

KWAME NKURUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF MATHEMATICS

TOPIC:

OPTIMAL ALLOCATION OF RESOURCES

CASE STUDY

**SENE DISTRICT ASSEMBLY,
BRONG AHAFO REGION OF GHANA.**

**A dissertation submitted to the Department of Mathematics,
Kwame Nkrumah University of Science and Technology,
Kumasi in Partial Fulfillment of the requirements for the
award of M.Sc Degree in Industrial Mathematics.**

BY

Shamsu – Deen

April, 2009

CANDIDATE DECLARATION

With the exception of works which have been duly acknowledged the researcher declares that, it is an original work and has never been submitted in part or whole for any purpose anywhere. The researcher is therefore entirely responsible for any errors in the work.

Student	Date	Signature:
Shamsu- Deen	April, 2009	

Supervisor	Date	Signature:
Dr. S. K. Amponsah	April, 2009	

Head of Department	Date	Signature:
Dr. S. K. Amponsah	April, 2009	

Dean of IDL	Date	Signature:
Prof. Edward Badu	April, 2009	

ACKNOWLEDGEMENT

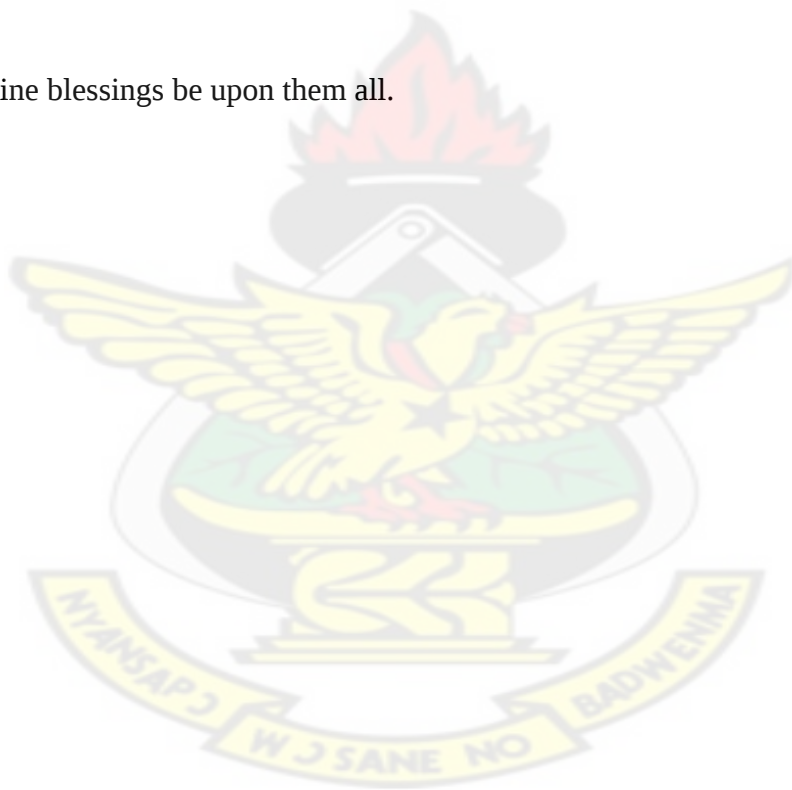
In every aspect of this work, the researcher acknowledges the mercy and grace of the almighty God who has sustained and provided the impetus for the successful completion of this work.

The researcher has continued to appreciate the tremendous efforts of his supervisor, Dr. S. K. Amponsah who tirelessly read and made the necessary and sufficient corrections to ensure a quality work.

Finally, the researcher is indeed, indebted to all those who through diverse means, supported and encouraged the materialization of this work.

May God's divine blessings be upon them all.

Amen.



DEDICATION

Dedicated to all those who love wisdom, strive for it and live by its dictates.

KNUST



ABSTRACT

In this thesis, optimization is used to optimally allocate and assign projects funded by the forty- nine percent (49%) discretionary allocation of District Assembly Common Fund (DACF) using the Hungarian assignment problem and factor- rating method.

The research seeks to evenly allocate and optimally assign resources to the four traditional councils constituting Sene District.

On the remaining fifty- one percent (51%) mandatory allocation of District Assembly Common Fund (DACF), the thesis revealed its optimal utilization as spelt out in the guidelines of its disbursement.



ACRONYMS

CF	-	Common Fund
DACF	-	District Assemblies Common Fund
DA	-	District Assembly
IGF	-	Internally Generated Fund
MCEs / DCEs	-	Metropolitan/Municipal/District Chief Executive
MPs	-	Members of Parliament
NYEP	-	National Youth Employment Programme
NHIC	-	National Health Insurance Council
ILGS	-	Institute of Local Government Studies
VIP	-	Village Infrastructure Projects
CBRDP	-	Community Based Rural Development Projects
BESIP	-	Basic Education Sector Improvement Programmes
ESRP	-	Emergency Social Relief Programme
LGF	-	Local Government Fund

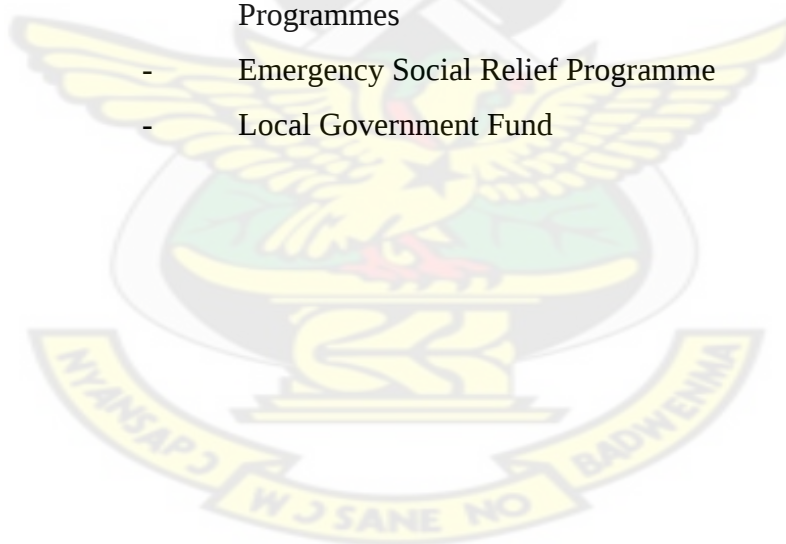


TABLE OF CONTENTS

ABSTRACT	i
ACKNOWLEDGEMENT	ii
DEDICATION	iii
TABLE OF CONTENTS	iv
ACRONYMS	v
CHAPTER ONE	1
1.0 INTRODUCTION	1
1.1 THE MISSION STATEMENT OF DISTRICT ASSEMBLY COMMON FUND (DACF)	2
1.2 OBJECTIVES OF THE DISTRICT ASSEMBLY COMMON FUND (DACF)	3
1.3 PROBLEMS OF ALLOCATION OF THE RESOURCES IN THE DISTRICT	3
1.4 GUIDELINES FOR UTILIZATION OF DISTRICT ASSEMBLY COMMON FUND (DACF)	4
1.4.1 Reserve Fund	4
1.4.2 Human Capacity Building	5
1.4.3 National Youth Employment Programme	5
1.4.4 Self- Help Projects	5
1.4.5 District Education Fund	5
1.4.6 Establishment and strengthening of Sub- District Structures	5
1.4.7 District Response Initiative	5
1.4.8 Malaria Prevention	6
1.4.9 People with Disabilities	6
1.4.1.0 Sports and Culture	6
1.4.1.1 Other Project	6
1.5 FINANCIAL ACCOUNTING AND BUDGETING CONTROL	6
1.5.1 Supplementary Development Budget	6
1.5.2 Accounting for Utilization of the Fund	7
1.5.3 Payment from the District Assembly Common Fund (DACF)	7
1.5.4 Standard of Project	8
1.5.5 Supervision and Monetary of Projects	8
1.5.6 Disbursement on Zonal, Urban, Town and Area Council Basis	8

1.6 GUIDELINES FOR UTILIZATION OF FIFTY PERCENT (50%) OF THE RESERVE FUND ALLOCATED TO PALIAMENTARY CONSTITUENCIES	9
1.7 DISTRICT FUND FOR PRODUCTIVITY AND INCOME IMPROVEMENT	10
1.7.1 Policy Objective	11
1.7.2 Process for establishing a Micro Credit Scheme	11
1.7.3 Type of Credit and Eligible Enterprise	12
1.7.4 Interest Rate	12
1.8 POLICY OBJECTIVE AND GUIDELINES ON COMMUNITY INITIATIVE PROJECTS	14
1.8.1 Project Initiation	14
1.8.2 Nature of Project	14
1.8.3 Project Design	14
1.8.4 Institutional Arrangements	14
1.8.5 Funding of Self- Help Projects	15
1.8.6 Budgeting	15
1.9 STATEMENT OF THE PROBLEM	16
1.10 PURPOSE OF THE STUDY	16
1.11 SIGNAFICANCE OF THE STUDY	17
1.12 THE LIMITATION OF THE STUDY	17
1.13 SENE DISTRICT	17
1.14 ORGANISATION OF THE STUDY	18
CHAPTER TWO	19
2.0 LITERATURE REVIEW	19
2.1 PROBLEM VARIATION	19
2.2 MAXIMIZATION OBJECTIVE	20
2.3 UNACCEPTABLE ASSIGNMENT	20
2.4 PROHIBITED ASSIGNMENT	21
2.5 UNEQUAL SUPPLY AND DEMAND	21
2.6 MAXIMIZATION ASSIGNMENT PROBLEM	21
2.7 ILLUSTRATION OF THE PROBLEM	22
2.7.1 The Hungarian Method	23
2.7.2 Illustration of the Hungarian Method	24
2.7.3 Related findings on Assignment Problem	27

2.9 FACTOR- RATING METHOD	31
2.9.1 Illustration of Factor- Rating Method	32
2.9.2 Related Finding on Factor- Rating Method	34
CHAPTER THREE	39
3.0 METHODOLOGY	39
3.1 RESEARCH DESIGN	39
3.2 POPULATION OF THE STUDY	39
3.3 SAMPLE OF PROCEDURE	40
3.4 INSTRUMENT OF DATA COLLECTION	40
3.5 DATA GATHERING PROCEDURE	40
3.6 DATA ANALYSIS PROCEDURE	40
3.7 BIOGRAPHICAL INFORMATION OF RESPONDENTS	41
3.8 SEX DISTRIBUTION OF RESPONDENTS	41
3.9 AGE DISTRIBUTION OF RESPONDENTS	41
3.10 ACADEMIC OR PROFESSIONAL QUALIFICATION OF RESPONDENTS	42
3.11 DEPARTMENT DISTRIBUTIO OF RESPONDENTS	43
3.12 LENGTH OF SERVICE OF RESPONDENTS	43
3.13 IMPACT OF COMMON FUND PROJECTS	44
3.14 TYPE OF DEVELOPMENT PROJECT	46
CHAPTER FOUR	48
4.0 RESULTS AND DISCUSSION	48
4.1 PROJECT WHICH ARE UNDERTAKEN USING DISTRICT ASSEMBLY COMMON FUND (DACF)	48
4.2 SATISFACTION DRIVE ON THE PROJECT	49
4.3 JUDICIOUS USE OF COMMON FUND	50
4.4 COMPETENCE OF THE MANAGEMENT OF DISTRICT ASSEMBLY COMMON FUND (DACF)	52
4.5 PROBLEMS AND CHALLENGINGS FACED IN THE IMPLEMENTATION OF DISTRICT ASSEMBLY COMMON FUND (DACF)	53
4.6 THE DISCRETIONAL ALLOCATION OF DISTRICT ASSEMBLY COMMON FUND (DACF)	57
4.6.1 Data Collected and Analyze on the Discretional Allocation	57

4.6.2 Council Development- Sector Assignment Problem	62
4.6.3 The Discretionary Allocation of District Assembly Common Fund (DACF)	64
CHAPTER FIVE	65
5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	65
5.1 SUMMARY	65
5.2 CONCLUSIONS	66
5.3 RECOMMENDATIONS	66
5.4 SUGGESTED AREA FOR FURTHER STUDY	67
LIST OF REFERENCES	68
APPENDIX: QUESTIONNAIRE	70



CHAPTER ONE

1.0 INTRODUCTION

Finance has been the major problem of local authorities in Ghana. Indeed local authorities have had to grapple with the problem of generating adequate revenue from their traditional sources to meet their development and recurrent expenditures.

Several attempts were made by previous governments to solve this problem through grants from central government and other donor agencies. For example, under the Third Republic Constitution of 1979, provision was made for the setting up of a Local Government Grants Commission but this never became operational. Then in 1988 the Provisional National Defense Council (PNDC) Government introduced the Ceded Revenue, which brought a slight improvement in the finance of District Assemblies. These central government grants have generally been inadequate and irregular to enable the Assemblies meet their recurrent and development expenditure.

It is in recognition of this problem that the District Assemblies Common Fund was created under Section 2552 of the Fourth Republic Constitution of 1992. On 6th July, 1993, Parliament enacted the District Assemblies Common Fund Act, (Act 455). Under this Act, parliament is annually required to allocate not less than five percent (5%) (as then was) of the total revenue of Ghana (i.e., all revenue collected by or accruing to the central government other than foreign loans, grants, non-taxable revenues and revenues already collected by or for Districts Assemblies under any enactment in force) to the District Assemblies for Development. Currently parliament has reviewed the common fund from 5% to 7.5% (Act 455).

The disbursement and consequent utilization of the District Assemblies Common Fund commenced in 1994. As of 31st December, 2004 a total of two million, six hundred and twenty-seven thousand, fifty four point two Ghana Cedis (GH¢2,627,54.2) has been released to all Metropolitan /Municipal District

Assemblies (MMDAs) for the period of 1994 to 2004, (Nicol, 2007). With the institution of the fund, the development aspirations of the District Assemblies and the people in general have been raised.

Within three (3) years of operation, several development projects have been executed to raise socio-economic status of the people of Ghana. These include; health and sanitary facilities, educational facilities such as classroom blocks and the supply of furniture, portable drinking water, market infrastructure, office and residential accommodation for the staff, postal agencies, lorry parks, rehabilitation of roads, extension of electricity including street lighting, provision of community centres and relief items for disaster victims, credit facilities, as well as youth employment programmes.

Despite the fact that all these facilities have been provided under the Common Fund, its utilization and management has been beset with a number of problems and lapses.

1.1 THE MISSION STATEMENT OF DISTRICT ASSEMBLY COMMON FUND (DACF)

The ministry of local government and Rural Development advocates the establishment and development of a vibrant and well decentralized system of local government for the people of Ghana.

The ministry's performance guiding principles are:

- Implementation, monitoring, evaluating policies and programmes to democratize government decentralized the machinery of government.
- Reforming and energizing local government to serve effective institutions for mobilizing and harnessing local resources with national administration and development.
- Facilitating the development of all human settlement. Facilitating the promotion of a clean and healthy environment.
- Facilitating horticultural development.
- Improving the demographic database for development plan and management.
- Promoting orderly human settlement development.

1.2 OBJECTIVES OF THE DISTRICT ASSEMBLY COMMON FUND (DACF)

- To formulate appropriate policies and programmes to accelerate implementation of decentralization of the machinery of government to avoid de-centralization of government machinery.
- To improve upon the human resources and institutional capacity of all levels of the decentralized government machinery.
- To improve the capacity of communities and local government institutions to mobilize, and manage resources for accelerated urban development.
- To promote community based registration, collection and publication of data on all births and deaths occurring in Ghana.
- To promote human development and sustain the orderly growth of rural urban settlement in Ghana.
- To monitor and evaluate the effectiveness of local governments institutions for improved management performance.

The ministry, has a lined up of regular activities which are successfully held as a means of creating awareness amongst Ghanaians;

Local Government Week, Sanitation Week and Rural Development.

These celebrations have been instituted to be part of the annual calendar of events.

- (a) The Monthly Regional District Chief Executive Meetings. The meetings have developed into zonal where District Chief Executive (DCE) meets to share ideas and strategies on the implementation of national agenda.
- (b) A mid-year Review meeting of District Chief Executive (DCE) is regularly.
- (c) The Annual conference of District Chief Executive (DCE) is also held regularly on a basis.

1.3 PROBLEM OF ALLOCATION OF RESOURCES IN THE DISTRICT

The study is not without problems. One of such problems has to do with the great number of contractors tendering for limited number of resources being allocated for the entire community of the district.

Another problem worthy of consideration is the number of competing Departments in the district for the resource to be allocated to them, eg., Ministry of Healthy,

Education, Agriculture, National Commission on Civic Education (NCCE), Police Service, Non-formal, Road and High ways, etc,

The thorniest problem that faces the district assembly is the siting of the resources in the district since the entire district is made up of four main traditional councils.

1.4 GUIDELINES FOR UTILIZATION OF DISTRICT ASSEMBLIES COMMON FUND (DACF)

PART I

ALLOCATIONS OF THE FUND

In accordance with section 9 of the DACF Act 1993, Act 455 following Guidelines for Utilization of the DACF by Assemblies is issued. This is in collaboration with the Ministry of Finance and in accordance with the decision of Cabinet.

1.4.1 RESERVE FUND

Ten per cent (10%) of each District Assembly's share of the 2002 DACF will be retained as a Reserve Fund and used as follows:

- A. One-half of the Reserve Fund (i.e. five per cent (5%) of the total DACF allocation for the year) is shared equally to the 230 Parliamentary Constituencies as was resolved by Parliament in 1997. This Fund will be utilized in accordance with guidelines agreed with Parliament as contained in Appendix A.
- B. The other one-half of the Reserve Fund (i.e. 5% of the total DACF allocation for the year) will be used as follows:
 - (i) 2.5% is allocated to the Ten Regional Co-ordinating Councils to be used for their statutory role of monitoring, co-ordinating and evaluation of the performance of Assemblies. The allocation of this portion is as follows: fifty per cent (50%) is shared equally to the ten regions and the remaining fifty per cent (50%) in proportion to the number of districts in the Region.
 - (ii) Two per cent (2%) to be used as authorized by the MINISTER MLGRD.
 - (iii) Half per cent (0.5%) to be used by DACF for monitoring & Evaluation.

1.4.2 HUMAN CAPACITY BUILDING

One per cent (1%) of each District Assembly's share of the 2008 DACF will be deducted to finance the cost of training and other capacity building programmes for Assemblies. This item should be included in the DACF supplementary Budgets of all Assemblies.

1.4.3 NATIONAL YOUTH EMPLOYMENT PROGRAMME

Thirty per cent (30%) will be utilized to set up a fund for the purpose of Youth Employment Programme. Activities selected to benefit from this fund should be in conformity with the poverty profits of the District and with the Ghana Poverty Reduction Strategy (GPRS). The NYEP under Common Fund will be utilized for Sanitation activities.

1.4.4 SELF-HELP PROJECTS

Up to two per cent (2%) should be allocated to support and sustain self-help spirit through community-initiated projects. Detailed guidelines for the operation of this fund are contained in Part V.

1.4.5 DISTRICT EDUCATION FUND

Up to two per cent (2%) will be used to support and sustain a District Education Fund. The Fund shall be used to finance scholarships, bursaries or repayable loans to financially needy students with a proven record of good academic performance.

1.4.6 ESTABLISHMENT AND STRENGTHENING OF SUB-DISTRICT STRUCTURES

Up to two per cent (2%) should be used for the establishment and strengthening of Zonal, Urban, Town and Area Councils (for the provision of offices, furniture and equipment).

1.4.7 DISTRICT RESPONSE INITIATIVE

Half per cent (0.5%) may be utilized to support the District Response Initiative (DRI) on HIV/AIDS.

1.4.8 MALARIA PREVENTION

Half per cent (0.5%) may be utilized for initiatives for the prevention of malaria

1.4.9 PEOPLE WITH DISABILITIES

Two per cent (2%) shall be utilized to support initiatives by the physically challenged in the District. This Fund is meant to assist people with disabilities (PWD) to organize programmes to create awareness about their activities, their rights and obligations etc.

1.4.10 SPORTS AND CULTURE

One per cent (1%) shall be utilized to support sports and cultural activities in the District.

1.4.11 OTHER PROJECTS

The remaining fifty-nine per cent (59%) may be used in the following areas;

Economic Ventures: Energy, markets, industry, agricultural services, roads, streets, bridges and culverts, ICT (Telecommunications), private sector support and counterpart funding.

Social Services: Education, health, electrification, water supply, housing, sports and recreation.

Administration: Human resource management, accommodation, office facilities and equipment as well as project management.

Environment: Sanitation, drainage systems, waste management and environmental protection.

1.5 FINANCIAL ACCOUNTING AND BUDGETING CONTROL

1.5.1 SUPPLEMENTARY DEVELOPMENT BUDGET

Each Assembly shall each year prepare a Supplementary Development Budget covering the DACF. This is because allocations of the DACF are not made before the commencement of the District Assembly's financial year of January to December.

The Supplementary Development Budget covering the District Assembly Common Fund shall be approved by Resolution of the Assembly in accordance with section

112 of the Local Government Act, 462 and transmitted along with a copy of the resolution to the Regional Co-ordinating Council.

In collating and harmonizing the Regional District Assemblies Common Fund Budget, the regional Co-ordinating Council shall ensure that projects programmes and other activities are in conformity with the GPRS.

The Regional Co-ordinating Council, shall distribute the collated Regional District Assemblies Common Fund Budget to:

- (i) The Administrator of the District Assemblies Common fund;
- (ii) The Ministry of Local Government and Rural Development;
- (iii) The Ministry of Finance;
- (iv) The National Development Planning Commission.

1.5.2 ACCOUNTING FOR UTILIZATION OF THE FUND

Financial Reports indicating:

- a) Amount utilized.
- b) Balance in the District Assembly Common Fund Account.
- c) Outstanding contractual financial commitment for the succeeding period of three months should be submitted by the District Assembly at the end of each quarter (i.e. end of March, June, September and December) and distributed to:
 - (i) The Administrator of District Assemblies Common Fund;
 - (ii) The Controller and Accountant General
 - (iii) The Ministry of Local Government and Rural Development;
 - (iv) The Regional Co-ordinating Council.
 - (v) The Member(s) of Parliament from the District.

1.5.3 PAYMENTS FROM THE DACF

All transactions, including requested payments and deductions defined under paragraph two (2) above by the Administrator of the DACF and unredeemed contracted retentions should be recorded in the Books of Accounts of the Assembly. The transactions should be reflected in the quarterly Financial Returns and monthly Trial Balance of the Assembly.

All payments should be made by the Finance Officer of the Assembly in accordance with existing financial regulations and administrative instructions in force.

The unredeemed contractual retention should be treated as a deposit; and payment of matured retention monies should be paid out of the Deposit Account.

1.5.4 STANDARD DESIGN OF PROJECTS

Standard Designs and their variations approved by the relevant sectors should be used in implementing of all projects involving the construction of infrastructure. In this connection the Ministry of Local Government and Rural Development has compiled a number of Standard Designs. Copies of the design document which include drawings and tender bid documents may be purchased from Regional Co-ordinating Councils.

1.5.5 SUPERVISION AND MONITORING OF PROJECTS

In accordance with Local Government Act of 1993, Act 462, and section 142(1) (b) Regional Co-ordinating Councils are to monitor the use of all monies allocated to the District Assemblies by any agency of the Central Government.

Regional Co-ordinating Councils are also to ensure that, Assemblies, their Committees and Sub-Committees and also the Sub-District Structures (Urban, Town, Zonal and Area Councils) and their Unit Committees perform their supervisory and monitoring.

1.5.6 DISBURSEMENTS ON ZONAL, URBAN, TOWN AND AREA COUNCIL BASIS

Assemblies are to note that Zonal, Urban, Town and Area Council areas are demarcated as development areas for purposes of direct allocation of funds and other development resources. This includes the identification and prioritization of development projects by the communities in the Zonal, Urban, Town and Area Council areas for consideration, approval and inclusion in the development budget of the Assembly. (L.T. 1589, Schedule 2, section 9 (iii) (vii).

1.6 GUIDELINES FOR UTILIZATION OF FIFTY PER CENT (50%) OF THE RESERVE FUND ALLOCATED TO PARLIAMENTARY CONSTITUENCIES

In approving the formula for sharing the District Assemblies' Common Fund, Parliament, by a consensus decision in 1997, resolved that fifty per cent (50%) of the ten per cent (10%) DACF allocation to the Reserve Fund be shared on Parliamentary Constituency basis selected and approved by the Member of Parliament.

The following revised instructions are provided in accordance with Section 91 (1) of the Local Government Act 1993, Act 462 and Section 9 of the District Assemblies Common Fund act 1993, Act 455.

- (i) The amount shall be shared quarterly to the 230 Parliamentary Constituencies.
- (ii) The amount shall be released quarterly to the assemblies by the Administrator of the Districts Assemblies Common Fund and the Member of Parliament shall be notified.
- (iii) A separate account shall be kept in respect of every constituency.
- (iv) Under no circumstances shall money be withdrawn from this account without a memorandum from the sitting Member of Parliament from that constituency.
- (v) Where a memorandum as been raised to the DCE for a project to be financed under this fund, the Member of Parliament shall be given a reply within fourteen (14) working days as to whether the request has been passed or whether a query has been raised.
- (vi) Payments from the accounts shall be made by the Finance officers of the Assembly.
- (vii) Accounting for this fund shall form part of the accounts of the Assembly and shall be incorporated in the financial returns of the Assembly.
- (viii) The District Chief Executive shall submit half-yearly progress reports on the operation of the constituency account to the Member of Parliament with copies to;
 - (a) The presiding Member of information of the Assembly;
 - (b) The Regional Minister, who shall compile the district half-yearly returns into regional returns and transmit to the
 - (i) Minister for Local Government and Rural Development.
 - (ii) Minister for Parliamentary Affairs.

- (ix) The selection of projects for support by the Member of Parliament under the Constituency Fund should conform to National and District Specific development plans and objectives and should fall within the scope of functions of District Assemblies. Correspond to the Poverty reduction strategy of the Assembly. Provide infrastructure in the areas of Education, Health, Agriculture, Water, Sanitation, Roads, Streets and Drains. Generate sustainable employment aim at income generation and wealth creation. Assist in disaster prevention and disaster relief.
- (x) Projects, which fall within the functions of sector Ministries such as clinics under health, and school buildings under Education and with require additional input to become operational or future repairs and maintenance should have the approval of the relevant sector Ministry.
- (xi) Where credit is granted to groups or individual entrepreneurs from this fund, it shall be done in conformity with credit recovery procedures under Part IV of these guidelines.

1.7 DISTRICT FUND FOR PRODUCTIVITY AND INCOME IMPROVEMENT

The Ghana Poverty Reduction Strategy, (GPRS) aims at reducing poverty by helping poor areas to increase their capabilities for economic development. It also aims at moving agricultural production away from subsistence farming through the wide application of agricultural technologies in poor areas to increase local production conditions and capabilities.

These policy guidelines for the use of the DACF for productivity and income improvement activities by District Assemblies aim at mobilizing the enthusiasm of local people for the above stated objective. To achieve this, use has to be made of local advantages while sidestepping adverse conditions and thereby increasing the ability of communities for self-development. Programmes should aim at combining financial appropriation and loans from the fifteen per cent (15%) allocation of

Districts Assemblies' share of the DACF (given through banks and non bank micro finance institutions) to provide funds for poverty-relief.

Assemblies must work hard to change attitudes where by credit from District Assemblies is regarded as free funds. In the allocation and use of the loans, a unified and rational approach should be adopted rather than the former approach of indiscriminate and equal allocation of credit to groups or individuals.

It must be noted that the most poverty stricken areas are lacking in natural resources or have harsh environments. People living in these areas are inadequately fed and clothed; poorly sheltered, and are not literate. Firstly therefore, the conditions for production and living in these poor areas should be greatly improved for them.

The most urgent task is to solve the problem of food, clothing, shelter, and then to go further to improve this through raising their cultural and educations levels. Given that the national economy is based on agriculture, Assemblies should collaborate with the Ministry of Agriculture to introduce and promote the use of improved farming methods and the application of technology to arming, processing of farm to increase their shelf life.

1.7.1 POLICY OBJECTIVE

District Assemblies shall allocate up to fifteen per cent (15%) of their respective yearly shares of the DACF to create a line of credit in each district for Poverty Reduction & Wealth Creation. The objectives of the credit scheme are to enhance productivity, create employment and improve incomes of the population, and to remove the obstacle of lack of access to credit for the informal sector, the self-employed and the development of micro, small and medium scale enterprise production conditions and capabilities.

1.7.2 PROCESS FOR ESTABLISHING A MICRO CREDIT SCHEME

- (i) Assemblies are required to establish, by resolution, a credit scheme for productivity and income improvement. The scheme should be aimed at micro, small and medium scale enterprises to enhance their productivity and to generate employment.

- (ii) The Credit Scheme shall be operated as a Revolving Credit by appointing a managing institution such as a Bank or such other micro-finance institution or NGO's with proven ability for dispensing micro credit, to manage the fund on behalf of the Assembly;
- (iii) No District Assemblies should directly manage its Credit Scheme.
- (iv) Monies shall be released to the institution managing the Credit Scheme out of each District Assemblies' Common Fund allocation for the quarter, not later than two (2) weeks after receipt of the allocation;
- (v) Applications to the assembly for credit shall be passed.
- (vi) Assemblies are required to establish a committee of seven (7) members to examine applications to vouch for applicants, and ascertain they are citizens of the District and to pass on the applications to the managing institution for processing.

1.7.3 TYPES OF CREDIT AND ELIGIBLE ENTERPRISE

The poor areas which constitute the demand side on Assemblies for credit and loans include:-

- ✓ Women in the informal sector
- ✓ Unemployed youth who have completed various kinds of training.
- ✓ Subsistence and small peasant producers in agriculture.
- ✓ Vulnerable groups in urban poor areas and rural communities.
- ✓ Disabled persons.

Credit and loans should be made available to enterprise for use as working or start up capital and seasonal cash advances can be granted for:

1. Agriculture: farming and fishing activities.
2. Cottage industries in agro-processing.
3. Traders in farm produce (indigenous agro-processed products)
4. Procurement and repair of machinery, vehicles and equipment.

5. Private sector initiative to provide services in health, tourism and education, ICT and housing.

Prospective beneficiaries of the Credit Scheme may be required to make initial financial commitments equivalent to ten per cent (10%) or more of the total cost of their projects from their own sources.

All credit granted under the Scheme shall be recovered within a period agreed with the micro finance Institution.

For this purpose the District Assembly shall each year sign an Agreement for the operation of the Credit Scheme with the selected micro managing bank/ institution?

A model of the Agreement is attached.

The managing bank/institution shall be responsible for credit delivery and recovery. Appropriate application and processing fees may be charged on an applicant. The fees to be charges shall not exceed two per cent (2%) of the total Credit required by the investor.

1.7.4 INTEREST RATE

- (i) All Credit granted under this Scheme shall attract an interest rate of sixty per cent (60%) of the prevailing Bank interest rate.
- (ii) The interest, less the cost of agreed fees of the Bank shall accrue to the Revolving Credit Fund of the District.
- (iii) The District Assembly shall negotiate with the Bank an all embracing fee (including application processing review of project feasibility, credit delivery and recovery and administrative costs) which shall not exceed thirty per cent (30%) of the interest earned on any credit granted.
- (iv) A list of applications for credit, which are approved by the Bank and disbursed, shall be transmitted to the District Assembly.

1.8 POLICY OBJECTIVE AND GUIDELINES ON COMMUNITY INITIATED PROJECTS

In support of a national policy of promoting and sustaining community-initiated projects, the following guidelines are provided for Assemblies.

1.8.1 PROJECTS INITIATION

All applications for assistance under District Assemblies' self help programme budget must have evidence of having been initiated by the community. The Unit Committee, Zonal, Urban, Town or Area Councils' approval to this effect will be required.

1.8.2 NATURE OF PROJECT

- (i) Self-help projects selected for consideration should have the basic aim of contributing to the provision of basic community social infrastructure, micro jobs and services. Additionally, they should have the following characteristics:
- (ii) The potential for quick implementation and for satisfying and relieving the hardship of as many communities as possible.
- (iii) Not require complex or sophisticated technology for implementation.

1.8.3 PROJECT DESIGNS

Standard/Model design of construction works approved by the sector agency responsible for the subject areas of the project are available to all District Assemblies and can be made available to communities wishing to undertake a self-help development programme.

1.8.4 INSTITUTIONAL ARRANGEMENTS

Urban / Town / Zonal / Area Unit levels will be responsible for the initiation, selection, prioritization and mobilization of local resources and implementation of approved projects. The District Department of Community Development will provide the required technical assistance to participating communities.

District Assemblies will receive, process and approve self-help project submission and applications for funding, and incorporate these into the Assembly's development

programme and budget. The District Planning Coordinating Units will be responsible for this activity.

Regional Coordinating Councils shall be responsible for the harmonization, monitoring and evaluation of District Self-help development programmes.

National agencies, through the inter-sectoral Technical Steering Committee chaired by the Ministry of Local Government and Rural Development will provide policies and technical standards relevant to the self-help development programme.

1.8.5 FUNDING OF SELF-HELP PROJECTS

The level of funding Self-Help Projects is crucial to sustaining the process; therefore, participating communities will bear twenty per cent (20%) of the project cost in locally available materials or cash. Sustaining the programme of Self-Help Projects could further be enhanced by NGO inputs, and donor official development assistance, targeted at Community initiated projects – e.g. the European Union Micro-project, and other assistance available at the various diplomatic missions.

Funding Self-Help Projects shall be programmed into the supplementary budgets of assemblies covering the District Assemblies Common Fund should be established by a budget line. In support of this budget line, not more than ten per cent (10%) of each year's district Internally Generated Revenue and the DACF shall be earmarked as the Self-Help Project Fund.

The Fund may be supplemented by donor inflows targeted at self-help projects. In the case of revenue generating self project funded on a cost recovery bases, proceeds shall be revolved through the Self-Help Project Fund.

1.8.6 BUDGETING

The Self-Help component of approved District Plans shall be annualized as part of the District Assembly's recurrent and capital expenditures. This should ensure that the relevant costs of relevant activities, e.g. technical preparations, material, labour, overheads, supervision, monitoring and maintenance of self-help programmes, are fully provided for and sustained.

- (i) All Metropolitan / Municipal & District Chief Executives
- (ii) Regional Ministers
- (iii) The Administrator, DACF
- (iv) Minister of Finance
- (v) The Auditor General
- (vi) All Members of Parliament
- (vii) All Presiding Members of Assemblies
- (viii) Director-General.

1.9 STATEMENT OF THE PROBLEM

Despite the fact that, the institution of the Fund has raised the development aspirations of the District Assemblies and the people, its utilization and management has been beset with a number of problems and lapses. The problems include late release of the funds and the stringent directives that accompany its utilization. The above mentioned problems, perhaps account for the public outcry about the optimal utilization of the fund to ensure the socio-economic development of the citizenry.

1.10 PURPOSE OF THE STUDY

Generally, the study focuses on the impact of the District Assemblies Common Fund (DACF) on the socio-economic development of the Sene District. This involves looking at the type of developmental projects being undertaken with the Funds and level of satisfaction of the people of Sene District with regards to the sitting and assigning of the projects funded by the common fund.

The study attempts to find out whether the Sene District is actually utilizing the common fund as spelt out in the guidelines, as well as the problems and challenges faced by the District Assembly whilst implementing the Common Fund Projects. The purpose of the study include the impact of the projects funded from the common fund on their lives, the kind of development projects undertaken by the District Assembly with its share of the fund, and the challenges facing the District Assemble with regard to the utilization of the fund.

1.11 SIGNIFICANCE OF THE STUDY

The results of the study will benefit policy makers on Local Government Financing and the District Assembly itself. Also it will serve as a source of reference for future researchers into the disbursement and optimal utilization of the District Assemblies Common Fund. Additionally, the people in the District will get an insight into the operation of the District Assembly Common Fund (DACF) in the District and finally it will help the policy makers and policy implementers to know the problems and challenges confronting them in the management of the DACF and the developmental projects undertaking by the DACF fund.

1.12 THE LIMITATION OF THE STUDY

The study will be undertaken in the Sene District. This has become necessary due to the apparent low level of development within the Kwame Danso Township and its environs coupled with the frequent outcry by the people of the District with regard to their developmental needs. Finally, limiting it to Sene District and its environs will enable the researcher do a thorough study to determine the impact of the DACF in the District.

The major constraint encountered during the study was inadequacy of funds.

As a result, the whole Ghana could not be covered and the study was limited to the Sene District.

Furthermore, since research has not conducted on the DACF, there is inadequate literature on the topic. Again, refusal of respondents to reveal some information for fear of victimization was another problem faced by the researcher.

1.13 SENE DISTRICT

Sene District is one of the twenty-two (22) districts in the Brong Ahafo region of Ghana. Sene District is carved out of Atebubu District in 1988, and it is one of youngest districts in the country.

It is also one of the largest of the twenty-two (22) administrative boundaries with the East Gonja District to the North – Volta i.e., Krachi and Jasikan District in the Volta Region to the east, and southeast. Kwahu North and Sekyere East District to the South and Southwest, and Atebubu District to the West. The District made up of four (4)

traditional councils namely: - Dwan, Wiase, Basa, and Nkumi with the capital situated at Kwame Danso.

1.14 ORGANIZATION OF THE STUDY

In order to provide a systematic flow of ideas, the study is presented in five (5) chapters. The first chapter focuses on the introduction to the study and deals with the background to the study, the statement of the problem, purpose of the study, definition of terms and organization of the study. The second chapter provides a theoretical frame work within which the study is located and some related research findings. This chapter deals with especially with the literature review. Chapter three highlights on the methodology, that is the procedures adopted to collect information for study. It involves research design, population, sampling procedure, instruments, data collection procedure and data analysis. Chapter four provides for the results of the data analysis and discussion of the result whilst the final chapter provides the summary, conclusion and recommendations of the study.



CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter provides a theoretical framework within which the study is located and related research findings. The chapter deals with the relevant literature review. Specifically, the chapter centered on two main topics, i.e., the Assignment problem and Aspect of Location (Factor Rating Method)

The assignment problem arises in variety of decision making situation; typical assignment problems involve assigning job to machine, agent to tasks, sales personnel to sales territories, contracts to bidders, and so on. A distinguishing feature of the assignment problem is that one agent is to assigned to one and only one task. Specifically, we look for the set of assignments that will optimize a stated objective, such as minimize cost, minimize time, or maximize profit. The Hungarian method involves what is called reduction. By subtracting and adding appropriate values in the matrix, the method determines an optimal solution to the assignment problem.

Finding the minimum number of lines sometimes it is not obvious how the lines should be drawn through rows and columns of the matrix in order to cover all the zeros with the smallest number of lines. In these cases, the following heuristic works well, choose any row or column with a single zero, if it is a row, draw a line through the column the zero is in; if it is a column, draw a line through the row the zero is in. continue in this fashion until all the zeros are covered. If one makes the mistake of drawing too many lines to cover the zeros in the reduced. Matrix and thus conclude an optimal solution has been reached when it has not, you will find you cannot identify a zero value assignment. Thus if you think you have reached the optimal solution, but a set of zero-value assignments cannot be found, go back to the previous step, and check to see if all the zeros can be covered with fewer lines.

2.1 PROBLEM VARIATIONS

We now discuss how to handle the following problem variations when using the Hungarian Method.

a) Number of agents not the same as the number of tasks.

- b) Maximization objective.
- c) Unacceptable assignments.

Number of agent = Number of tasks. If we had considered the case of four (4) clients and only three (3) projects, we would have had to add a dummy row (dummy project) in order to apply the Hungarian method. The client receiving the dummy project would not actually be assigned an immediate project and would have to wait until one becomes available. To obtain a problem form compatible with the solution algorithm, it may be necessary to add several dummy rows or columns but not both.

2.2 A MAXIMIZATION ASSIGNMENT PROBLEM

We now have an assignment problem that requires a maximization objective. We can obtain an equivalent minimization assignment problem by converting all the elements in the matrix to opportunity losses. This conversion is accomplished by subtracting every element in each column from the largest element in the column. It turns out that finding the assignment that minimizes opportunity loss leads to the same that maximizes the volume of the assignment in the original problem by converting the assignment matrix to one in which the elements represent opportunity losses. Hence, we begin our solution to this maximization assignment problem by developing an assignment matrix where each element represents the opportunity.

What about the opportunity losses associated with the dummy column? Well, the assignment of a department to this dummy location means that the department will not be assigned a location in the optimal solution. Since all departments earn the same amount from this dummy location, zero, opportunity loss for each department is zero. For each cell in an assignment matrix, the opportunity loss is the difference between the largest value in the column and the value in the cell. The entries in the cells of an assignment matrix must be converted to opportunity losses to solve maximization problem using the Hungarian method.

2.3 UNACCEPTABLE ASSIGNMENT

We define a value M for unacceptable minimization assignments and a value $-M$ for unacceptable maximization assignment, where M is an arbitrary large value. In fact, M is assumed to be so large that M plus or minus any value is still extremely large.

Thus, an M- value cell in an assignment matrix retains its M value through out the matrix reduction calculations. An M – valued cell can never be zero, so it can never be an assignment in the final solution. (Anderson, Sweeney and Williams, 2003).

The solution procedure for the assignment method can be summarized as follows:

- (i) Develop the opportunity cost table through row and column reductions.
- (ii) Draw the minimum number of horizontal and / or vertical lines necessary to cross out all zeros. If the number of lines satisfies the condition $m = n$, the optimal assignment has been determined. If not, perform step 3.
- (iii) Subtract the minimum uncrossed value from all uncrossed cell value and add this same amount to all values at the intersection of lines.
- (iv) Repeat the test for $m = n$ unique assignments.

2.4 PROHIBITED ASSIGNMENT

It may occur that an assignment of an operator to a facility is prohibited – perhaps due to physical impairments. In such cases a value of M should be assigned to the cell representing the prohibited assignment and the solution method continued normally.

2.5 UNEQUAL SUPPLY AND DEMAND

An important requirement of the assignment problem is that the number of rows, m equal the number of column, n. however, in realistic situations this condition may not occur naturally. Often the number of available operators will exceed the number of machines, or vice versa. In such cases, a dummy row or column is added to balance the requirements. The unit assignment costs for the dummy row or column will all be zero.

2.6 A MAXIMIZATION ASSIGNMENT PROBLEM

Thus, far we have only considered assignment problems in which the objective function represents cost and, therefore, is minimized. However, problems do exist that can be classified as assignment problem (i.e., they have the general assignment formulation) yet with an objective function that is maximized. The solution procedure for maximization assignment problem requires that the largest cell value (i.e., profit coefficient) in the tableau be selected and other tableau cell values be subtracted from

it. This creates a new tableau of relative “cost” values so that the problem can now be solved according to the normal assignment solution method.

2.7 ILLUSTRATION OF THE PROBLEM

Let n councils $C_1, C_2, C_3 \dots C_n$ be considered to n developments (projects) $P_1, P_2 \dots P_n$. As a result of trial assignments in the past, we know that the i^{th} council C_i assigned development project P_j produce a positive benefit (efficiency). Each council is to have one development project and every project is to be filled by a council. How the assignment should be made so as to maximize the total benefit (efficiency). This is the assignment problem to state it mathematically,

Let:

$$X_{ij} = \begin{cases} 1, & \text{if Councils } C_i \text{ is assigned development project } P_j \\ 0, & \text{if Councils } C_i \text{ is not assigned development project } P_j \end{cases}$$

Then the problem is minimize $\sum_{i=1}^n \sum_{j=1}^m C_{ij} X_{ij}$

Subject to $\sum_{i=1}^m X_{ij} =$

$$\sum_{j=1}^n X_{ij} =$$

$$X_{ij} = 0 \text{ or } 1$$

This is infact, a very special kind of balanced transportation problem in which $m=n$, if we regard the employees as supply depots and the jobs as warehouse. Thus the steppingstone Method or Bala’s Zero-one programming algorithm may be used. However because of the special nature of the problem, an algorithm called Hungarian Method is more efficient for it and it is explained below.

2.7.1 The Hungarian Method

Like any balanced transportation problem, the assignment problem is represented by a tableau as shown below:

Jobs

C ₁₁	C ₁₂	.	.	.	C _{1,n-1}	C _{1n}	1
C ₂₁	C ₂₂	.	.	.	C _{2,n-1}	C _{2n}	1
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
C _{n-1,1}	C _{n-1,2}				C _{n-1,n-1}	C _{n-1,n}	1
C _{n1}	C _{n2}				C _{n,n-1}	C _{n,n}	1
1	1				1	1	

Employees

Step1

Subtract the smallest C_{ij} in each row from every entry of that row.

Step2

Subtract the smallest C_{ij} in each column from all entries of that column.

Step 3

The two operations in Steps 1 and 2 can be shown to have no effect on the optimal solutions since they merely change the objective function by a constant.

Check to see if a feasible solution of zero entries can be found, it is optimal.

To carry out this check, proceed as follows:

- Identify a row or column with exactly one zero entry. If this is not available, find a new row or column with the smallest number of zeros. Identify a zero in the selected row or column, if it is a row that is selected, draw a vertical line through this zero and if it is a column that is selected, draw a horizontal line through this zero.

- (ii) Repeat the above procedure with each zero that has no line through it, until each zero has at least one line through it.
- (iii) If exactly n lines have been drawn through zeros, then an optimal solution of zeros is present, the zeros with lines through them constituting a solution. If less than n lines have been drawn, the zeros do not form an optimal solution and in this case we proceed to step 4 below.

Step 4

Redistribute the zeros in the coefficient matrix and return to step 3:

- i) Subtract minimum entry with no lines through it in coefficient matrix from matrix Elements, which has no lines through them.
- ii) Add number subtracted to each entry in coefficient matrix with two lines (one horizontal and one vertical) through it.
- iii) Remove all lines.

2.7.2 ILLUSTRATION OF HUNGARIAN METHOD

i) A machine operator assignment problem

Four operators are available to be assigned to work on the four machines. Each operator is able to produce an item on a particular machine at the differing per unit cost. For example, operator one can produce an item on machine one at a cost of \$ 10, which it cost 14 for operator two to produce the same item on machine one. The cost of each operator i in working on machine j , is given as follows:

Initial assignment tableau

Operator \ Machines	1	2	3	4
1	10	15	16	18
2	14	13	16	10
3	11	9	8	18
4	13	13	11	9

Assignment tableau with row and column reductions

Operator \ Machines	1	2	3	4
1	0	4	6	8
2	4	2	6	0
3	3	0	0	10
4	4	3	2	0

Assignment tableau with line tests for independent zeros

Operator \ Machines	1	2	3	4
1	0	4	6	8
2	4	2	6	0
3	3	0	0	10
4	4	3	2	0

Adjusted Assignment tableau

Operator \ Machines	1	2	3	4
1	0	4	6	10
2	2	0	4	0
3	3	0	0	12
4	2	1	0	0

The test for unique assignments must be repeated. In this case, it now requires a minimum of four to cross out all zeros, regardless of how they are drawn.

The optimal assignments are as follows:

Operator	Machine	Cost (\$)
1	1	10
2	4	10
3	2	9
4	3	11
Total		\$ 40

ii) Solve the following assignment problem using the Hungarian Method

Employees	9	8	5	6	Jobs
	10	11	12	13	
	7	4	3	2	
	1	14	15	16	

a) Subtracting the minimum entry in each row, we obtain the following tableau

Employee	Jobs			
	4	3	0	1
	0	1	2	3
	5	2	1	0
	0	13	14	15

b) Subtracting the minimum entry in each column of the last tableau, we obtain the following tableau

Employee	Jobs			
	4	2	0	1
	0	0	2	3
	5	1	1	0
	0	12	14	15

c) Applying the rules for covering the zeros with lines, we find that all the zeros are covered by four lines.

Employee	Jobs			
	4	2	0	1
	0	0	2	3
	5	1	1	0
	0	12	14	15

Hence the zeros provide an optimal solution. The zeros are as shown below:

		0	
	0		
			0
0			

Examining this tableau, we see that the only assignment possible for row 1 is cell (1, 3) where the zero is. Assigned 1 and removing row 1 column 3 from further consideration.

It is now clear that, the only assignment possible for column 4 is cell (3, 4) where zero is. Assign 1 here and remove row 3 and column 4 for further consideration. Next we see that the only assignment possible for column 2 is in cell (2, 2).

Finally, we see that the only possible assignment for row 4 is cell (4, 1) where the zero is. Assign 1 here to complete the solution. The final optimal solution is as shown below.

	J_1	J_2	J_3	J_4	
E_1			1		1
E_2		1			1
E_3				1	1
E_4	1				1
	1	1	1	1	

2.8 Among the most prominent related research findings on assignment problems are:

- The generalized assignment problem is a classical combinatorial optimization problem known to be NP-hard. It can model a variety of real world applications in location, allocation, machine assignment, and supply chains. Researchers have studied the problem since the late 1960s, and computer codes for practical applications emerged in the early 1970s. Arago et al., proposed a new algorithm for this problem, which proves to be more effective than previously existing methods. The algorithm features a path relinking approach, which is a mechanism for

generating new solutions by combining two or more reference solutions. Computational comparisons on benchmark instances show that the method is not only effective in general, but is especially effective for the types D and E instances of the generalized assignment problem, which are known to be quite difficult. (Mutsunori Yagiura, Toshihide Ibaraki and Fred Glover, June 2002).

- ii) Arago et al.,(1999) conducted to formulate a solution to the gamma-connected assignment problem that requires the determination of a minimum cost assignment of each vertex in V with exactly one color in K in a way that no color q stimulates a subgraph with more than a given number of connected components. A dynamic programming algorithm was developed to solve this NP-hard problem. The proposed algorithm shows that the gamma-connected assignment problem is solvable in polynomial time. Mixed-integer programming formulations were also proposed.
- iii) A probabilistic analysis of sequencing job with deadlines (SJD) problem finds that obtained estimation of the optimal solution value could be very useful in formulating and testing the approximate algorithms for solving the SJD problem. The study focused on the growth of optimal solutions values and also finds that the asymptotical value of the random SJD problem is determined by the 'increments of the deadlines' (Szkutula and Krzysztof, 1998).
- iv) Distributed virtual environments (DVEs) are distributed systems that allow multiple geographically distributed clients to interact concurrently in a shared virtual world. DVEs, such as online games, military simulations, and collaborative design, etc., are very popular nowadays. To support scalable DVEs, a multi-server architecture is usually employed, and the virtual world is partitioned into several zones to distribute the load among servers. The client assignment problem arises when assigning the participating clients in the zones to servers. Current approaches usually assign clients to servers according to the locations of clients in the virtual world; i.e., clients interacting in a zone of the virtual world will be assigned to the same server. This approach may degrade the interactivity of DVEs if the network delay from a client to its assigned server is large. In this paper, we formulate the client assignment problem and propose two

algorithms to assign clients to servers in a more efficient way. The proposed algorithms are based on the heuristics developed for the well-known terminal assignment problem. Simulation results with the BRITE Internet Topology Generator show that our algorithms are effective in enhancing the interactivity of DVEs. (D. N. B. Ta and S. Zhou, 2007).

v) Ishmail et al., introduced the incremental assignment problem. In this problem, a new pair of vertices and their incident edges are added to a weighed bipartite graph whose maximum weighed matching is already known and the maximum weighted matching of the extended graph is sought. We propose an $O(|V|^2)$ algorithm for the problem.

vi) Cunningham et al., investigated a restricted version of the Quadratic Assignment Problem (QAP), where one of the coefficient matrices is an Anti-Monge matrix with non-decreasing rows and columns and the other coefficient matrix is a symmetric Toeplitz matrix. This restricted version is called the Anti-Monge Toeplitz QAP. There are three well-known combinatorial problems that can be modeled via the Anti-Monge – Toeplitz QAP: (P1) the Turbine Problem, i.e., the assignment of given masses to the vertices of a regular polygon such that the distance of the center of gravity of the resulting system to the center of the polygon is minimized. (P2) The Traveling Salesman Problem on symmetric Monge distance matrices. (P3) The arrangement of data records with given access probabilities in a linear storage medium in order to minimize the average access time. We identify conditions on the Toeplitz matrix that lead to a simple solution for the Anti Monge- Toeplitz QAP: The optimal permutation can be given in advance without regarding the numerical values of the data. The resulting theorems generalize and unify several known results on problems (P), (P2) and (P3). We also show that the Turbine Problem is NP-hard and consequently, that the Anti-Monge – Toeplitz QAP is NP-hard in general. (W. H. Cunningham, S. T. McCormick, and M. Queyranne)

vii) A new heuristic for the quadratic assignment problem

We propose a new heuristic for the solution of the quadratic assignment problem. The heuristic combines ideas from tabu search and genetic algorithms. Run times are very short compared with other heuristic procedures. The heuristic performed very well on a set of test problems.(Zvi Drezner)

viii) Krokhmal et al.,(2006) provides valuable insights into the behaviour and properties of problem's solutions, feasible region, and optimal values, especially in large-scale cases. A class of problems that have been studied extensively in the literature using the methods of probabilistic analysis is represented by the assignment problems, and many important problems in operations research and computer science can be formulated as assignment problems. The author presented an overview of the recent results and developments in the area of probabilistic assignment problems, including the linear and multidimensional assignment problems, quadratic assignment problem, etc.

ix) The channel assignment in cellular systems has the task of planning the reuse of available frequencies in a spectrum efficient way. A classical approach to frequency assignment problems, when applied to the frequency planning of cellular networks, does not enable this task to be performed in an efficient way, since it does not consider the cumulative effect of interferers. Capone, (July, 1999) proposed a new model for the channel assignment problem in narrow-band cellular networks, which accounts for the cumulative effect of interferers. In this model, the service area is partitioned into regions and the propagation characteristics are assigned by means of the levels received in each region by the considered base stations (BSs). The objective is to maximize the sum of traffic loads offered by regions in which the ratio between the received power and the sum of powers received from interfering transmissions is above a threshold value. We also present an algorithm, based on tabu search (TS) techniques, to solve this problem. This algorithm has been tested on some instances obtained b using a simple radio channel model and on a real world instance.

- x) Computation models for resolving three-dimensional assignment problems (3DA) with triangle inequalities are presented. The 3DA problem focuses on finding a minimum-weight collection of triangles covering each point exactly once. Experiments indicate that these approaches are excellent in finding 3DA in randomly generated cases where the cost of a triangle is either the sum of the lengths of its sides or the sum of the lengths of its shortest sides. (Crama, Yves, Spieksma and Frits C. R, 1992).
- xi) Two geometric special cases of the three-dimensional assignment problem are examined. Three sets called B (blue), R (red) and G (green) are given with each set having n grid points in the Euclidean plane. The goal is to look for a partition of $B \cup R \cup G$ into n three-colored triangles so that the total circumference of all triangles or the total areas of all triangles is minimized. Both versions of the problem are found to be NP-hard (Spieksma, Frits C. R., Woeginger and Gerhard J).
- xii) Copositive and Semidefinite Relaxations of the Quadratic Assignment Problem
Semidefinite relaxations of the quadratic assignment problem (QAP) have recently turned out to provide good approximations to the optimal value of QAP. We take a systematic look at various conic relaxations of QAP. Johz (2006), first showed that QAP can equivalently be formulated as a linear program over the cone of completely positive matrices. Since it is hard to optimize over this cone, we also look at tractable approximations and compare with several relaxations from the literature. We show that several of the well-studied models are in fact equivalent. It is still a challenging task to solve the strongest of these models to reasonable accuracy on instances of moderate size. We also provide a new relaxation, which gives strong lower bounds and is easy to compute. (Janez Povh (janez.povh@uni-mb.si)).

2.9 FACTOR RATING METHOD

The factor method is popular because a wide variety of factors from education to labour skill can be objectively included. Sources have suggested several factors that have been deemed as important enough to be included into the factor rating method. Although they are not the only ones that can be included in the equator, they are there

to give the prospective from a starting point. The suggested include: labour, cost (wages unionization productivity), labour availability proximity to raw materials and suppliers, proximity to markets, state and local government fiscal policies, environmental regulation, utilities, number of inhabitants and quality of government. When using factor ratios method, the following steps must be followed strictly. These are:

- (a) Develop a list of relevant factors.
- (b) Assign a weight to each factor to reflect its relative importance in the company's objectives.
- (c) Develop a scale for each (e.g., 1 to 10, or 10 to 100 points)
- (d) Have management or related people score each relevant factors, using the scale developed in (c) above.
- (e) Multiply the score by the weight assigned to each factor and total the score for each location.
- (f) Make a recommendation based on the maximum point score, considering the result qualitative approaches as well.

When a decision is sensitive to minor changes, further analysis of either the weighting or the point assignment may be appropriate, (Amponsah and Dankwah, 2007).

2.9. 1 Illustration of factor rating method

Tema Oil Refinery, headquarters in Tema, must decide among three sites for the construction of a new oil- processing center. The firm selected seven factors listed below as a basis for evaluation and has assigned rating weights on each factors.

Factor	Factor Name	Rating Weight
1	Proximity to port facilities	5
2	Power- source availability and cost	3
3	Workforce attitude and cost	4
4	Distance from Tema	2
5	Community desirability	2
6	Equipment suppliers in area	3
7	Economic activities	1

Management has rated each location on a 1 to 100 points basis

Factors	Location A	Location B	Location C
1	100	80	80
2	80	70	100
3	30	60	70
4	10	80	60
5	90	60	80
6	50	60	90
7	90	60	60

Which site will be recommended?

Solution

Factor	Factor Name	Rating Weight	Location A	Location B	Location C
1	Prox. to port	5	100	80	80
2	Power source	3	80	70	100
3	Workforce	4	30	60	70
4	Dist. from Tema	2	10	60	80
5	Comm. desirability	2	90	60	90
6	Equip. suppliers	3	50	60	60
7	Econ. activities	1	90	60	60

Rating Scores

Factor	Factor Name	Rating Weight	Ratio of Rate	Location A	Location B	Location C
1	Pro. to port	5	0.25	25	20	20
2	Power source	3	0.15	12	10.5	15
3	Workforce	4	0.20	6	12	14
4	Dist. From Tema	2	0.10	1	8	6
5	Comm. Desira	2	0.10	9	6	8
6	Equip. supplier	3	0.15	7.5	9	13.5
7	Econo. activities	1	0.05	4.5	3	3
Aggregate Score of Locations A, B and C				65	68.5	79.5

Clearly from their respective aggregate scores, Location C i.e. site C would be recommended since it has the highest aggregate.

2.10 Among the most prominent related research findings on location problems are:

- (i) Factor analysis of the Zung self-rating depression scale in a large sample of patients with major depressive disorder in primary care.
- (ii) The aim of this study was to examine the symptomatic dimensions of depression in large sample of patients with major depressive disorder (MDD) in the primary care (PC) setting by means of a factor analysis of the Zung self-rating depression scale (ZSDS).

Methods

A factor analysis was performed, based on the polychoric correlations matrix, between ZSDS items using promax oblique rotation in 1049 PC patients with a diagnosis of MDD (DSM-IV).

Results

A clinical interpretable four-factor solution consisting of a core depressive factor (I); a cognitive factor (II); an anxiety factor (III) and a somatic factor (IV) was extracted. These factors accounted for 36.9% of the variance on ZSDS. The 4 – factors structure

was validated and high coefficients of congruence were obtained (0.98, 0.92 and 0.87 for factors I, II, III and IV, respectively). The model seemed to fit the data well with fit indexes within recommended ranges (GFI = 0.9330, AGFI = 0.9112 and RMR = 0.0843).

Conclusion

Our findings suggest that depressive symptoms in patients with MDD in the PC setting cluster into four dimensions: core depressive, cognitive, anxiety and somatic, by means of a factor analysis of the ZSDS. Further research is needed to identify possible diagnostic, therapeutic or prognostic implications of the different depressive symptomatic profiles. (Irene Romera, Helena Delgado – Cohen 1, Teresa Perez2, Luis Caballero3 and Immaculada Gilaberte 1).

(ii) Model Building and Location Problem Solving in a Plane with Forbidden Gaps¹
Problems of optimal object location in a plane outside rectangular forbidden gaps are considered. Objects under location are connected with one another and with the objects, located in the same plane. The criteria are the minimization of maximal weighed distance or total cost of the links between objects. A model building procedure of integer linear programming of the problems above for rectangular metric is given. Solution algorithms are briefly described. The outcomes of a numerical experiment are given (G.G. Zabudskii , 2005).

(iii) Some theoretical aspects of position-location problems

The position-location problem is that of computing the coordinates of a set of objects in space (usually a plane) from a sparse set of distance measurements. Because the problem is analogous to that of constructing a pin-Jointed structure from rigid bars (of given respective lengths), it is intimately linked to problems of structure rigidity. In addition to its practical significance, the problem leads to a number of surprising results and intriguing theoretical problems in geometry, combinatorics, and algorithm design. This paper presents some of the theoretical algorithmic aspects of the position-location problem; its major objective is to attract researchers to complexity problems of structural rigidity. Among the major results presented is the discovery of a large class of geometrical decision problems, all of which are randomly decidable (i.e., decidable by a probabilistic polynomial-time algorithm), but many of which seem to be Intractable, (Yemini and Yechiam , 1979).

(iv) Solving the Stochastic Location-Routing Problem with Genetic Algorithm

Location-routing problem is a kind of hard combinatorial optimization problem arose in supply chain and logistics system. The deterministic location-routing problems in which all data are known in advance have been researched sufficiently, and the conventional method of solving the deterministic problems is to divide the problems into location-allocation problems and vehicle routing problems. The stochastic location-routing problem which is much closer to the real case is researched in this paper. In the stochastic problem the demands of the customers follow a certain random distribution. A genetic algorithm is designed to solve the stochastic location-routing problem. Novel genetic represent and corresponding genetic operations are designed in the genetic algorithm so that the location-allocation and vehicle-routing can be tackled simultaneously. Local search is also applied in the algorithm in order to improve the search effectiveness and solution quality. Simulations based on numerical examples show that the proposed algorithm is effective. (Ye Wei-long Li and Qing , 2007).

(v) Optimization Modeling and Algorithm of Facility Location Problem in Perishable Commodities Emergency System.

In this paper, the optimization modeling and algorithm of facility location problem in perishable commodities emergency system is studied. First, transportation cost and perishability loss of the distribution network is computed separately. Then, our problem is modeled as a kind of emergency optimization problem under certain time constraints, and the modeling objective is logistics cost minimization. In order to solve it, are-making algorithm is proposed, (Zhang Wuhan University, 2007).

Vii) The maximum coverage location problemIn this paper we define and discuss the following problem which we call the maximum coverage location problem. A transportation network is given together with the locations of customers and facilities. Thus, for each customer I , a radius r_i is known such that customer I can currently be served by a facility which is located within a distance of r_i from the location of customer i . We consider the problem from the point of view of a new company which is interested in establishing new facilities on the network so as to maximize the company's "share of the market". Specifically, assume that the company gains an amount of W_i in case customer I decides to switch over to one of the new facilities.

Moreover, we assume that the decision to switch over is based on proximity only, i.e., customer i switches over to a new facility only if the latter is located at a distance less than r_i from i . The problem is to locate p new facilities so as to maximize the total gain.

The maximum coverage problem is a relatively complicated one even on tree-networks. This is because one aspect of the problem is the selection of the subset of customers to be taken over. Nevertheless, we present an $O(n^2p)$ algorithm for this problem on a tree. Our approach can be applied to other similar problems which are discussed in the paper. (Nimrod Mediddo, Eitan Zemel and S. Louis Hakimi)

(vii) Direct asymptotic equivalence of nonparametric regression and the infinite dimensional location problem. We begin with a random design nonparametric regression having random predictors and Gaussian errors. We produce a convenient, easily implementable mapping of this problem into a Gaussian infinite dimensional location problem. Such an infinite dimensional problem can reflect a Fourier, or wavelet, or other orthogonal basis representation of the original regression situation. In this way it may be easier to analyze than the original regression formulation. There is considerable literature on doing this; beyond describing the situation we do not pursue here this issue of the analysis of such infinite dimensional models. For most of our results the random regressors in our theory may have either a known or unknown distribution.

The correspondence we produce between the regression and location problems is an asymptotic equivalence mapping. (We also explicitly describe the converse mapping from the location problem to the regression). Thus any solution to a statistical problem in one formulation can be easily converted to a solution or the other formulation.

The basic mapping from the regression to location formulations involves a few steps. First, bin the regression observations and use the bin averages to compute an empirical infinite series transform. Then truncate this series appropriately. Add a small amount of prescribed Gaussian noise to the truncated series coefficients. Then use a subset of these to linearly predict the remaining tail coordinates of the infinite

series. In many applications the later two steps are not necessary even though they are needed for an explicit asymptotic equivalence mapping, ((Lawrence D. Brown and Linda H. Zhao DMS-997175).

(viii) On exact solution of a Point-Location Problem in a System of d -dimensional Hyperbolic Surfaces.

We present a new algorithm for reliable point-location problem in a system of d -dimensional hyperbolic surfaces. The problem is perpetual to many applications, including modeling of a molecular system represented as a set of polydisperse spheres through the use of the Euclidean d -dimensional Voronoi diagram. The algorithm is provided for the d -dimensional case and its implementation in a 3 – dimensions is discussed, (M. L. Gavrilova and S. Bessamyatnikh).

(x) Genetic algorithms and the corridor location problem: multiple objectives and alternative solutions.

Corridor planning problems are challenging because their solution often requires the participation of multiple stakeholders with different interests and emphases. Though such problems fall into the domain of multiobjective evaluation, existing corridor location models often search for a single global optimum by collapsing multiple objectives into a single one using a weighting method. In multiobjective problems with competing objectives, however, optimality will often have different interpretations among decision makers, and, as a consequence, no single optimal solution will satisfy all participants. This paper describes the design and implementation of a multiobjective genetic algorithm for corridor selection problems (MOGADOR). This new approach generates a large set of Pareto – optimal and near-optimal solutions that can be evaluated with respect to the untargeted or imprecisely modeled characteristics of ill-structured corridor location problems. Experimental results suggest that the MOGADOR approach outperforms traditional shortest-path methods in both computation time and solution quality. An analytical and visualization tool is provided to help decision makers identify good candidates and evaluate trade-offs among alternatives, (Zhang and Armstrong).

CHAPTER THREE

3.0 METHODOLOGY

This chapter spells out in some details the research methods and techniques employed for the study. It begins with the research design, the population from which a sample is selected and a brief characteristics of the respondents. The sampling procedures used to select the sample are also described. It concludes with data collection procedures and techniques employed in the analysis of the data collected.

3.1 RESEARCH DESIGN

The descriptive survey was used for this study. This research design was used because the research was meant to solicit information from players in the district assembly concept about the utilization of the District Assemblies Common Fund (DACF). That is, finding their views, perceptions and understanding of how the fund was disbursed and utilized in their district. The usefulness of the descriptive survey for this type of study is supported by Gay (1987) who emphasizes that the descriptive survey is an attempt to collect data from members in a given population in order to determine the current status of that population with respect to one or more variables.

The two types of allocation spelt out in the DACF utilization guidelines are;

- (i) Mandatory – which is demanded by law (normally fifty- one per cent (51%) of DACF)?
- (ii) Discretionary – which is decided by the officials and not fixed by law (normally forty-nine per cent (49%) or less).

3.2 POPULATION OF THE STUDY

The population for this study was somehow varied but it can be described as the players in the DACF in the Sene District Assembly in the Brong Ahafo Region. It was made up of the Sene District Assembly's staff from some selected departments of the assembly. The selected departments included administration, finance, internal audit, planning, budget and engineers'.

3.3 SAMPLING PROCEDURE

The sample size for this study was twenty six (26) respondents. The method for the selection was the purposive sampling method because only staff who it was deemed could give vital information was involved.

It was not every member of staff who could give the needed information required on the utilization of the DACF; hence those who were technically placed were selected for data collection. Once again, staff selected came from the Finance, Internal Audit Department, General Administration, Budget, Planning and Engineer's Departments.

3.4 INSTRUMENT FOR DATA COLLECTION

The instrument used for collecting data for this study was a questionnaire. The questionnaire had two main sections: biographical information and the main topic items. The biographical information related to age range of respondents, educational/professional qualifications, department deployment, sex of respondents and length of service with the assembly. The main topic items were in the form of supply questions, simple alternatives and open-ended questions.

3.5 DATA GATHERING PROCEDURE

The research instrument was administered personally by the researcher after introductory formalities had been done. Two weeks was used for data administration. All twenty-six questionnaires given out to secretary to the district coordinating director's

Secretary and she in turn distributed them to the respondents. The questionnaires were retrieved through the same format after the second week of submission.

3.6 DATA ANALYSIS PROCEDURES

Since the descriptive design was used in data collection, same would be done to data analysis. This would be done by the use of sample frequencies where applicable and frequency table as well as pie-chart would also be used in data presentation. Where necessary some of the discussion would be done without tables but from the data collected.

3.7 BIOGRAPHICAL INFORMATION ON RESPONDENTS

Five things were measured from the bio data of respondents. These are sex distribution of respondents, age distribution of respondents, highest academic/professional qualification of respondents, department of schedule and length of service with assembly.

3.8 SEX DISTRIBUTION OF RESPONDENTS

Table 3.1

Sex	Frequency	Percentage
Male	17	65
Female	9	35
Total	26	100

The total number of respondents was twenty-six (26) and this was made up of nine female and seventeen male.

3.9 AGE DISTRIBUTION OF RESPONDENTS

As it is normal with most research studies, age distribution of respondents are sought which most often helps in drawing conclusions to the findings. With this study, it was deemed necessary to seek information on respondents' age to confirm to the convention in practice. Table 3.2 presents the age ranges of the respondents.

Table 3.2

Age Distribution of Respondents

Age range	Frequency	Percentage
21-30	3	11.5
31-40	7	27.0
41-50	11	42.3
51-60	5	19.2
Total	26	100.0

From Table 3.1, it can be seen that more than sixty – one percent (61%) of the respondents were forty-one (41) years or above. This shows that most of the staff

involved in the management of the assembly are matured in age and all other things being equal are better placed to take decisions that positively affect the socio-economic lives of the people in the Sene District Assembly. The remaining respondent's age fell below forty-one (41) years.

3.10 ACADEMIC / PROFESSIONAL QUALIFICATION OF RESPONDENTS

One other which was considered under the bio data of respondents was academic / professional qualification of respondents which are deemed necessary in determining the competence of the staff of the assembly. Table 3 presents the responses as given by the staff of Sene District Assembly.

Table 3.3

Academic /Professional Qualification of Respondents

Qualification	Frequency	Percentage
GCE 'A' Level	2	7.7
Diplomats	3	11.5
First Degree	18	69.2
Second Degree	1	3.9
Post Graduate Professionals	2	7.7
Total	26	100

Table 3.3 shows that eighteen (18) respondents, represented by 69.2% had first degree. These included Bachelors of Education, Arts, Science and Administration among others. Again the table indicates that two respondents (that is 7.7%) were postgraduate professionals. These respondents had acquired professional certificates after their bachelors' degree in their respective fields.

Significantly, Table 3.3 shows that one respondent had a Masters in Planning and this was good for the assembly because he was well qualified to help in coordinating the planning unit of the assembly. The others were either holders of GCE Advanced Level Certificates or Diploma Certificates.

3.11 DEPARTMENT DISTRIBUTION OF RESPONDENTS

The Assembly has different under which its mandate is carried out especially in the management of the District Assemblies Common Fund. Respondents were consequently asked to indicate the department where they were assigned. Their responses appear in Table 4.

Table 3.4

Respondents' Department of Responsibility

Department / Unit	Frequency	Percentage
Finance	3	11.5
Administration	8	30.8
Internal Audit	3	11.5
Engineers	8	30.8
Planning / Budget	4	11.5
Total	26	100

Table 3.4 shows that, eight (8) respondents each from the administration and engineers' departments respectively. These categories of respondents have vital roles to play in the implementation of the District Assembly's Common Fund in the district in terms of records keeping and project monitoring.

Again, Table 3.4 shows that three (3) respondents each, represented by 11.5% came from the finance and internal audit departments as described in Chapter three. When it come to keeping proper records on finances and ensuring accountability of the funds generated the finance and audit department cannot be ignored, hence their involvement in the study. The batch of respondents came from the planning /budget department. They had also been included in the study to give technical input on how to ensure that projects are planned ahead for effective execution.

3.12 LENGTH OF SERVICE WITH THE ASSEMBLY

In talking about working experience one cannot discount the length of service one spends on the job. It was therefore imperative to capture the length of time

respondents had spent with the assembly at the time of data collection. Responses given by respondents are presented in Table 3.5.

Table 3.5

Length of Service with the Assembly

Length of Service (years)	Frequency	Percentage
1-5	14	53.8
6-10	10	38.5
11 and above	2	7.7
Total	26	100

Table 3.5 shows that 53.8% of the respondents had worked with the assembly for less than six years. This finding connotes that majority of the assembly's staff had stayed and worked with it for a reasonable length of time. This is coupled with the remaining 45.2% of respondents who had worked with the assembly for more than five years. This shows that there is stability in the assembly's core department/units staffing position. The implication is also that, there is consistency in thought in so far as implementation of decisions of the assembly is concerned.

3.13 IMPACT OF THE COMMON FUND PROJECTS

Research question one states: What is the impact of the Common Fund projects on the lives of the people of the Sene District. This research question sought to find out from respondents the impact projects undertaken by the DACF had on the lives of the people of the Sene District. Two items were put in the questionnaires to elicit the needed responses from respondents. The responses have been edited and presented in Tables 3.6 and 3.7.

Table 3.6

Responses on the Impact of the DACF Projects

Degree of Impact	Frequency	Percentage
To a large extent	18	70
To a lesser extent	8	30
No impact at all	—	—
Total	26	100

Table 3.6 shows clearly that the impact of the DACF projects in the Sene District had been phenomenal. This is seen in the fact that seventy percent (70%) of the respondents indicated that the impact had been to a large extent. A World Bank Report on Ghana (2004) indicates that the DACF is seen as a reliable for providing resources to the districts to provide basic infrastructure in the field of education, health, water, and the other, which hitherto had been neglected. This also means that without the DACF some of the basic infrastructure could not be provided.

Table 3.7

Explanations Respondents Gave Concerning the Impact of the DACF

Explanations	Frequency	Percentage
More improved health facilities	9	35
Improvement in staff capacity building	7	27
More schools had been built	8	31
Improvement in economic infrastructure	2	7
Total	26	100

Table 3.7 is a sequel to table 6, in that the responses in the later were brief. Responses in this table rather elaborate the responses in table 6. It is clear from the table that respondents explained that there had been more improvement in health facilities than the others. This is because nine respondents gave that explanation. The table also shows other explanations given by respondents. All these were affirmed by what Nyarko and Eghan (2008) said concerning the DACF that within three (3) years of its operation several development projects were executed to raise the socio-economic status of the people.

These include health and sanitary facilities. Others were educational facilities such as classroom blocks and the supply of furniture, portable water, market infrastructure, office and residential accommodation for the staff. Additionally, through the DACF postal agencies, lorry parts, rehabilitation of roads, extension of electricity including street lighting, provision of community centres and relief items for disaster victims, credit facilities, as well as youth employment programmes were also undertaken.

3.14 TYPES OF DEVELOPMNTAL PROJECTS

Research question two states; what types of Developmental projects are undertaken with the Common Fund. This research question sought the views of respondents on types of projects that were undertaken with the DACF. The responses to this research question were presented in two folds: - the first one was about the type of projects, whilst the second talked about factors that determined the types of projects to be undertaken in the Sene District. Table 3.8 and 3.9 present the responses given by respondents.

Table 3.8

Types of Projects Undertaken with the DACF

Type of Project	Frequency	Percentage
Educational Infrastructure	5	19
Health Infrastructure	6	23
Road Network	4	15
Market Infrastructure	3	12
Pipe Borne Water	5	19
Sewage Facilities	2	8
Scholarship	1	4
Total	26	100

Table 3.8 shows that, the DACF was used mainly on health and educational infrastructure. This was because forty-two percent (42%) of respondents indicated that the DACF that came to the Sene District Assembly was allocated for the provision of clinics, health centres, building of classrooms, teachers' bungalows and rehabilitation of other educational facilities.

Again, the table indicates that the third most important project undertaken with DACF was provision of pipe borne water. About nineteen percent (19%) of the responses gave this indication. There is no doubt the provision of clean and portable drinking water contributes to good health especially in the eradication of water borne diseases such as guinea worm and bilharzias.

Also the table shows a project was not only central in the local economy but the national economic development, which was good road network. In the Sene District the issue of good road network was one of the prioritized projects because fifteen percent (15%) of total responses attested to that. Apart from the major projects, there were equally important projects and programmes that DACF ceded to the district was used for. These projects were market infrastructure twelve percent (12%), sewage facilities eight percent (8%) and scholarship four percent (4%) as they are shown on the table. Scholarship for instance was catered for directly form the guidelines that accompanied the release of the funds (refer to table 5 for the 2007 DACF Utilization Guidelines)



CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

In this chapter, data collected are presented and discussed citing relevant literature to support the finding that merge. From results the investigation conducted with the questionnaire.

4.1 PROJECTS WHICH ARE UNDERTAKEN USING DISTRICT ASSEMBLY COMMON FUND (DACF)

The projects that were discussed could not see the light of day if certain factors or steps were not taken. The managers of the assembly were enjoined to follow some steps to determine the projects to be undertaken at point in time. Table 1 presents the responses. Table 4.1 shows that thirty percent (30%) of respondents indicated that a development budget is prepared by the Budget Department in collaboration with Planning Coordinating Department of the assembly. Also the table indicates that twenty-seven percent (27%), eight percent (8%), and thirty-five percent (35%) respectively noted that the budget was prepared and sent to Finance sub committee, executive sub committee and the general house scrutinized the budget before implementation by the technocrats.

Table 4.1

Factors that Determine Types of Projects

Factors	Frequency	Rel. Freq. Percentage
Preparation of development Budget to DACF	8	30
The Assembly Committee's Scrutiny	7	27
Authority Committee's scrutiny	2	8
General Assembly's scrutiny	9	35
Total	26	100

The steps or factors as they appeared on the table were exactly how the factors were followed in satisfying regulations of the district assemblies. First the managers (Planning and Finance or the Engineers Department) prepared the development plan

for submission to the appropriate assembly's subcommittee for deliberation. After a thorough deliberation, it was sent to the authority for further discussion and approval. The last stage was the general assembly scrutiny where all members of the assembly met, discussed and approved or disapproved before implementation could take place.

4.2 SATISFACTION DERIVED FORM THE PROJECT

Research question three states; Are the people of the Sene satisfied with the project being undertaken with the Common Fund? This particular research sought to find out the feelings of the people within the communities in the Sene District on the DACF projects undertaken so far. Two items were formulated under this research question to measure the feelings from respondents. One item demanded a single response of "Yes" or "No" and the other sought explanation to the "Yes" or "No" answer.

Table 4.2

Satisfaction Derived from Projects

Response	Frequency	Percentage
Yes	26	100
No	0	0
Total	26	100

It is significant to note that all the 26 respondents answered "Yes" to the items that asked if members in the district were satisfied with the projects. Reasons to the unanimous "Yes" answer are presented in Table 3.

Table 4.3

4.3 Reasons of Respondents

Reasons	Frequency	Percentage
Projects are taken good care of	11	42
Projects are utilized by the community members	7	27
Durbars are held to commemorates their acceptance	6	23
The incessant request from communities which have Not benefited from the DACF project yet	2	8
Total	26	100

From Table 4.3, the foremost reason why respondents felt citizens were satisfied with projects undertaken with the DACF was seen in how they took good care of the said projects. Table 4.3 clearly shows that forty-two percent (42%) of the responses indicated that DACF were taken good care of by the citizenry.

Another reason, which is somehow close to the one above, was the fact that projects were utilized by the people in the district. Twenty-seven percent of respondents supported this reason. Story one hears sometimes from some communities was that certain projects undertaken with the DACF were done without approval of the people. Looking at the factors that have to be considered, the people indirectly have to be consulted through their representatives. It is equally important to indicate that the incessant request communities make for the provision of projects with the DACF is an indication that communities which have benefited had shown their satisfaction to the envy of those that had not benefited, hence agitation from the later to claim their shares of the cake. Table 4.3 shows lastly that, beneficiary communities organized durbars to inaugurate the DACF projects to show their acceptance. The projects were dedicated with durbars.

4.4 JUDICIOUS USE OF COMMON FUND

Research question four states: is the District Assembly actually utilizing the Common Fund in line with Guidelines for disbursement. Since the DACF was set up by a legal frame work so is, its utilization governed by legal guidelines – thus yearly guidelines for utilization. Respondents indicated that they utilized the funds according to the guidelines. They noted that the guidelines differed year by year. The summary of the 2007 utilization guidelines show the percentage allocation of the fund to various sectors for development. These facts are presented in Table 4.4 .

Table 4.4

4.5 DACF Utilization Guidelines as compared for 2007 and 2008

Activity	Percentage Allotted	
	2007	2008
Reserved Fund	10	10
Human Capacity Building	2	1
National Youth Employment Programme	20	30
Self-Help Projects	5	2
District Education Fund	2	2
Establishment & Strengthening of Sub-District Structures	5	2
Malaria	1	2
Support for People with Disabilities	2	2
Sports and Culture	3	1
Total	51	52.5

Table 4.4 shows that the allocation of the fund was not constant for all the activities. It depended largely on the government priorities. A look at the allocation to the National Youth Employment Programme (NYEP) gives a clear picture of the assertion made earlier. In 2007, NYEP was allocated 20% of the total fund but it had 30% in 2008. Malaria prevention saw a slight increase in its all allocation from one percent (1%) to two percent (2%). All the others, apart from the reserved fund saw a reduction in percentage allocation. Self-Help Projects experienced a drop of three percent (3%) (from 5% to 2%) and Establishment & Strengthening of Sub-District Structures went through the same trend.

This is mandatory allocation from the ministry of Local Government and Rural Development, and must be adhered to. The remaining forty-nine percent (49%) is what is termed as the discretionary allocation of DACF. This is where one employed the used of Factor Rating and Assignment Method to optimally disburse it to the four competing traditional councils in the Sene District. This would be dealt with later.

4.5 COMPETENCE OF THE MANAGEMENT OF DACF

Research question five states: Are those managing the Common Fund and its processes competent and capable enough. Financial Management of the magnitude of the DACF demands well qualified and competent people to carry out that responsibility. In the past, local government had not succeeded because of lack of qualified personnel (The Ghana Districts, 2007). Owing to this, it became imperative to elicit from respondents if the district had the right caliber of staff to manage the DACF in the district. A portion of the DACF was devoted to human resource development; meaning competent personnel to manage the districts were not lost on those who muted the decentralization concept. Table 4 presents the responses of respondents to the items that sought their views.

Table 4.5

Roles Played in the Management of the DACF

Role	Frequency	Percentage
Preparation of Payment Vouchers	8	31
Preparation of Cash Books	6	23
Preparation of Returns	4	15
Inspection / Monitoring of projects	5	19
Pre and Post-auditing of the payment vouchers	3	12
Total	26	100

A casual look through the responses on the table would indicate that only the staff of the finance section work on the DACF. All the other departments play some roles at different stages of the management process. No doubt the table shows that thirty-four percent (34%) of the responses on this role said they are involved in the preparation of the payment vouchers. It must be stated that assembly members and opinion leaders do not play any role in the preparation of the vouchers, which are purely administrative function.

Table 4.5 shows that nineteen percent (19%) of respondents indicated that they were involved in the inspection / monitoring of projects. Monitoring / inspection of projects

did not deserve any special technical expertise to do so, it can be deduced that some administrator may be involved in the performance of this role. The other roles, however demands technical expertise to carry them out. Preparation of cash books attracted six (23%) respondents and this role was possibly played by the staff of the finance and audit departments because it fell within their domain.

Furthermore, Table 4.5 indicates that the preparation of payment attracted the highest number of respondent that is thirty-one percent (31%). There is no doubt that this role involves a lot of process in the administrative process with the government bureaucracy to ensure record keeping and accountability.

4.6 PROBLEMS AND CHALLENGES FACED IN THE IMPLEMENTATION OF THE DACF

Research question six sought to find out the problems and challenges faced by the District Assembly in the implementation of the Common Fund Projects. Two items were used to solicit for the answers required. Responses from the first items are presented in Table 6 and the second is presented as suggestions to how the challenges could be overcome in the discussion of the contents of the table

Table 4.6

Challenges Faced in the Management of DACF

Challenges	Frequency	Percentage
The release of the DACF delays		
The Directives for the utilization restrict the assembly	8	31
Payment to contractors delays	4	15
Too many deductions limits the usage of the funds	6	23
Too many projects on the DACF	5	19
	3	12
Total	26	100

Table 4.6 shows that respondents were passionate about the challenges that faced them in the management of the DACF. This is seen in the percentage rate of the

responses – they are almost evenly distributed. However, delay in the release of funds topped the responses with thirty-one percent (31%). The respondents were not the only people complaining about the two challenges mentioned above.

For instance, a study by the World Bank (2004) found that there were wide gaps between the release date by the Ministry of Finance and Economic Planning, the transfer date by the Controller and Accountant General's Department (CAGD) and the payment date by the Bank of Ghana.

The gaps, especially between the transfer date by CAGD and the payment date, gave cause for concern. Specifically the study indicated such issues as the lack of funds or too many competing demands on the resources, delays in getting the proposed formula for allocation approved by Parliament, the government's fiscal and monetary policy concerns and failure or delays in submitting supplementary budgets and financial reports by district assemblies (World Bank, 2004). This amply supports the responses given by respondents.

In another development at a stakeholders' workshop, a discussant also touched on the delays in releasing the DACF to the districts. The discussant Mr. Kyei-Baffour bemoaned the rate of statutory interference in the disbursement of the DACF which affected the implementation of the approved budgets of Metropolitan Municipal Assemblies and by extension their financial functions.

Table 4.6 shows that there were other teething challenges that confronted the Sene District Assembly in the management of the DACF. The issue of the delay in the payment of contracts from the delay in releasing funds generally forms the central government. When this happened projects were not completed on time.

From the foregoing, the challenges have to be attended to by central government by releasing the DACF early enough for the district to carry out its obligations. Also, government should stop the numerous deductions from the DACF at source or explain the national for the deductions.

Rhetorically, what was the level of development in the District before and after the introduction of DACF was research question of the study. To get a better assessment

of the developmental situation of the district, it became imperative to measure that from respondents who were the major stakeholders in the district development. They were therefore asked to give the state of development of the district prior to the inception of the DACF and the aftermath of its introduction. The responses that emerged are discussed qualitatively.

Respondents indicated that before the introduction of the DACF, the district found it very difficult to undertake developmental projects because of lack of funds. This led to poor health care, low enrolment in schools, poor environment as a result of drainage facilities among others. The capacity of the staff of the district was low but the situation was different. A look at the year by years guidelines would inform one about the projects and activities undertaken to better the lives of the citizens within the districts and so most projects had been undertaken based on the guidelines which had brought changes in the socio-economic life of the district.

The last research question took a look at the main purpose why the DACF was introduced into the local government of Ghana. The views of respondents are presented in Table 4.7

Table 4.7

Views of the Purpose of the introduction of DACF

Views of Respondents	Frequency	Percentage
To provide financial support to the districts	7	27
Equitable distribution of developmental resources	5	19
To deepen physical decentralization and Support local governance	5	19
To improve socio-economic infrastructure of district assemblies	9	35
Total	26	100

Table 4.7 shows the views of respondents on the purpose for the introduction of the DACF. Exactly thirty-five percent (35%) of the respondents indicated that the DACF

was introduced with the view of improving the socio-economic infrastructure of District Assemblies. Some of these socio-economic infrastructure that the DACF had been used to undertake in the Sene District included school buildings, health cares/clinics, markets, roads, public places of conveniences pipe borne water and drainage facilities.

Again, the table shows that twenty-seven percent (27%) of the respondents indicated that the DACF was introduced to provide financial support to the district assemblies to enable them meet their numerous financial obligations. District assemblies have the responsibility of providing some basis amenities such as the provision of sanitary facilities in the form of places of convenience and waste disposal to keep the environment clean, which requires substantial financial resources to enable them undertake. The DACF was therefore a relief in this direction.

Furthermore, Table 4.7 indicates that twenty –seven percent (27%) of the respondents showed that the DACF has brought about equitable distribution of developmental resources. There is not denying the fact that some of the districts are well endowed and others deprived. To distribute developments fairly if not equally, the DACF was introduced to bridge the developmental gaps among the districts. This is done by the formula for the disbursement of the DACF, which is prepared by the Administrator of the DACF and approved by parliament.

Lastly, table 4.7 shows that, one of the purpose of the DACF was to deepen the decentralization process and to support governance. There cannot be effective decentralization without adequate funding because year in year out a portion of the DACF to the districts is allocated to strengthen existing local government structures and establish non-existing ones.

The 2008 DACF guidelines for disbursement specifically said that two percent (2%) of each district share of the DACF should go into “the establishment and strengthening of sub-District Structures such as Zonal, Urban, Town and Area Councils (for the provisions of officers, furniture and equipment)”.

4.6 THE DISCRETIONARY ALLOCATION OF DACF

The Sene District General Assembly's Scrutiny has selected seven factors listed below as a basis for evaluation and has assigned rating weights on each factor.

4.6.1 Data collected and analyzed

Table 4.8

Factor	Factor Name	Rating weight
1.	Population of the council	5.00
2.	Availability of funds	4.00
3.	Personnel to man the project	3.00
4.	Accessibility to the council	2.00
5.	Material supplies in the council	3.00
6.	Economic activities in the council	2.00
7.	Community desirability	1.00

The District General Assembly's scrutiny has rated four development sectors in each council in the district on ten (10) to hundred (100) point basis.

Table 4.9 (I)

Gives the point for the development sector of council (I)

Development Sector Factor	Education	Health	Water & Sanitation	Road Network
1.	90.00	70.00	60.00	50.00
2.	80.00	90.00	70.00	45.00
3.	65.00	70.00	30.00	60.00
4.	50.00	90.00	50.00	100.00
5.	60.00	80.00	70.00	50.00
6.	50.00	70.00	50.00	45.00
7.	80.00	90.00	50.00	50.00

Table 4.9 (II) gives the total rating score of the development sector for the council (I)

Factor	Factor Name	Rating weight	Ratio of rate	Educ	Health	Sanitation	Road network
1.	Population of the council	5.00	0.25	22.50	17.50	15.00	12.50
2.	Availability of funds	4.00	0.20	16.00	18.00	14.00	9.00
3.	Personnel to man the projects	3.00	0.15	9.75	10.50	4.50	9.00
4.	Accessibility to the council	2.00	0.10	5.00	9.00	5.00	10.00
5.	Material supplies	3.00	0.15	9.00	12.00	10.50	7.50
6.	Economic activities Community	2.00	0.10	5.00	7.00	5.00	4.50
7.	Community desirability	1.00	0.05	4.00	4.50	2.50	2.50
Total Rating score of the development for council I				71.25	78.50	56.50	55.00

Table 4.10 (I) gives the points for the development sectors of the council II

Development Sector Factor	Education	Health	Water & Sanitation	Road network
1.	100.00	60.00	50.00	45.00
2.	80.00	90.00	70.00	50.00
3.	70.00	60.00	40.00	60.00
4.	65.00	70.00	50.00	50.00
5.	75.00	60.00	65.00	70.00
6.	75.00	70.00	50.00	50.00
7.	60.00	65.00	70.00	50.00

Table 4.10 (II) give the total rating score of the development sector for the council II

Factor	Rating weight	Ratio of Rate	Educ.	Health	Water & Sanitation	Road Network
1.	5.00	0.25	25.00	15.00	12.50	11.25
2.	4.00	0.20	16.00	18.00	14.00	10.00
3.	3.00	0.15	10.50	9.00	6.00	9.00
4.	2.00	0.10	6.50	7.00	5.00	5.00
5.	3.00	0.15	11.25	9.00	9.75	10.50
6.	2.00	0.10	7.50	7.00	5.00	5.00
7.	1.00	0.05	3.00	3.25	3.50	2.50
Total Rating score of the development for council II			79.75	68.25	55.75	53.25

Table 4.11 (I) gives the points for the development sector of the council III

Development Sector Factor	Education	Health	Water & Sanitation	Road Network
1.	95.00	65.00	45.00	45.00
2.	70.00	80.00	60.00	50.00
3.	60.00	50.00	30.00	30.00
4.	60.00	55.00	45.00	35.00
5.	70.00	70.00	60.00	50.00
6.	65.00	60.00	50.00	45.00
7.	55.00	50.00	60.00	40.00

Table 4.11 (II) gives the total rating score for the development sector of council III

Development Sector Factor	Rating weight	Ratio of Rate	Educ.	Health	Water & Sanitation	Road Network
1.	5.00	0.25	23.75	16.25	11.25	11.25
2.	4.00	0.20	14.00	16.00	12.00	10.00
3.	3.00	0.15	9.00	7.50	4.50	4.50
4.	2.00	0.10	6.00	5.50	4.50	3.50
5.	3.00	0.15	10.50	10.50	9.00	7.50
6.	2.00	0.10	6.50	6.00	5.00	4.50
7.	1.00	0.05	2.75	2.50	3.00	2.00
Total Rating score of the development for council III			75.50	64.25	49.25	43.25

Table 4.12 (I) gives the points for the development sector of council IV

Development Sector Factor	Education	Health	Water & Sector	Road Network
1.	80.00	80.00	100.00	45.00
2.	100.00	70.00	80.00	50.00
3.	70.00	60.00	30.00	60.00
4.	60.00	80.00	10.00	50.00
5.	80.00	60.00	90.00	85.00
6.	90.00	60.00	50.00	50.00
7.	60.00	60.00	90.00	80.00

Table 4.12 (II) gives the total rating score of development sector for council IV

Development Sector Factor	Rating Weight	Ratio of Rate	Educ.	Health	Water & Sanitation	Road Network
1.	5.00	0.25	20.00	20.00	25.00	12.25
2.	4.00	0.20	15.00	10.50	12.00	10.00
3.	3.00	0.15	14.00	12.00	6.00	9.00
4.	2.00	0.10	6.00	8.00	1.00	5.00
5.	3.00	0.15	8.00	6.00	9.00	12.75
6.	2.00	0.10	13.50	9.00	7.50	5.00
7.	1.00	0.05	3.00	3.00	4.50	4.00
Total rating score of the development for council IV			79.50	68.50	65.00	57.05

Table 4.13 is the combination of the four traditional councils with their total rating scores for the four chosen development- sectors by the District General Assembly's Scrutiny Board on the discretionary allocation of DACF

Table 13

Development Sector Council (j)	Education	Health	Water & Sanitation	Road Network
Council I (Dwan)	79.50	68.50	65.00	53.25
Council II (Wiase)	72.50	64.25	49.25	43.25
Council III (Basa)	71.25	78.50	56.50	55.00
Council IV (Nkomi)	79.75	68.25	55.75	53.25

The question is which of these four development sectors should be awarded to one and only one the four traditional councils for the optimal benefit to the people of the

district with minimal discretionary allocation cost. Hugarism Method of assignment outlined in the chapter II of the literature review. This gives us a typical council development sector Assignment problem.

4.6.2 COUNCIL DEVELOPMENT-SECTOR ASSIGNMENT PROBLEM

Under the discretionary allocation of DACF, four development sectors were considered to be assigned to the four competing councils of the district. Each council is rated on an evenly seven selected factors listed in table 4.8 as the basis for evaluation at differing total rating score.

The score of each council (i) vying for a development-sector, (j) is given as follows: where $1 \leq i \leq 4$ and $1 \leq j \leq 4$

Initial assignment tableau

Development Sector Council	Education	Health	Water & Sanitation	Road Network
Council i	79.50	68.50	65.00	53.25
Council ii	72.50	64.25	49.25	43.25
Council iii	71.25	78.50	56.50	55.00
Council iv	79.75	68.25	55.75	57.00

Assignment tableau with row and column reduction

Development Sector Council	Education	Health	Water & Sanitation	Road Network
Council i	10.00	2.75	11.75	0.00
Council ii	13.00	8.50	6.00	0.00
Council iii	0.00	11.00	1.50	0.00
Council iv	7.75	0.00	0.00	1.25

Assignment tableau with line test for independent zeros.

Development Sector Council	Education	Health	Water & Sanitation	Road Network
Council i	10.00	1.25	10.25	0.00
Council ii	13.00	7.00	4.50	0.00
Council iii	0.00	9.50	0.00	0.00
Council iv	9.25	0.00	0.00	2.75

Adjusted assignment tableau by subtracting 1.25 to the uncrossed values and adding 1.25 to each junction. The final tableau.

Development Sector Council	Education	Health	Water & Sanitation	Road Network
Council i	8.75	0.00	9.00	0.00
Council ii	11.75	5.75	3.25	0.00
Council iii	0.00	9.50	0.00	1.25
Council iv	9.25	0.00	0.00	4.00

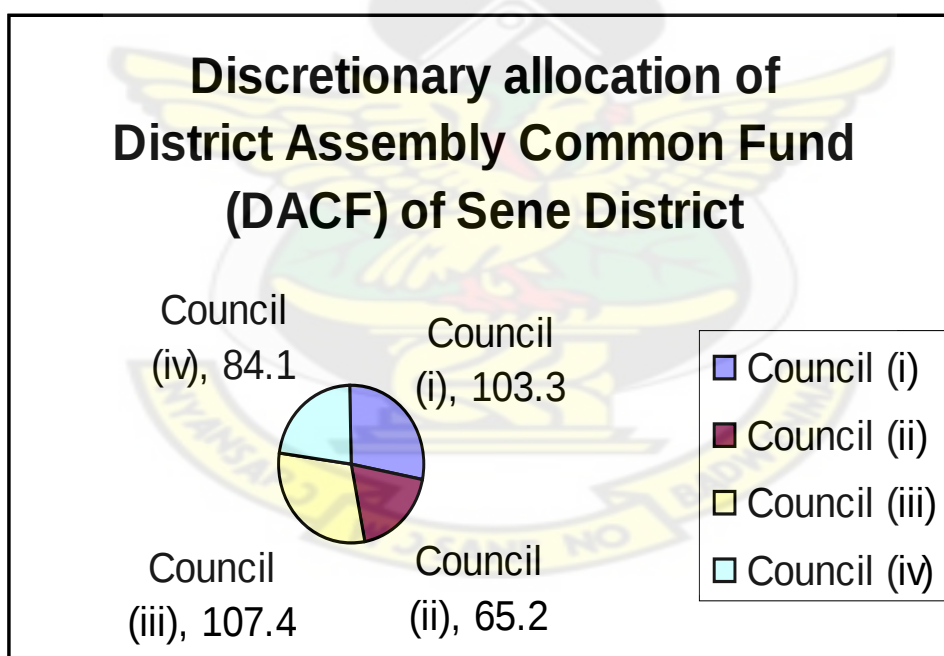
The optimal assignments are as follows:

Council (i)	Development – sector (j)	Individual optimal value	Discretionary allocation percentage
Council i	Health	68.50	14.06%
Council ii	Road	43.20	8.87%
Council iii	Education	71.20	14.62%
Council iv	Water & Sanitation	55.75	11.45%
Total optimal allocation value		238.65	49%

4.6.3 DIAGRAMATIC REPRESENTATION OF THE RESULTS

PIE CHART FOR THE DISCRETIONARY ALLOCATION OF THE DACF OF SENE DISTRICT

Council	Discretionary allocation in percentage	Discretionary allocation in degrees
Council i	14.06%	103.30 ⁰
Council ii	8.87%	65.20 ⁰
Council iii	14.62%	107.40 ⁰
Council iv	11.45%	84.10 ⁰
Total	49%	360 ⁰



CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter deals with the summary of the findings of the study, conclusions drawn from the findings, recommendations made with regards to the findings and suggestions for further study.

5.1 SUMMARY OF THE STUDY

The study was conducted on the optimal allocation of resources of District Assemblies Common Fund (DACF) in the Sene District of Brong Ahafo Region. A background to the DACF was given in chapter one, which also carried the statement of the problem, purposes of the study, research questions that guided the study, significance of the study among others.

Also, adequate literature was reviewed in chapter two. The literature review covered areas beyond the DACF. Chapter three dealt with the methodology used for data collection and analysis, whilst chapter four dealt with the presentation and analysis. Finally, this chapter sums up the study.

The findings of the investigation, enumerated according to the order of the research questions posed, indicated that the impact of the DACF projects on the lives of the people had been phenomenal.

This was seen in the improvement in social and economic infrastructure such as clinics, school buildings, markets, public places of convenience and roads. It was also found that the project concentrated on basic health facilities, improvement in educational facilities, good road network, environmental and sanitation projects.

Furthermore, it was found that the people in the Sene District were satisfied with the developmental projects undertaken with the DACF and that guidelines for the utilization of the DACF were followed strictly.

On the issue of the competence of management staff at the district level, which by extension is a prerequisite for effective management of the DACF, it observed that the

academic/professional qualifications of the staff of the assembly were one of the best at the local government levels.

It was also found that there were some challenges and problems with the implementation of the common fund project in the Sene District. Among them was delay in the release of the fund, too many deductions from source (DACF Secretariat), too many projects funded the DACF and the directives that central government gives.

Moreover, it was found that before the introduction of the DACF, the Sene District could not undertake any major development projects. However, with the introduction of the DACF, the district had seen a lot of development projects as had been earlier in this section.

Finally, it was found that the rationale for the introduction of the DACF at the local government level was to financial, which eventually eased the financial burden on the assemblies.

5.2 CONCLUSIONS

From the findings, it was found that the DACF had played a major role in the socio-economic development of the district. The conclusion that can be drawn is that it is a step in the right direction in local government financing and particularly in the provision of basic, social and economic infrastructure. It can also be stated that it has brought economic and social relief to the district. This is seen in the scholarships awarded to needy but brilliant students and the assistance to the disabled people (physically and visually impaired) receive from the assemblies.

5.3 RECOMMENDATIONS

Based on the findings of the study and the conclusion drawn, it is recommended that:

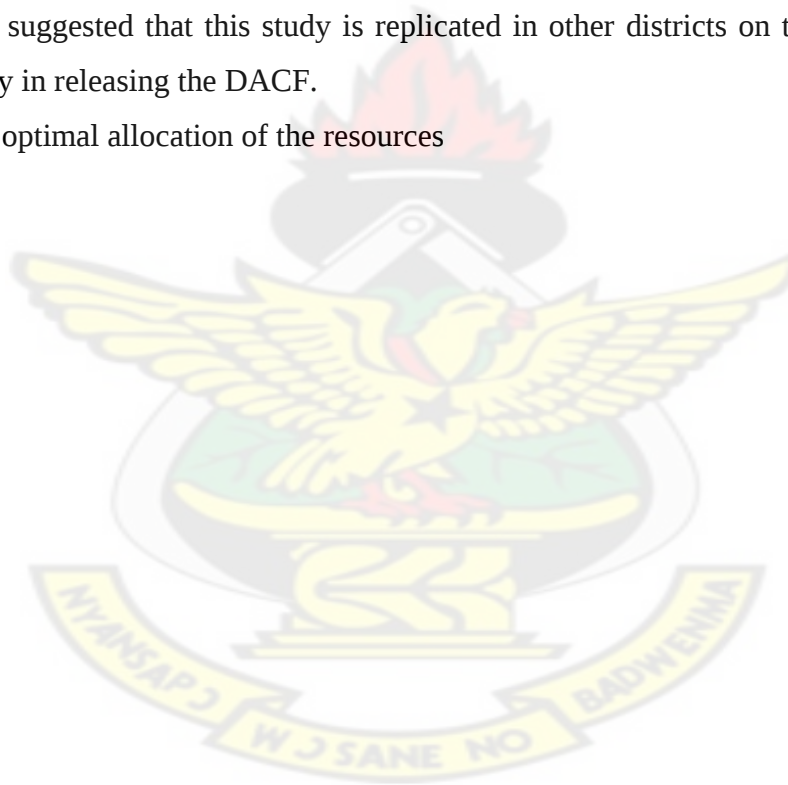
- i) The discretionary allocation should be increased.
- ii) The delay in the release of the fund should be looked at in order words the DACF should be released promptly to enable the assembly utilize it based on the guidelines.
- iii) The deductions from source should be minimized and properly explained to the assembly to set minds of the stakeholders at ease.

- iv) The directives from central government which impede the management of the DACF should be done away with.
- v) Moreover, it was seen that the DACF plays important role in decentralization process.

Based on this it is recommended that the currently 7.5% of the ceded revenue from central government should be increased to fifteen percent (15%) to enable the local authorities undertake more developmental projects.

5.4 SUGGESTED AREA FOR FURTHER STUDY

- i) Knowledge of the transportation, assignment and allocation should take precedence over the mere mandatory allocation.
- (ii) It is suggested that this study is replicated in other districts on the causes of the delay in releasing the DACF.
- iii. And optimal allocation of the resources



REFERENCES

- Amponsah S. K. And Darkwah K. F., (2008), Lecturers notes on Operation Research (pp.2-3)
- Andorson, Sweeney and Williams, Introduction to Management Science Quantitative Approaches to Decision Making. 7th Edition (pp. 315-320).
- Aragao, Marcus Poggi de, Uchoa and Eduardo, (1999), European Journal of Operational Research.
- Bank of Ghana Statistical Bulletin (2002), Accra, Ghana Publishing Company
- Controller and Accountant General's Department Report Covering (2002-2006), Accra, Ghana Publishing Company.
- Cunning W. H., S. T., McCormick and Queyranne M. (1996) Lecture. Notes in Computer Science 1084, Springer Verla (pp. 204-158).
- D. N. B. Ta and S. Zhou (2007), Proceeding of the Third International Conference on Natural Computation, Volume 01, ISBN Publication (pp.246-256).
- European Journal of Operational Research Subjects. Mathematical Programming (1998) Business International ISSN Publication.
- Extract from Ghana Districts Documents Retrieval from (www.ghanaweb.com).
- Fourth Republican Constitution of Ghana, (1992), Accra, Ghana Publishing Company.
- From Journal (2002) International Journal of Computers and Applications
- Gay. L. R. (1987), Educational Research Competencies for Analysis and Application, 2nd Edition, Ohio, Peril Publication Company.
- Grainger C. D. Growth Factor Review, Volume 11, (pp. 133-145).
- Ismail H. Toroslu and Gokturk U. (2006) Increment Assignment Problem (pp 19-23). Journal of Applied Mathematics and Decision Science (2002) Volume 6, Issue 3, (pp. 143-153).
- Krokmal Pardolos, Panos and M. (2006), (www.google.com) Random Assignment Problems.
- Lee, Moore and Taylor, Management Science (pp. 243-249).
- Mutsunori Z., Toshigide I., and Fred G., International Symposium on Scheduling, Japan, June 4-6 (105-108).
- Special Edition of the D4ecentralisation Agenda (2007), Accra, Ghana Publishing Company.

Third Republic Construction of Ghana (1979) Accra, Ghana Publishing Company.

This Paper Appears in: Foundations of Computer Science, (1979), Annual Symposium on Publication, Date 29-23 October, (pp. 1-8).

United State Documents on Local Government Finance (2007).

Vehicular Technology, IEEE Transactions on Publication (1999) Volume 48, Issue 4, pages 125-1260, ISSN: 0018-9545.

World Bank (2004) Country Report in Ghana.

Ye Wei- L. L., and Qing, (2007) Appearance in: Management Science and Engineering. International Conference on Publication, (pp. 429-434).



APPENDIX:

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY DEPARTMENT OF MATHEMATICS

Questionnaire for Sene District Assembly Staff

These set of questions are intended to collect data to answer “the question as to how the District Assemblies Common Fund (DACF) has impacted on the socio-economic life of the people in the Sene District.

PREAMBLE

Any information that will be provided will be treated with the outmost confidentiality and that respondent’s identity will be protected. Respondents are therefore requested to be very frank in the answering of the items. Where they are required to look through records to answer questions they should not fail to do so.

Biographical information

1. Sex of respondents: Male [] Female []
2. Age range of respondents
Below 21 [] 21 – 30 [] 31 – 40 []
41 – 50 [] 51 – 60 []
3. What is your highest academic /professional qualification?
.....
4. Which department do you work with in the assembly?
.....
5. How long have you being working with this assembly?
.....

On the impact of the common fund:-

- (1) What is the impact of the common fund project on the lives of the people of Sene District?
.....
- (2) What types of Development project are undertaken with DACF?
.....
- (3) Is the District Assembly actually utilizing the DACF in line with the guidelines for disbursement?
.....
- (4) Are those managing the common fund and its process competent and capable enough?
.....
- (5) What are the problems and challenges faced by the District Assembly (DA) in implementation of DACF?
.....
- (6) Has there been any satisfaction derived from the project (Yes or No)
.....
- (7) What was the level of development in the District before and after the introduction of DACF?
.....