Government support
d) Lack of technicians monitoring the tanks
e) The reproduction of fish is very slow
f) No limited experience in the field of feeding

g) Little motivation to implement fish and pond

h) Others……..

16- How many kg or piece of fish did you capture in 2011? Please specify……
……

17- How did you divide the activity in farm

Activities	Family member	Yes or No
Construction of ponds	men	
Construction of shelters	men	
Maintenance	men and women	
Feeding birds	women and child	
feeding birds	men	
Feeding fish	women and child	
Selling eggs and chicken	women and men	
Selling fish	Women and men	