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**THE EFFECT OF AGRICULTURAL RESEARCH FUND AVAILABILITY ON
AGRICULTURE: THE CASE OF SAVANNA AGRICULTURAL RESEARCH
INSTITUTE (SARI)**

BY

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DECLARATION OF AUTHORSHIP

I hereby declare that this is my own work submitted towards the award of a Master of Business Administration (Accounting) and that to the best of my knowledge, it contains no martial published before by another person or any martial which has been accepted for the award of any degree of the university, except where due acknowledgment has been made in the text.

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ABSTRACT

The development of agriculture, economic growth, and the eradication of poverty are all significantly enhanced by investments in agricultural R&D. This work explores the availability of finances for agricultural research and its impact on agriculture in Ghana, with a focus on the CSIR- Savannah Agricultural Research Institute (SARI) and the consequences for the underfunding of agricultural research in Ghana. A total of 110 selected employees from the accounting, administrative, scientific, and technical fields took part in the survey. All respondents' data was gathered through questionnaires, and the Internal Management Committee (IMC) members of the institute were interviewed individually. The data were analysed using Excel 2013 and the package of social scientists. The study identifies the Government of Ghana (GoG) grant and Internally Generated Fund (IGF) as the funding sources accessible to SARI. There were gaps in these sources of funding. The performance of various sources varies. There were shortfalls in GoG funding, except for the personal emolument component. IGF was equally not performing so well. Further research is needed, according to the report, to improve SARI's internally generated fund (IGF) as a source of funding for agricultural research. Moreover, consider how the government may be more dedicated to releasing the duly authorized budget on a timely basis.

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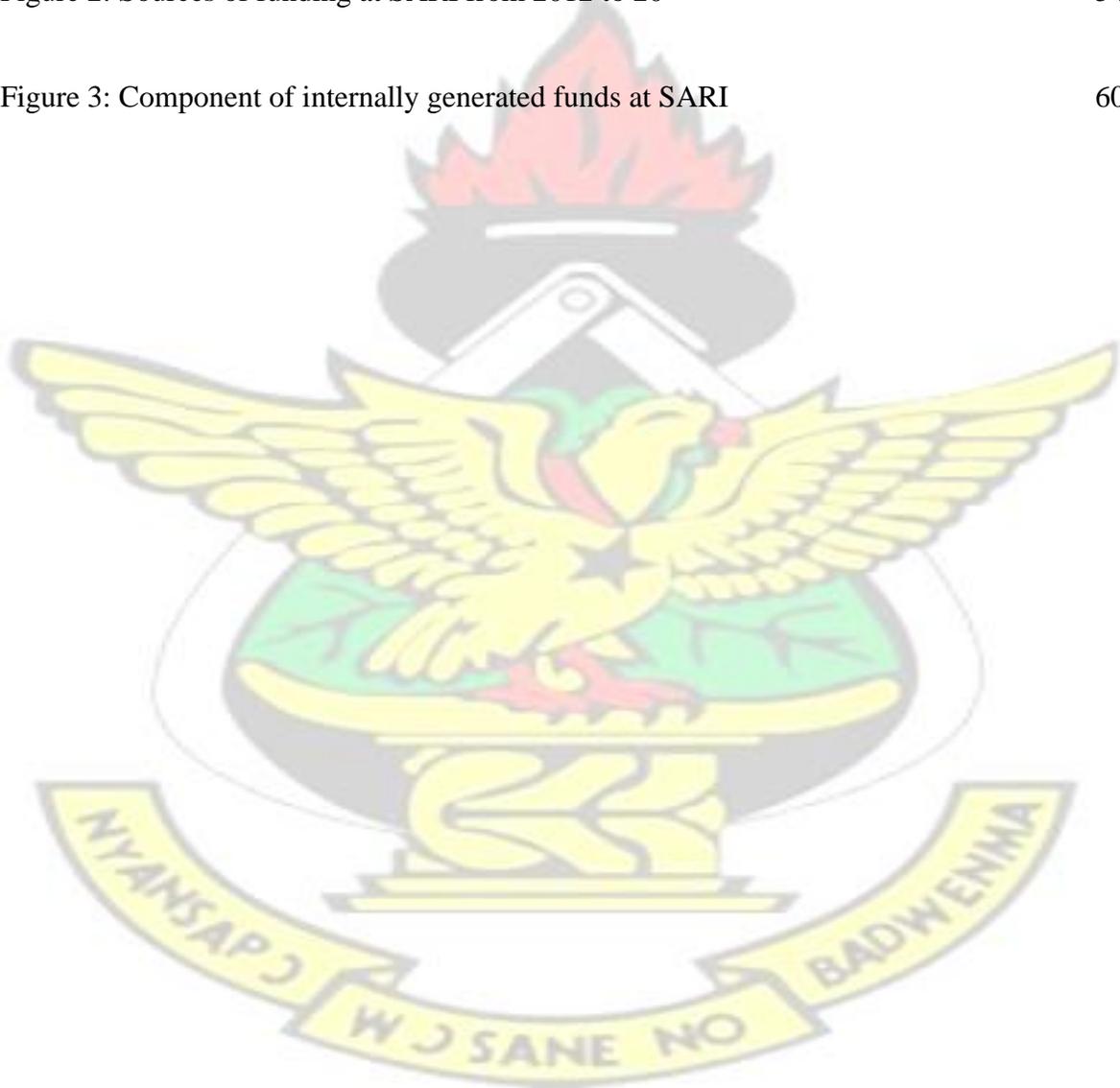


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LIST OF Abbreviations

CSIR: Council for Scientific and Industrial Research

SARI: Savannah Agricultural Research

CRIG: Cocoa Research Institute of Ghana

FORIG: Forestry Research Institute of Ghana

KNUST: Kwame Nkrumah University of science and technology

UCC: University of Cape Cost

UDS: University for Development Studies

MOFA: Ministry of Food and Agriculture

PGRRI: Plant Genetic Resource Institute

OPRI: Oil Palm Research Institute

AGRA: Alliance for Green Revolution in Africa

WRI: Water Research Institute

ARI: Animal Research Institute

UG: University of Ghana

IGF: Internally Generated Funds

GOG: Government of Ghana

CST: College of Science and Technology

IMC: Internal Management Committee

FAO: Food and Agriculture Organization

OECD: Organization for Economic Co-Operations Development

FTE: full-time equivalent

MFRD: Marine Fisheries Research Framework

R&D: Research Development

CRI: Crops Research Institute

IDA: International Development Association

NEPAD: New Partnership for Africa Development

MES: Ministry of Environment and Science

AGSSIP: Agricultural Science sub-sector Investment Programme

NARP: National Agriculture Research Program

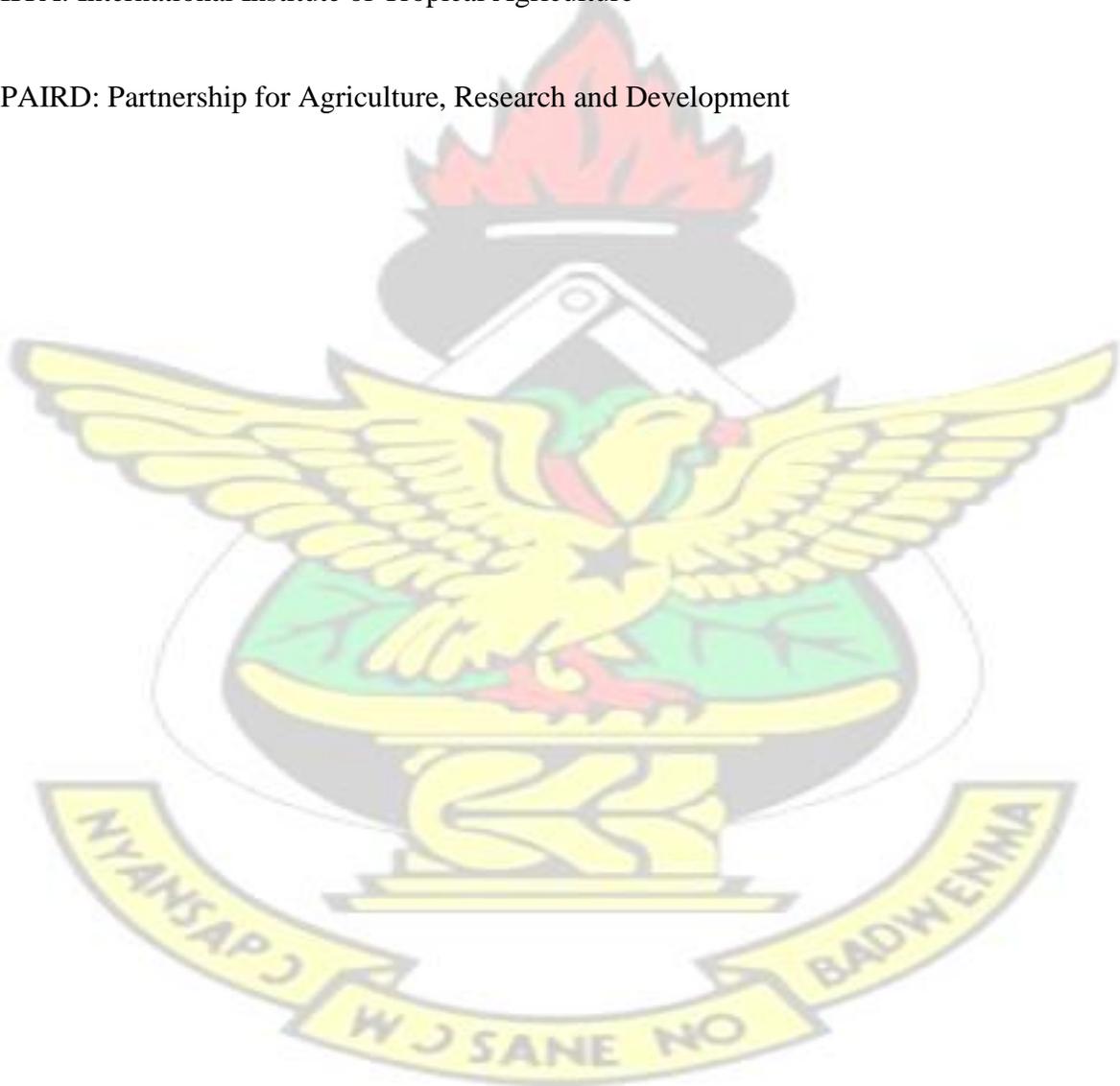
GDP: Gross Domestic Product

SDGs: Sustainable Development Goals

NGO: non-governmental organization

IITA: International Institute of Tropical Agriculture

PAIRD: Partnership for Agriculture, Research and Development



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CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background of the study

To exploit the advantages of the rapid growth, the agricultural sector can contribute to the structural change of the economy of Ghana (MoFA, 2016). The industry employs the majority of people over 45.38 % of the total labour force (GSS, 2019).

Globally, rising food prices is making the problems of poverty and hunger more badly. Sustainable Agriculture (DFID, 2008), International Development Department. Despite the fixed amounts of arable land, diminishing water supplies, population growth, declining soil fertility, and the effects of climate change, agricultural production must increase more than ever in the next 50 years (Aseri *et al.*, 2016).

To overcome these obstacles and achieve higher agricultural productivity, food security, and the post-2015 development goals, there is a great demand for new technology to accomplish higher agricultural productivity, food security, and the post-2015 development goals relating to nutrition, health, and the reduction of poverty and hunger (FAO, 2009). The achievement of this goal can be accomplished via funding agricultural Research and Development (R&D), which aims to enhance agricultural funding, collaboration and structure. Unlocking the

Potential of Agriculture (Zorya *et al.*, 2011). The adoption of the Sustainable Development Goals (SDGs) by the globe in 2015 further emphasizes the importance of agriculture. Ending hunger, achieving food security, enhancing nutrition, and promoting sustainable agriculture are the objectives of SDG 2 (ISSER, 2015). Global food price increases have made the problems of poverty and hunger worse. A 50-year plan is required for agricultural output (DFID, 2008). In order for agriculture to be sustainable, resources must be made accessible for research and development as well as a knowledge base (ISSER, 2015)

In many Sub-Saharan African nations, the agriculture sector has remained the cornerstone of socioeconomic development because it provides the majority of jobs, food security, and means of survival. Around 20 % of Ghana's Gross Domestic Product (GDP) in 2019 came from agriculture. For many Ghanaians, especially those living in rural areas, it is a source of employment (Johnston, 1970).

For the previous few years, the industry has had consistent growth in 2019; it contributes about 20 % to Gross Domestic Product (GDP) of Ghana. The sector have had the highest growth of 7.0 %, in 2020, which is an increase from 2019, which recorded 6.9 % (Doris, 2020). Base on the figures projected above, agriculture not only contributes significantly to Ghana's Gross Domestic Product (GDP) but also to the socioeconomic progress of many other Sub-Saharan African nations.

This industry not only boosts the Economy but also supplies raw materials for expansion and development of industries. The health of agricultural research and development (R&D) is crucial to Ghana's growth and development. The reasons are that it gives food, raw materials for industries, and foreign exchange, all of which enhance Ghana's industrialization (Johnston, 1970)

There is interest in the study of agricultural research and development in Ghana because there is evidence that investment in agricultural R&D has greatly increased agricultural productivity globally, resulting in better income, reduced levels of poverty, and greater food security (Alene and Coulibaly, 2009).

This Extensive empirical evidence demonstrates that investing in agriculture research and development (R&D) has greatly contributed to economic growth, agricultural development, and poverty reduction in Sub-Saharan Africa (SSA) over the past five decades (Beintema and Stads, 2011). New technology results from R&D investment have enhanced the quantity and quality of agricultural output and have led to higher income, greater food security and better nutrition. Considering the challenges such as rapid population growth, adaptation of climate change, and volatility of price in the global markets, investing in agricultural R&D remains crucial in increasing productivity of agriculture and reducing poverty in Sub-Saharan Africa (Beintema and Stads, 2011).

Many nations in the region continue to significantly underinvest in agricultural research despite the well-established data that it has a significant payoff. A long-term commitment of adequate amounts of sustained funding is necessary for agricultural research, which cannot be completed in a single year due to the significant time gap between investing in research and seeing its benefits, which is generally decades. Rarely do these long research cycles coincide with short-term election cycles, fluctuating political goals, and changes in government budget allocations, all of which have significant effects on agricultural research and may jeopardize future planning and results (Scoones, 2005)

Additionally, many SSA nations' agricultural R&D is heavily dependent on development banks and donors, which are typically sporadic, short-term, and can lead to significant fluctuations in a nation's annual agricultural R&D investment (Asare and Essegbey, 2016). Agricultural research is essential to the industry and has enormous potential to increase output and lower poverty (Asare and Essegbey, 2016)

Government funds has been a major source of funding for agricultural research over the years. Apart from salaries paid to employees, government support for agricultural research have been decreasing over the past ten years. The Savanna Agricultural Research Institute

(SARI) of the Council for Scientific and Industrial Research (CSIR) has received more donations overall over the past ten years. Yet, a large portion of these donor's contract research operations does not involve research into other fields of national significance, only those that directly address the donor's needs. The nation's national agricultural research agenda will be impacted by this over time. Moreover, the CSIR-SARI, which is supposed to fund 30 % research activities from internal sources is not progressing. Regarding the government's commitment to finance agricultural research, much have been spoken but nothing much has been done. This led to the need for a study into the type and funding of agricultural research in Ghana (SARI, 2020)

1.2 Statement of the Problem

Government grants for administration, service, and investment that are intended to support the basic functions of research institutions have been significantly cut back over time (Asare and Essegbey, 2016). In 2011, the grant from government to CSIR-SARI for administration, service and investment was GHS 9, 44.36 and reduced to GHS 0.00 from 2012 to 2020. This has significantly harmed the council's different institutes, notably CSIR-SARI (SARI, 2020)

Conducting agricultural research while facing severe budgetary constraints can prevent the nation from reaping the full benefits of the research's potential and failing to produce the

desired best results. Insufficient financing for agricultural research would affect several stakeholders that depend on agriculture for jobs and advanced agricultural technologies (Beintema and Stads, 2011).

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Too much reliance on donor organizations runs the risk of ignoring equally essential research fields in favour of only those that are now in demand by donors. Despite the numerous financial obstacles in this industry, little research has been done to determine the current situation (Asare and Essegbey, 2016)

1.3 Objectives of the Study

Using the CSIR-Savanna Agricultural Research Institute (SARI) as an example, the specific goals are to:

1. To identify the different financing options for agricultural research that are accessible to CSIR-SARI.
2. To assess the difficulties with CSIR-SARI funding for agricultural research activities.

1.4 Research Questions

1. What are the various financing options for CSIR-Savannah Agricultural Research Institute (SARI) agricultural research?
2. What financial difficulties does SARI face in sponsoring agricultural research?

1.5 Significance of the Study

The advancement of agriculture, which employs over 60 % of Ghana's population, depends on agricultural research (Breisinger *et al.*, 2011). The results of agricultural research, which will significantly advance the growth of the nation, will be greatly influenced by adequate funding.

This study will assist the government and policymakers in determining their lead role in agricultural research funding and the consequences of failing to carry out their duties as policymakers, highlighting how failure on their part to release adequate funds on time can affect a sector that is a significant contributor to the nation's GDP.

This will also assist the CSIR-Savannah Agricultural Research Institute (SARI), and other agricultural research organizations in understanding the effect and sources of their funding, especially donor support, and Internally Generated Funds (IGF) to supplement declining government funding sources. The research will assist CSIR-SARI in keeping track of the sources of its funding and the directions it has gone in, especially the need to increase its Internally Generated Funds (IGF) to sustain its activities as an institute and the decline of government funding components for administration, services, and investment. The study's results will advance our understanding of the topic and the body of literature surrounding it.

1.6 Scope of the Study

It would have been most appropriate to research the types of funding made available to agriculturally based institutes under the Council for Scientific and Industrial Research Ghana, the agricultural department of the University of Ghana, and the research organizations under the Ministry of Food and Agriculture (MOFA). However, the study is concentrated on CSIR-SARI. The study also examined CSIR-SARI's financing information from 2012 to 2020.

1.7 Summary of Methodology

The research inquiry was conducted using a case study methodology. This methodology provides for a concentrated emphasis on a specific phenomenon and the use of a wide range of data collection techniques, providing means to fully address the issue at hand at a

reasonable cost. This methodology is chosen because it allows for flexibility, enabling extra research to be done when significant new problems or concerns pop up while the study is still ongoing.

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Both quantitative and qualitative strategy is employed aiming to compile data and information already accessible regarding the various financing sources available to CSIR-SARI. The quantitative technique, in particular trend analysis, was utilized to confirm the outcome of the sustainability of various sources of funding. Most of the time, secondary sources of data were employed. To ascertain the pattern of research funding during the previous nine years, a trend analysis was performed. To gather quantitative data, questionnaires were distributed to both research professionals and supporting employees. To confirm observations and generate potential solutions for the research challenge, the existing literature was studied. By interviewing with the Internal Management Committee (IMC) of the institute, the qualitative method is taken into account.

1.8 Limitations of the Study

All the institutes under CSIR would have formed a representation of the study outcome SARI however has been singled out for resource limitation.

Other limitations include;

1. Possible sampling error and respondents' biases.

However, sampling was done and the questionnaire was structured in such a way as to reduce respondent's biases and minimize sampling error. Again, SARI has similar characteristics to that of the other institutes under CSIR: The study outcome of SARI could be used to generalize for the other institutes.

2. Fieldwork in every research institute does not always end without a few challenges. This research is not going to be different. However, all challenges would be resolved in the best way possible so as not to affect the outcome of the study. Below is the highlight of some possible problems that are likely to be faced during the data collection exercise:

- a) Busy nature of some of the respondents: Some of the respondents who were interviewed are so busy that they hardly give enough time for you to go through to the end of your interview guide and ask further probing questions.
- b) Unwillingness in returning the questionnaires: Some of the respondents were reluctant in answering the questionnaires but this problem was resolved by persistence and regular visits by the researcher.
- c) Financial constrain. Some respondents were expecting some financial reward after giving you their time and attention. CSIR-SARI mostly run project with donor funds some despondence may think is a donor project you are running and expect some payment before they respond to your questionnaires but this problem was resolved by explaining

to them the purpose of the research and also indicating to them that it is a theses in partial fulfilment of a master's program.

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1.9 Organization of the Study

The research is divided into five chapters:

The study's background and the impact of CSIR-SARI's access to agricultural research funds are covered in introduction in chapter one. The problem statement, study objective, research question, significance of the study, scope of the study, study methodology, and limitations of the study are all included in this chapter.

Chapter Two deals with a review of literature from empirical and theoretical perspectives. These would include the concept of agriculture, the development of an agriculture research system, the effect of agricultural research fund availability, the importance of agricultural research, and the changing trends in agricultural research funding.

Chapter 3 provides an in-depth explanation of the methodology of the study. It described the research design, study population, sampling technique, and procedure, source of data, instrumentation, ethical principle, and method of data analysis.

Chapter 4 presents the results and discussion of the study and showed the performance level of the various funding source of the Savana Agricultural Research Institute (SARI).

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Chapter 5 focused on summary, conclusion, and Recommendations on the various funding sources and conclusions made based on the findings of the study.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The concept of agriculture research, the development of the agriculture research system, the significance of public funding for agriculture, funding sources, and their performance, public agriculture research funding in Ghana, the internally generated fund, inadequate agriculture research funding in Ghana, challenges in agriculture research funding in Ghana, and changing trends in agriculture research funding in Ghana are all covered in this chapter.

2.1 Conceptual Literature Review

The goal of agricultural research has been more precisely defined during the past decades taking into account not only yield but also other aspects like resource sustainability and environmental impact. Improved varieties, plant nutrition, water use, agricultural economics, and farm management are all areas of agricultural research that are vital to the sustainable use of resources for the benefit of people and the environment. (Nyamekye and Cheng, 2021).

The goal of agricultural research is to improve the quality and efficiency of agricultural output while considering ecological and social constraints. This will help farmers earn a living wage and have better living conditions.

Agriculture has enormous socioeconomic potential, which can be realized by:

2.1.1 Technology

Investing in technology to create more sufficient technology and make it accessible to farmers results in rising productivity impacts, which often result from the technologies that increase yields because of investment in agricultural R&D (<https://education.nationalgeographic.org/resource/impact-technology-agriculture/>).

2.1.2 Human-Capital-Enhancing Productivity Effects.

Investing wisely in human resources, often result from government spending on agricultural extension, education, and information, all of which contribute to improving the knowledge and abilities of farmers and those involved in agricultural production. (Teo *et al.*, 2011)

2.1.3 Transaction Cost–Reducing Productivity Effects.

Lower transaction costs that result from public investments in agricultural sector infrastructure (such as storage facilities, market data, and feeder roads), which in turn helps to improve access to input and output markets and lower post-harvest losses and cost of agricultural inputs and technologies. (Den Butter, 2010).

The literature also demonstrates that performance effects are not the same for all forms of expenditure, in addition to the different pathways via which performance effects of public agriculture financing may manifest. Various investment levels result in different outcomes. (ISSER, 2015).

A model that specifies agricultural performance as a function of the results of both public and IGF funding of agriculture, as well as the use of resources like land, labour, and modern inputs, as well as other uncontrollable elements like rainfall, can capture these varied effects. (ISSER, 2015).

An example of the mission of agriculture research in an industrial nation is to protect crops and livestock from pest and disease, improving the quality and safety of agricultural produces, determine the nutritional need of people from birth to old age, sustaining soil, water and other natural resources, ensuring profitability for farmers and processors and keeping down cost to consumers since every rational consumer would maximize satisfaction at a minimum cost. (FOA, 2019)

Agriculture research's main objective is to support agricultural and rural development through the proposal of technical innovation tailored to the physical and socioeconomic

conditions and the provision of technical data such as soil maps, biological resource inventories, farm surveys, disease, and other data. (Alene and Coulibaly, 2009)

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2.2 Theoretical review

Investments in agricultural R&D have a significant positive impact on economic growth, agricultural development, and poverty reduction in emerging nations. This thesis explores the relationship between Ghana's agricultural performance and funding for agricultural research, with a focus on the Savana Agricultural Research Institute (SARI). (FAO, 2009)

Around 50 % of Ghana's overall agricultural research spending is made up of CSIR's total expenditures. However, the survey revealed a sharp fall in capital investments, which went from 0.1 % of total government financing in 2011 to 0.0 % in 2020; operating costs also showed a similar trend of decline. Nevertheless, after taking into account all available funds, government support is the main source of funding for agricultural R&D in Ghana (85 %), the sale of goods and services (6.7 %), and others serving as complementary (SARI, 2020).

Though there have been considerable government investments in agricultural R&D in CSIR over the period, the impact on operational and research activities has been minimal as a chunk of it went into payment of salaries and wages. The fundamental challenge is funding the very important operational and research activities, which lead to technology development and innovation. Increasing commercialization of research technologies and government

investment in agricultural R&D in Ghana, are recommended to address this investment challenge (<https://www.scirp.org/journal/paperinformation.aspx?paperid=66765>).

2.2.1 An analysis of the theory

The development of agriculture, economic growth, and the eradication of poverty are all significantly enhanced by investments in agricultural R&D. (Nyamekye *et al.*, 2021).

With an emphasis on the Savana Agricultural Research Institute, this thesis investigates the connection between Ghana's agricultural performance and funding for agricultural research at SARI.

Almost half of Ghana's total expenditures for agricultural research come from the CSIR. (Awuni and Essegbey, 2014).

The poll did, however, demonstrate a steep reduction in capital investments, which went from 0.1 % in 2011 of total government financing to 0.0 % in 2020, as well as a comparable trend in operating costs. (SARI, 2020).

Some theories regarding investments and their anticipated impact on agricultural production include;

2.2.2 The Capital Investment Theory Using the Net Income Methodology

The Net Income Approach to Capital Structure Theory is the first theory covered in this section. This hypothesis was made by (Durand, 1952) who predicted that the cost of capital

would alter as financial advantage increased. To put it another way, as the debt ratio increases, the capital structure strengthens, and the weighted average cost of capital (WACC) declines, which raises the value of the company. The theory contends that by raising the quantity of debt in its capital structure, agriculture might raise productivity, improve value, and lower overall capital costs.

2.2.3 Growth and Finance Theory

The concept of "money and growth" was first put forth by (King and Levine, 1994) they contend that the banking system's role in financial intermediation is crucial to economic progress. Concerning the question of whether finance promotes the growth of other economic sectors, such as manufacturing, Schumpeter argues that financial institutions receive greater support from banking institutions. As a result, the financial institution has a twofold effect on the production of each economic sector, including the agricultural sector. The earlier impact is the one that is initially highlighted by (Townsend, 1983), who also finds a positive association between financial expansion and the real per capita GNP rate. As a result, the idea highlights how important the financial system is to the growth of agriculture, particularly in emerging countries. Economic growth will be supported by a financial system that is well funded.

2.3 Empirical Evaluation

2.3.1 Funding sources for agricultural research in Ghana

The government has historically been in charge of subsidizing agricultural research. Governments in developed nations have and continue to support agriculture in developed and developing nations. (Beintema *et al.*, 2011)

According to Oppen *et al.* (2000), private investment in agriculture only occurs in places where the investor expects a return on their investment. Yet, in recent years, those obligations on agricultural research that were ascribed to the public and private sectors in some locations have been shared by third parties who are privately funded non-governmental organizations more frequently. As a result, the types of funding-grants from the public sector (governments), investments and donations from the commercial sector, and donations from non-governmental organizations have been categorized (Stads and Gogo, 2004; Flaherty *et al.*, 2010).

2.3.2 Financing for Public Agricultural Research in Ghana

Sub-Saharan Africa, including Ghana, followed some trends in the funding of agricultural research globally. According to Beintema (2011), from 2001 to 2008, Sub-Saharan African investments in agricultural research and development rose by more than 20 %. Nonetheless, pay hikes and improved employee remuneration played a significant role in these rises. A

tiny portion of the overall amount of funds provided by the government for research goes to service (core research activities) and investments (plants and equipment).

Stads and Gogo (2004) mentioned that, the government of Ghana typically provided money for agricultural research through annual budgetary allocations as well as loans from National research programs like the National Agriculture Research Program (NARP) and the Agricultural Services Sub-Sector Investment Program (AGSSIP) are sponsored by international organizations like the World Bank. In 2001, Ghana invested \$ 0.44 on agricultural research for every \$100 of agricultural output, according to their findings. This was significantly less than the 1995 African average of \$0.85. Ghana spent less on agricultural research than many other African nations, and the amount of spending showed a generally downward trend.

The study of Flahery *et al.* (2010) indicated the government of Ghana primarily funds agriculture and development, with some assistance from donors and organization internally generated Funds (IGF). Their data supported Beintma's (2011) finding that agricultural research and development spending in Ghana has more than doubled since 2012, following a decade of modest growth in the 1990s. The total amount spent on agricultural research and development in 2008 was \$95. Yet, the study also noted that almost all of the growth achieved during the time was used to pay for personal emoluments (salaries). Consequently, the personal emolument component of research expenditure payment in 2012 was 57.6 %,

administrative and service costs were 0.0 %, and investment costs were 0.0 %. 2013 saw a rise of 8 % for personal emolument in 2013, 0.0 % for administration and service costs, and 0.0 % for investment costs, respectively. In practice, while personal emoluments (salaries) increased from 2012 to 2020, investment and service grants were reduced to 0 % concurrently. (SARI, 2020).

Aoryd and Smith (2007) examined public spending on agriculture and expressed similar sentiments in their study. They found that the majority of the government of Ghana's low-level expenditure for the agriculture sector from 2002 to 2005 roughly, 70 % to 88 % of the overall expenditure for the Ministry of Environment and Science and Technology (MEST) was consumed by personnel remuneration. There were 9.5 % to 24 % of expenses devoted to administration, leaving only 2.6 % to 3 % for service and investment activities. According to the research, domestic government spending on agriculture increased from 27,153 billion in 2000 to 97,018 billion in 2005. In 2000, the MEST received a 2.0 % allocation, but by 2005, that amount had dropped to 1.3 %. This is a blatant indication that MEST, even though government spending on salaries was constantly rising, the reduction in allocation was reflected in a steady decline in capital investment dependent on the CSIR and its agencies. According to Ayensu (2005), a larger portion of government spending about 95 % supports administrative and personnel emolument costs.

According to Ocansey (2009), government budgetary allocation as a share of total discretionary budgetary spending has steadily decreased over the past thirty years to a level of about 2 %, which is far below the Maputo Treaty declaration of allocating 10 % of member countries' annual budgets to the agriculture sector. This indicates the inadequacy of the spending on operation and capital costs (for service and investment activities). Kamajour (2011) also made a similar statement as he expressed his worry about the declining fiscal support for agriculture in sub-Saharan Africa, which fell from roughly 5 % in the 1990s to 3 % in 2010. He pointed out that this was far less than the 10 % goal outlined in the Moputo Declaration, which heads of state and government signed during the summit of the African Union (AU) in July 2003. From the aforementioned, it can be concluded that although there appears to be a rising trend in Ghana's public support of agricultural research, this growth is merely intended to keep up with the administrative costs of research and development at the various research organizations. It was nearly impossible to finance operations and technology of research because spending on operation and capital costs was so nearly non-existing.

2.3.3: Internally Generated Funding of Agriculture in Ghana

In 1996, the Ghanaian government passed legislation requiring the CSIR and its institutes to cover 30 % of their yearly budget needs locally. (Council for scientific and Industrial Research Act 19961).

According to Gatge *et al.* (2001), CSIR and its institutions had only averaged 4.6 % by 1999. At the time, SARI's performance was 3.7 %. Studies by (Stats and Gogo, 2004) showed that as of 2001, all CSIR institutes had struggled to reach their goal of 30 % domestically produced funds, with an average of less than 5 %; the only one to succeed was OPRI, which managed to reach 33 % and raise the CSIR average to 7 %. Without OPRI, the CSIR often achieved 2.5 %. According to Flasherty *et al.* (2010), OPRI achieved 22 % in 2008, whereas the average share for CSIR including SARI and the four institutes not directly related to agriculture was 6 %. These studies show that the CSIR institute performed poorly in producing the 30 % IGF to maintain its budget.

2.3.2 Challenges in Obtaining Agricultural Research Funding

The funding of agricultural research is fraught with difficulties. Financial support for agricultural research is essential for expansion and advancement (Akosa, 2007). According to Akroyd and Smith (2007), who cited Pardey *et al.* (2006), recent analysis has showed that agricultural research investment intensity in developing nations has increased significantly since 1981, and there is evidence of substantial research and development abandonment in several nations. As stated by The Global Harvest Initiative (2011), a collaboration between the Mosanto Company, Dupont Company, Deere & Co., and Aecher Daniels Midland Company, made a call for increased federal funding of agricultural research in 2011. They claimed that the support for agricultural and food research is "totally inadequate and on the

decline." The statement stressed how federal research to solve long-term needs is overlooked while private industry research is focused on returns on investment.

Another significant issue in Ghana is the inadequate funding for agricultural research. Despite the vital role agriculture plays in the economy, the sector is severely lacking in many areas, particularly in the areas of government budgetary allocation and credit allocation (Osabutey, 2009). In a document created for the New Partnership for Africa Development (NEPAD), FAO (2009) expressed a similar opinion, claiming that both the African government and its bilateral development partners do not practice what they preach when it comes to agriculture and rural development. According to reports, many African countries only devote 1 % or less of their annual budget to agriculture. The World Bank is a reliable source of fund for Africa, agricultural loans accounted for 39 % of the company's lending in 1978, but that number dropped to 16 % in 1996 and then to 7 % in 2000. On May 31, 2018, the World Bank authorized a \$50 million International Development Association (IDA) loan to assist the government of Ghana in laying a solid foundation for rapid, inclusive, and sustainable growth in agriculture, a vital industry that supports the majority of people's lives.

The funding for agricultural research has suffered because of these difficulties so it is not surprising that agricultural research, which has historically relied primarily on donor and government grant is currently experiencing severe financing issues. It is well known that donor assistance is frequently unstable and of a short duration making long-term planning

challenging. It is important to emphasize that the majority of government grants funded just administrative costs and personal income, leaving little money for service and investment operations.

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The inability of agricultural research organizations to raise sufficient funds internally to augment government grants and donor support funds presents another funding difficulty. This has been made possible in part by the research mandates of these institutions as well as the staff's weak commercialization orientation. Gage *et al.* (2001) and Flaherty *et al.* (2010), in their respective investigations, noted the commercial potential of many research activities and their desire to obtain 30 % of their annual budget, more than a decade after the beginning of the commercialization program.

2.3.5 The Changing Trends and Their Effects on Agricultural Research Funding

Agriculture investment trends paint a different picture. Currently, in absolute terms, low- and middle-income nations invest nearly as much in agriculture research and development as high-income countries do about US\$190 billion in both country groups. Agricultural investment levels rose in all nations between 1991 and 2014, although at varying rates.

Between 1991 and 2014, agricultural investment levels increased across all countries, but at various rates, USD\$120 billion to US\$190 billion, with an annual average growth rate of around 2 %. In China, it grew from less than US\$10 billion to US\$75 billion, a growth rate of about 9 %, while investment in agriculture in the remaining low- and middle-income countries including Ghana, grew from about US\$45 billion to US\$115 billion, a growth rate of around 4 %.

Following a decade of comparatively stagnant spending on agricultural research and development (R&D) in the 1990s, Ghana saw a sharp rise in R&D spending after 2002. Compared to GHS151 billion or USD 41 million in 2002, Ghana spent GHS352 billion or USD 95 million on agricultural research and development in 2008.

Since 2002, there has also been a growth in agricultural research and development, with 537 Full-Time Equivalent (FTE) researchers employed in this field in 2008. The size of several of Ghana's 27 agricultural research and development organizations did not grow regularly; there was diversity among the organizations. In certain organizations, development has been uneven, and in others, the number of researchers has decreased between 2001 and 2008. The government of Ghana has acknowledged the value of the agricultural sector, and R&D in particular, in advancing the country's national agenda, which is reflected in the huge growth in agricultural R&D spending. The increase in agricultural R&D spending can also be viewed

in the larger scientific and technological policy environment. Science and Technology (S&T) resource allocation, budgetary resource soared from USD\$5 million in 2007 to USD\$39 million in 2008 (NDPC 2009) for the main S&T agencies in the country; the then Ministry of Education, Science and Sport; and the Ghana Atomic Energy Commission. However, this unprecedented increase should be understood against the background of many years of understanding especially concerning the conditions of service of the research staff.

CSIR is the main government research organization in Ghana, encompassing 13 research institution, 9 of which conduct agriculturally related research activities: the Animal Research Institute (ARI), the Crops Research Institute (CRI), the Soil Research Institute (SRI), the Oil Palm Research Institute (OPRI), the Plant Genetic Research Institute (PGRRI), the Savannah Agricultural Research Institute (SARI), and Water Research Institute (WRI), Forestry Research Institute of Ghana (FORIG). CSIR accounts for about two-thirds of total research and one-half of total spending on agricultural R&D in Ghana. Since 2001, total investment by the CSIR-funded agricultural R&D organizations has greatly expanded, rising from GHS79 billion to GHS171 billion cedis in 2008 (In 2005 constant price).

In 2008, 77 FTF researchers were engaged by CSIR, making up one-fourth of all CSIR expenditures for agricultural research. The remaining three non-CSIR government organizations in the sample are the Biotechnology and Nuclear Agricultural Research Institute (MFRD, 10 FTE), the cocoa research institute of Ghana (CRIG 46, FTE in 2008) which together accounts for 38 % of agricultural research, and development spending but

only 14 % of the nation's total agricultural research capacity; and which had 46 full-time employees in 2008. (In 2008, agricultural research spending among these agencies was GHS132 billion (constant 2005 price), a steep increase compared with GHS 50 billion in 2001. CRIG, with its mandate for research on Ghana's primary export, crop like cocoa, is the largest of the three agencies and accounted for most of this agricultural research expenditure. The 15 identified agricultural higher education agencies accounted for close to one-fifth of Ghana's total agricultural research. The largest agricultural higher education agency in 2008 was the College of Agriculture and consumer science at the University of Ghana (UG), which employed 21 FTE researchers. The other higher education agencies that conduct agricultural research are various faculties and departments at the Kwame Nkrumah University of Science and Technology (KNUST), the University of Cape Coast (UCC), the University for Development Studies (UDS), and the University of Education, Winneba. Non-profit and private companies, although involved in some collaborations with CSIR and higher education agencies, were found to have minimal involvement in Agricultural Research and Development.

The total amount spent on agricultural R&D expressed as a percentage of agricultural output (AgGDP), often known as the research intensity ratio, is a common statistic for comparing agricultural R&D spending among nations. Beginning in 1983, the ratio in Ghana had a rapid increase before varying from year to year. The ratio started to rise in 2005 and 2006, and it reached its peak in 2008. The FAO's real food price index has declined to levels last seen in

the early 1980s after peaking in 2008 and again in 2011, although it is still significantly higher than the low levels of the 1990s and the early 2000s.

The Organization for Economic Co-operation and Development (OECD) and FAO's most recent joint study paints a somewhat conflicted picture of medium-term changes in Prices for actual food commodities in 2025.

For every \$100 in agricultural output during this time, \$0.94 was invested, which is one of the highest rates in West Africa. Due to a faster increase in agricultural R&D spending compared to (AgGDP), the amount in 2001 was \$0.53 for every \$100. With an average of 90 researchers per million farmers from 2001 to 2008, another ratio, the number of FTE agricultural researchers per million farmers, has been more stable.

2.4 Conceptual Framework

The primary source of income for rural impoverished people around the world is agriculture. Compared to other industries, agricultural growth can more quickly and effectively lower rural poverty rates. In the discussion of agricultural financing in Ghana, the government's commitment to funding agriculture takes center stage. Finance operations have been carried out as a component of national social and economic policy through statutory allocations to the agriculture sector and through special purpose vehicles established by succeeding political governments to address the issues of agricultural funding. There is little question that finance has a significant impact on how well agriculture performs on a global scale; the

more funding that is made available to agriculture, the better its performance. Most sub Saharan African countries including Ghana invest little in irrigation which means that the over 60 % of the population engaged in agriculture must rely on rain for their livelihoods. The Northern part of the country in particular have only one rainy season, limiting farmers to only one cropping season since they depend solely on rainfall. Irrigation is therefore crucial to Ghana's agricultural growth and the development of Africa as a whole, it must be prioritized as an investment area if the nation is to address this issue and increase agriculture productivity. Despite its strength and importance to our economy, not many investments have been made. Donor support accounts for the majority of the funding for research. As shown in Figure 1, there is a definite relationship between the financial sources available for agriculture and its success.

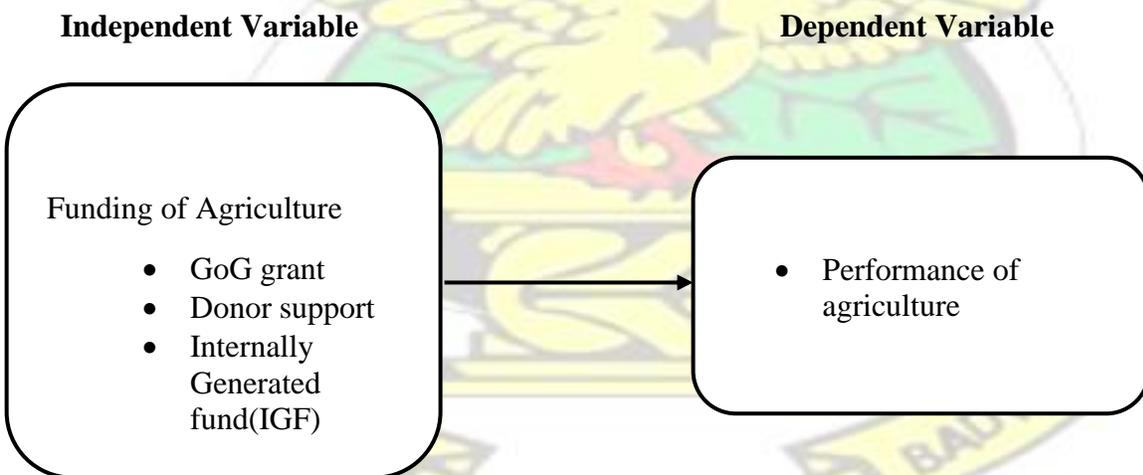


Figure 1: Diagrammatic representation of the conceptual framework

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The procedures and techniques used to address the study's associated questions are the main topics of this chapter. The research design, study population, sampling method, and size, as well as the methods and tools used for data collecting, are all covered in this chapter. The case study's profile of the Savanna Agricultural Research Institute (SARI) is also documented.

3.1 Research Design

This chapter's main focus is on the methods and approaches applied to answer the questions related to the study. This chapter covers the procedures and tools used for data collection as well as the research design, study population, sample method, and size. The Savanna Agricultural Research Institute (SARI) profile from the case study is also documented. Sources of secondary data that are thought to be more suitable for this investigation. To support her observations and provide early concepts for the research subject, the researcher used available literature. By conducting interviews with the CSIR-SARI Internal Management Committee (IMC) members, a qualitative approach is taken into consideration.

3.2 Population of the Study

The population of the study is 133 people, made up of both the senior members and senior staff of CSIR-SARI. These staff members are further grouped into research scientists, technicians, administrative staff, accounts staff, and information divisions of the Institute.

3.3 Sample and Sampling Technique

Stratified sampling methods was used to divide the population into homogeneous (strata) subgroups according to their job unit before sampling. Each subgroup is mutually exclusive from the other while simple random sampling is done on each of the strata. This ensured the representativeness of the study population. Using the sample size formulae of $S = P / 1 + P(e)^2$. Where S is the sample size, P is the population and e is the margin of error. Applying a margin of error of 5 % with the population of 133 the sample size is one hundred and ten (110) personnel made up of twenty (20) research scientists, sixty-five (65) technicians, fourteen (14) accounts staff, and eleven (11) administration staff of the institute. The categories are shown in (Table 1).

Table 1: Population and Sample size

Staff category	Population	Sample
Research Scientist	29	20
Technicians	75	65
Accounts Staff	16	14
Administrative Staff	13	11
Total	133	110

3.4 Data and Data Collection

The researchers use primary and secondary data sources to conduct the investigation. Self-administered questionnaires and in-person interviews were used to gather primary data. A high response rate, accurate sampling, and minimal bias are all guaranteed by the self-administered questionnaire, which also benefited from personal interaction by providing the essential justification. The interview made sure that data collecting is flexible, reliable, legitimate, and had a high response rate. In addition, it aided the researcher in obtaining more detailed responses unique to the respondent group and eliciting additional information that may have evaded the researcher. An application seeking permission to distribute questionnaires and conduct interviews with chosen Institute staff members was granted by the Director of the institute. The CSIR-SARI manual, final accounts of CSIR-SARI, and excerpts of in-house review reports and presentations at CSIR-SARI, as well as publications, library and archival research, books, and internet search engines like Google were used to compile secondary data that was pertinent to the study. This needs to be examined and contrasted with primary data in order to create a reliable database that yields valuable research findings.

3.4.1 Data Collection Instruments

3.4.2 Interviews and Questionnaires

Interviews were conducted with the members of the internal management committee (MIC), of Savanna Agricultural Research Institute (SARI) using an interview guide.

This method is adopted to enable the researcher to gather other important information such as the policy on research proposal writing and various challenges that hinders their quest to obtain sufficient funding to run the institute which may have not been captured by the researcher but could have significant input to the study, Institute policy and management of internally generated fund (IGF). Personal contact was established with respondents at their offices, laboratories, and research fields either to conduct the interview or administer the questionnaire. Responses received were recorded to enhance meaningful data collation and evaluation. Self-administered questionnaires created based on the study's key goals were used to collect data from the remaining respondents. The surveys focused on identifying the various funding sources for agricultural research, the evolving trends, the difficulties in funding agricultural research, and how research finance affects agricultural research in CSIR-SARI.

3.5 Data Presentation and Analysis

The collected data was compiled, coded, edited, and analysed using Microsoft Excel and the Package for Social Scientist software to create simplified data in the form of tables, percentage averages, charts, and graphs for straightforward analysis and explanation. The interview guide and questionnaire were used to gather primary data, which were then properly categorized and presented as tables, percentages, averages, charts, and graphs to demonstrate their relative value and relevance to the study's themes. For trend analysis, secondary data from financial reports were employed. To clearly illustrate their relationships, a line graph was used to exhibit the levels of funding from the various sources relative to the total financing for the Institute.

3.6 Ethical Consideration

Respondents' responses were treated confidentially and in utmost good faith as this is a purely academic exercise. Literature, data, and information taken from other writers and sources were duly acknowledged and referenced.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

This chapter presented the analysis of data obtained from the study methodology adopted and discussed the findings of the study to achieve the objectives and answer research questions.

Primary data for the study was obtained by conducting interviews and administration of questionnaires to respondents. This is augmented with secondary data obtained from SARI's financial statements from 2012 to 2020. Both primary and secondary data are based on the main themes of the objectives of the study. The data obtained sought to answer what the funding sources for SARI's research activities are, how available the funding obtained from such sources, the changing trends of agricultural research funding at SARI, and challenges to agricultural research funding at SARI.

The results of the study, derived from both the primary and secondary data were analyzed and presented with the aid of tables and graphs to provide a vivid account of the results. Major findings of the study were appropriately discussed, research questions are adequately answered, and set objectives for the study are achieved.

4.1 Background of Respondents

The respondent's backgrounds included information on their gender, age, educational attainment, duration of service with the Institute, and staff categorizations. This is done to help the researcher determine whether the chosen respondents knew enough about the topic of funding for agricultural research in CSIR-SARI.

4.1.1 Gender and Age of Respondent

The study population of CSIR-SARI has more male than female with the male population taken as high as 78.6 % but only 21.4 % for the female (Table 2). The age distribution of the respondents showed that staff with ages between 41 years and above form 54.7 % compare to those with ages between 18 and 40 years with 45. % (Table 3). The age distribution implies that there is a blend of old and experienced staff with new and young staff. There is, therefore, the need for an effective mentorship program and this was emphasized by the Director, Dr. Francis Kusi, and Dr. Boache Emmanuel Chamba when they mention that the institute has young fine brains and there is the need to transcend this knowledge to the young and upcoming scientist through mentorship during a thanksgiving service held by CSIR-SARI on the 15th of December 2022. This is to ensure that institutional memories are kept and expertise properly transmitted for effective agricultural research work.

Table 2: Gender of respondents

Gender	Frequency	Percentage (%)
Female	27	21.4
Male	106	78.6
Total	133	100.0

(Source: Field data, 2020)

Table 3: Age of Respondents

Age	Frequency	Percentage (%)
18-30	15	13.4
31-40	44	31.6
41-50	46	32.7
51+	28	22.0
Total	133	99.7

(Source: Field data, 2020)

4.1.2 Educational Level and Designation of Respondent

The respondents were selected from various units of the institute both supporting and the core research staff. Technicians made majority (59.09 %) of the population, followed by supporting staff (accounts and administration) with 22.27 % and the least population of 18.19 % representing research scientists (Table 4).

Table 4: Designation of respondent

Staff Category	Occurrence	Percentage (%)
Accounts Staff	14	12.73
Administrative Staff	11	10
Research Scientist	20	18.18
Technicians	65	59.09
Total	110	100

Source: Field data, 2020

The findings showed that most of the respondents had their tertiary education with the lowest being HND with only 2 respondents and forming 1.5 % of the population. Sixty-four are first-degree holders making 48.12 %, while the second-degree level is 35.33 % of the respondents and the Ph.D. had 15.04 % (Table 5).

Table 5: Education level of Respondent

Educational level	Frequency	Percentage (%)
HND	2	1.5
Degree	64	48.12
Masters	47	35.33
PhD	20	15.04

Total 133 100

(NB: The designation as a research scientist means one must be at least a Ph.D. holder)

4.1.3 Duration of service of respondent with CSIR-SARI

More than half (67.5 %) of the respondents have worked for five (5) years and more at CSIR-SARI, while 23.3 % have worked for less than five years. This Shows that majority of the respondents are experienced enough in assessing the nature of funding at the institute over the period under review as shown in (Table 6).

Table 6: Number of years of service of respondents with CSIR-SARI

Variable	Frequency	Percentage (%)
Less Than 5 Years	37	24.3
Between 5 and10 Years	44	27.4
Between 10 and 20 Years	24	19.5
Above 20 Years	28	20.6
Total	133	91.8

(Source: Field data, 2020)

4.2 Funding Sources to CSIR-SARI

Primary data collected through interviews, questionnaires, and secondary data obtained from a financial statement and IGF reports at CSIR-SARI indicated two sources of funding to the

institute. These are the government of Ghana grants (GoG), and Internally Generated Fund (IGF).

The various components of funding sources at CSIR-SARI in percentage (%) are presented in Figure 2. Government of Ghana (GoG) grants had the bulk with an average of 48.15 % from 2012 to 2020 and internally generated funds recorded an overall average of 3.4 %. These funding sources affirmed the funding pattern of a public institution as stated by Akortsu and Abor (2011), that funding of public healthcare institutions in Ghana is through government grants, donor support funds, and internally generated funds.

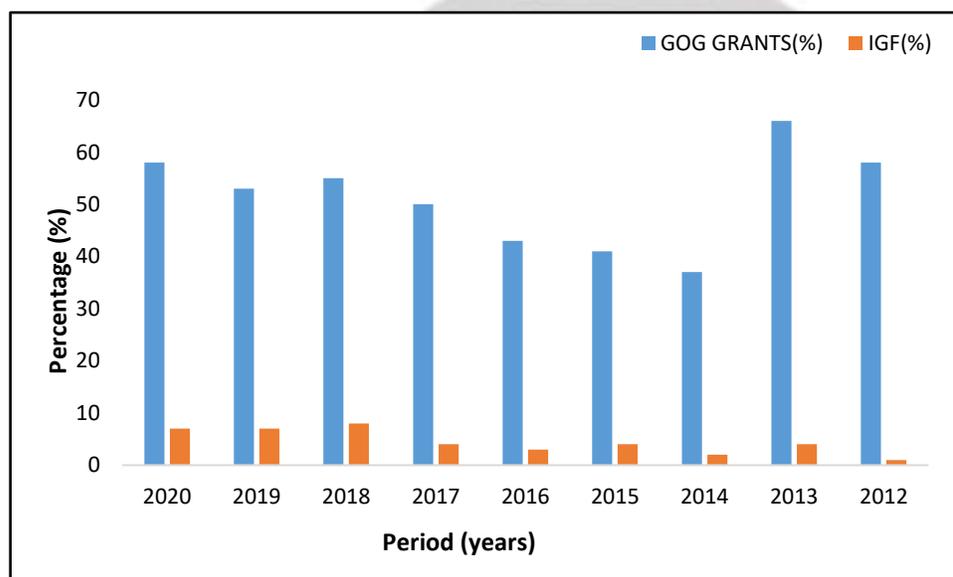


Figure 2: Sources of funding at SARI from 2012 to 2020

4.2.1 The Government of Ghana Grants (GoG)

The study showed that the government of Ghana's funding to CSIR-SARI is categorized into four main components. These are the personal emoluments (P.E. or item 1) administrative grants (item 2), service grants (item 3), and investment grants (item 4). In table 7, it can be observed from the figures that, personnel emoluments constituted the bulk of the government of Ghana grants (GoG). Investment grants as well as service grants had ceased for a very long time, leading to some of the research and laboratory equipment being outmoded. Akortsu and Abor (2011), studies revealed that government spending on research institutions consists of personnel costs, from 2012 to 2020 in Table 7, personnel emoluments take the bulk of these grants 100 % of all government grants, with 0 % taken for administrative and service costs. This research supported studies by Ayensu (2005), Akroyd and Smith (2007), and others that found that, on average, 95.00 % of Ghana's annual government grants to agriculture went toward staff salaries, with only 5.00 % going toward administrative, (which has gotten worse over time), service, and investment activities. The implication of this is that the government merely paid employees' salaries while giving them fewer resources to complete their work effectively and efficiently, which made the employees less productive. Costs associated with administration, services, and investments in the table below makes this clear.

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Table 7: Components of Government of Ghana Grants to CSIR-SARI from 2012 to 2020.

Year	Personal Emolument (GHS'000)	Administration grant (GHS'000)	Goods and service grant (GHS' 000)	Investment grant (GHS'000)	Totals (GHS'000)	% of P.E Over Total GoG
2012	4,631,425.3	-	-	-	4,631,425.3	57.6
2013	6,935,413	-	-	-	6,935,413	66.0
2014	10,346,542	-	-	-	10,345,542	58.0
2015	9,091,132	-	-	-	9,091,132	41.0
2016	8,784,506	-	-	-	8,784,506	37.0
2017	10,506,855	-	-	-	10,506,855	50.0
2018	10,883,935	-	-	-	10,883,935	55.0
2019	12,660,105	-	-	-	12,660,615	52.9
2020	25,033,202	-	-	-	25,033,202	57.6

(Source: Financial Statement of CSIR-SARI, 2012-2020)

The research also affirms these components of the GoG grants. As many as 71.4 % of respondents identified these grant groupings (Table 8).

Table 8: Components of Government of Ghana Grants

Variable	Frequency	Percentage (%)
Personal Emolument (P.E) (Item 1)	26	100
Administrative Grants (Item 2)	22	0
Service Grants (Item 3)	5	0
Investment Grants (Item 4)	0	0
Items 1, 2, 3 & 4	80	0
Total	133	100.0

4.2.2 Internally Generated Fund (IGF)

CSIR Act 521 was passed in 1996 to amend the mandate of CSIR to include the commercialization of some of its activities to generate 30 % of its annual budget requirement. However, this commercialization concept did not go as expected. Almost all of the institutes except OPRI, performed poorly. Studies conducted by Flaherty *et al.* (2010) indicated that in 2008, on average the Council agricultural-based institute can only generate 6 % of its total budgetary annual requirement with OPRI and SARI having 39 % and 22 % respectively. SARI is not left out, as indicated above the performance of SARI internally generated funding contribution to the year's total funding received by the institute, only 4 % of IGF is contributed by CSIR-SARI in 2013, this figure dropped to 2 % in 2014. On average IGF

contributed only about 4 % over the decade to the total funding sources of CSIR-SARI. The implication of this is that the agricultural research agencies and for that, matter CSIR-SARI are not complying with the legal framework that set them up. The council is supposed to support 30 % of its budgetary requirement from internal sources which has become a big challenge (table 9).

Table 9: Internally Generated Fund as a Source of Funding Research at CSIR-SARI.

Year	Total (GHS'000)	Funding IGF(GHS'000)	%of total IGF(GHS)	funding Over
2020	25,033,202	1,861,427	1,344.84	
2019	23,949,671	1,600,951	1495.97	
2018	19,724,117	1,641,947	1,201.27	
2017	21,202,937	892,412	2,375.91	
2016	20,088,501	712,813	2,818.20	
2015	22,073,090	801,955	2,754.41	
2014	17,769,652	389,694	4,600	
2013	10,548,892	480,625	2,194.82	
2012	8,058,680	68,992	11,692.46	

Total 188,218,394

48.42%

(Source: Financial Statement of CSIR-SARI, 2012 to 2020)

4.2.2.1 Components of Internally Generated Fund at CSIR-SARI.

The internally generated fund of SARI for 2012 of CHS68, 992 is made up of project support which forms 32 % of the amount, rent & hire of the facility was 2 % income from the sale of produce and breeder seed was 32 %, soil analysis forms 13 %, hire of tractor & vehicle was 2 %, guest house income forms 0.40 % of the total amount (Figure 3). The core commercialization activity is supposed to be the income from the sale of farm produce, sale of breeder seeds, and soil analysis but these three components only form 45.5 % of the total internally generated funds. The other ancillary components such as the project support, rent, hire of the facility, hire of tractor and vehicle, and guesthouse income form the bulk of the total internally generated funds. There is therefore the need to put structures in place to reap the bulk of internally generated funds from the main research activities

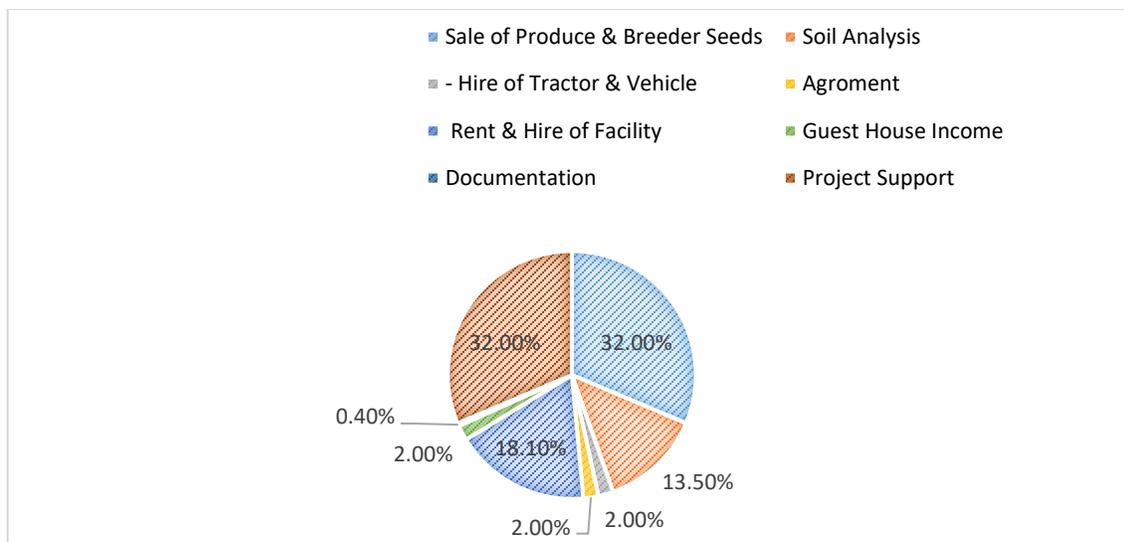


Figure 3: Component of internally generated funds at SARI

(Source: Financial statement, CSIR-SARI, 2020)

4.3: Challenges of Agricultural Research Funding at SARI.

The respondents are of the view that the following were the challenges in agricultural research funding at SARI;

Inability on the part of the government to release budgeted administrative, service, and investment funds to the various institutes for the effective operation of their research activities. Kamajour (2011) expressed concern about the dwindling budgetary support for agriculture in Sub-Saharan Africa, which has reduced from around 5 % in the 1990s to 3 % of GDP by 2010. He indicated that this is far below the 10 % target set in the Maputo Declaration made by the Heads of States and Governments during the African Union (AU) summit in July 2003. Spending on operating and capital costs (for service and investment

activities) is so negligible that it is virtually impracticable to fund operations and maintain the structures and equipment of the research institutions.

4.4 Discussion of Findings

The study indicated that the funding sources for SARI were government grants and internally generated funds. These funding sources confirmed the study by Akortsu and Abor (2011), about the nature of funding of public institutions in their studies of financing public healthcare in Ghana. It also revealed that government grants to the agricultural research institute consist of personnel costs, administrative, service, and investment costs. From 2004 to 2013, personnel cost averaged 95 % with administration and service taken at 5 % and nothing at all to investment cost. This finding also confirms studies by Akroyd and Smith (2007) and Avenu (2005) in their studies which concluded that on average 95 % of government grants to agricultural research institutions in Ghana were mainly to cater for personnel costs with only 5 % going to administrative, service and investment cost. The increase in the donor support funding at SARI runs counter to the studies by Hearn *et al* (2011) and Eicher (2003) which concluded that there were declining trends in donor support funding to Sub-Sahara African Countries. It could be argued that their studies focused on a far broader scope, which CSIR-SARI could not have been an exception. The performance of SARI on internally generated fund is very poor and from 2012 to 2020 was able to generate only about 4 % on the average instead of the required 30 %. A studies by Gage *et al* (2001), Stads and Gogo (2004) and Flaherty *et al* (2010) all confirmed the poor performance of CSIR-SARI on IGF over the period.

The situation could be attributed to the subsistence nature of farming in Ghana. Majority of the farmers, the number one clients of SARI farm on small scale bases and subsistence level, and as such find it difficult in paying the right price for some of our outputs like improves varieties, newly developed technologies, and the likes.



CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter details the summary of findings, conclusion, policy implication, recommendations, and suggestions for further research.

5.1 Summary of Findings

5.1.1 Funding Sources Available to SARI for Agricultural Research

According to the report, grants from the Ghanaian government (GoG) and Internally Generated Fund (IGF) were the financing sources accessible to Savanna Agricultural Research Institute (SARI). Personal emoluments, administrative grants, service grants, and investment grants were the other categories into which the government of Ghana divided its grants. The revenue from soil analysis, the sale of farm products and breeder seeds, the sale of rice, the rental of a tractor and vehicle, the revenue from the guest house, the rent and the hire of property and documentation are all included in the Internally Generated Fund (IGF), which serves as a source of funding for SARI.

These two main funding sources available to SARI has performed as follows:

1. Given that the institute was able to pay employee wages on schedule, the government of Ghana's funds for personal emoluments was largely regular and adequate. The institute has

to rely on project support to make up for these shortfalls because administrative funds and service grants were insufficient and inconsistent. The institution records do not contain investment grants from the past nine years these were grants intended to buy laboratory and research equipment as well as other assets for the institute, due to their unavailability, the institute has been forced to rely on outdated technology, which has led to several inefficiencies. Once more, donor assistance funds are useful for purchasing and replacing this outdated equipment to conduct research properly and effectively.

2. Increased trends were seen across all funding sources as a result of inflationary and economic indices. The grants from the Ghanaian government (GoG) grew to GHS917, 600 in 2020 from GHS6, 935. 41 in 2012. A similar trend can be seen in internally generated funds, which increased from GHS368, 992.00 in 2012 to GHS1, 861,427 in 2020.

3. The internally produced funds could only produce an average of 4 % of the legal requirement of 30 % from 2012 to 2020, which is appallingly insufficient given the amount invested in agricultural research in SARI.

4. Contribution from the various financial sources accessible to SARI, with grants from the government accounting for the majority of the average amount (62.6 %) from 2012 to 2020. Followed by internally generated funds, which have been only 4 % on average.

5.1.2 Adequacy of Funding Sources in Performing Research Requirement at CSIR-SARI

The analysis established that SARI's total funding sources were insufficient for the organization to effectively carry out its mandate. A lack of funds prevented most of the intended research activities from happening. According to the respondents, the following factors contributed to the funding shortfall:

1. Government grant releases, notably those for administrative and service awards, fell short of the budget, and the out-of-coverage area investment grants made matters worse.
2. Inadequacy of funding was also caused by the institute's own internally generated funds' poor performance. It believed that the required 30 % of the administrative and service grant deficiencies should be covered by domestically produced revenues. However, most CSIR institutes, including SARI, were unable to accomplish this. SARI's average percentage of internally generated funds from 2012 to 2020 was 4 %, which is not particularly impressive.
3. The only funding source that showed signs of success was donor support. The overall pattern was very good, with funding levels increasing from 28.0 % in 2012 to 35.8 % in 2020. Lackluster IGF and declining government contributions caused a funding gap that the donor funds were unable to fill, leaving limited room for the planned research activity to be carried out.

5.1.3 Changing Trends of Agricultural Research Funding at SARI

1. Grants from the Ghanaian government for administration and service are almost non-existent. In addition, it has long since stopped for grants for investments. These circumstances have led to resulting in a financing gap that the project support fund aims to fill.

According to the respondents, SARI's agricultural research financing has several difficulties, including the following:

1. SARI's internally created funds have performed poorly. A strong showing at IGF might have compensated for the deficiencies in administrative, service, and investment grants. The IGF efforts at SARI were hindered by a lack of proper marketing of the institute's goods, a workforce that was poorly oriented toward commercialization, and customers that are primarily low-income subsistence farmers.
2. The seed law's restriction prevents SARI from producing certified seeds, which are the ones that are sold directly to farmers. Because it only sells to the Ghana Grains and Legumes Board and a small number of certified seed growers, SARI is only permitted to produce foundation and breeder seeds, which do not generate much revenue. Breeder seed production is very expensive, time-consuming, and involves many other costs, which makes it difficult to make much money from the sale of breeder seeds.

3. University rivalry made it difficult for the institute to get all feasible donor support for projects. Also, there is a full pool of research experts available to pursue and secure large projects that will provide the funding required to carry out the institute's research mandate.
4. The respondents also mentioned the irregular and non-release of administrative, service, and investment funding to SARI, which prevented it from carrying out all of its planned research activities seed.

5.2 Conclusion

In this study, Savanna Agricultural Research Institute (SARI) was used as a case study to examine whether agricultural research funding is available and how this affects agriculture in Ghana (SARI). The work outlined the funding sources for agricultural research that SARI may access, analysed the issues in agricultural research financing at SARI, evaluated the sufficiency of agricultural research funding, and determined the changing trends in agricultural research funding and how they affect agricultural performance. According to the report, the Savanna Agricultural Research Institute received funding from two main sources: grants from the Ghanaian government and internally generated resources. While, government grants showed a better performance, internally generated funds display significant deficiencies. Because of this, the institute has to rely primarily on projects to carry out its

main research activities. However, the project support funds did not offset the loss brought on by subpar performance in the IGF and government administrative, service, and investment grants. This caused the institute's research activities to suffer and prevented the completion of scheduled operations. Implementing the suggestions made in response to these issues could significantly improve the situation and increase the institute's chances of receiving the necessary financing for effective and efficient agricultural research and development.

5.3 Policy Implications and Recommendations

Release of approved budgeted funds on a regular and timely basis.

To ensure adequate funding and avoid any gaps in financing research activities government should make deliberate policies that would favour agricultural research and development in Ghana example, (one district one factory, one village one dump).

There should also be a value addition to the agricultural products that we produce in Ghana this would help reduce post-harvest loss of our farmers hence increasing their interest in agriculture and helping in the value chain of agricultural research and development in Ghana.

The approved funds must be routinely and promptly released to CSIR-SARI and all agricultural research institutes by the Ministry of Finance. Budgets for administration, goods, services, and investments (assets), in particular, had not been constant and timely in previous years. Research institutes will be able to effectively carry out their duty to the benefit of

raising agricultural productivity and its multiplier effects if they have access to all of their funding sources.

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The CSIR institutes with an agricultural focus and other agricultural research organizations in the nation should understand that the 30 % obligatory IGF is here to stay and that the sooner they put the necessary systems in place to achieve it, the better. A full-scale commercialization of the institute's goods and services should be the goal of all those charged to perform this duty. The problems facing the commercialization units should be identified and solved. Institutes will be able to completely fund most if not all of their research activities without having to worry about service grants or other forms of government subsidy if they can produce 30 % of their funding from internal sources. The management of the institute should set up the appropriate administration to monitoring commercialization activities.

5.6.1 Diversification and Expansion of CSIR Activities' Frontiers

To raise money to maintain its operations, CSIR might also diversify and widen its horizons. The most reliable approach to raising money to support its other research endeavours is through the formation of the CSIR College of Science and Technology (CCST). This university college was established at the Forestry Research Institute (FORIG) Fumesua in Kumasi, with plans to expand to SARI. Other campuses are anticipated at the Crop Research Institute and the Soil Research Institute, both in Kumasi. At these campuses, the CSIR

scientists will offer lectures with ease. Subsequently, more campuses would be established in other CSIR institutes to allow Ph.D. and post-graduate students to receive practical training while also generating income for those institutions.

5.6.2 The Establishment of Proposal Writing Teams at the Various Institutes

According to the respondents, every CSIR institute should establish a research proposal team to help the institute win the most project that becomes available when national and international proposals are requested. By ensuring the institute does not lose any funding for its research, doing so will also act as a proposal-writing training ground for aspiring young scientists.

5.7 Suggestions for further research

Finally, it is advised that more research be done on ways to enhance SARI's internally generated fund (IGF) as a source of support for agricultural research. Also to look at how the Government could be more committed to the release of government-approved budgets on a timely basis.

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5. Designation

.....
.....

6. How long have been working with SARI?

(a) Less than 5 years ()

(B) Between 5 and 10 years ()

(c) Between 10 and 20 years ()

(d) Above 20 years ()

SECTION B: THE EFFECT OF AGRICULTURAL RESEARCH FUNDING

7. How is agriculture funded at SARI

(a) Government of Ghana Grant (GoG) ()

(b) Internally generated fund (IGF) ()

(c) Others please specify

.....
.....

(8). which of the following do you think contributes more to agriculture research funding in SARI?

(a) GoG grant (). (b) IGF. () (c) Others please be specific.....

(9) Funding of agriculture by Government of Ghana include: (choose one)

(a) Personal emolument (item 1)

(b) Administrative grant (item 2)

(c) Service grant (item3)

(d) Investment grant (item4)

(e) Others please specify.....

10. What is the contribution of the IGF (in percentage) component of agricultural funding at SARI?

(a) Less than 5 % (b) 5 % - 10 % (c) 11 % - 30 % (d) I do not know

SECTION C: ASSESSING THE AVAILABILITY OF AGRICULTURAL RESEARCH FUNDING

(11). which of these from Government of Ghana have been regular to SARI

(a). personal emolument grant

(b) Administration grant

(c) Service grant

(d) Investment grant

Do you think that these sources of funding are always ready available

(a) Yes () (b) No () (c) If no why.....

SECTION D: ASSESSING THE CHANGE IN THE MOVEMENT OF AGRICULTURAL RESEARCH FUNDING AT SARI

12. Have the funds available to SARI for agricultural research changed in the last nine years?

(a) Yes () (b) No () (c) I do not know ()

13. Which of the component of agricultural research funding is doing better?

(a) GoG Grant () (b) IGF () (c) Others please be specific

Challenges faced by research funding at SARI

14. Is personal emolument from the government always regular?

(a) Yes () (b) No () (c) do not know ()

15. Does the government always release funds for administration?

a) Yes () (b) No () (c) do not know ()

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