

**COMPUTATIONAL ANALYSIS OF COMMODITY
PRICES IN RURAL DEVELOPMENT
(A CASE STUDY OF KATSINA AGRICULTURAL
AND RURAL DEVELOPMENT AUTHORITY)**

BY

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PGD/MCS/216/96**

**A PROJECT SUBMITTED TO THE DEPARTMENT OF
MATHEMATICS AND COMPUTER SCIENCE, SCHOOL OF
SCIENCE AND SCIENCE TECHNOLOGY IN PARTIAL
FULFILLMENT OF THE REQUIREMENT FOR THE AWARD
OF POST-GRADUATE DIPLOMA IN COMPUTER SCIENCE,
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA.**

MARCH 1998

APPROVAL PAGE

This project has been carefully read and approved by the following persons on the behalf of the Department of Mathematics and Computer studies, Federal University of Technology, Minna as meeting the requirement toward the award of Post Graduate Diploma in Computer science.

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DEDICATION

This project is dedicated to my beloved father late Alhaji Salihu Makudawa, mother Hajiya Mama Salihu Makudawa, my wives and children only whom Allah can reward them for what they have done and encouraged me through all my academic pursuit.

ACKNOWLEDGEMENT

I wish to acknowledge the effort of project supervisor, in the person of Dr. Reju S. A., my head of department in the person of Dr. K. R. Adeboye and all other lecturers of the mentioned department who had contributed generously of their time and resources (financial and material) towards a successful completion of the entire course undertaken in the university.

My acknowledgement also goes to all my classmate who contributed in one way or the other especially Mallam Shehu Yusuf Galadima Kontagora and finally those who wishes me well.

ABSTRACT

The project work is on the computational analysis of commodity prices in Rural Development (a case study of Katsina Agricultural and Rural Development (KTARDA) using statistical tool (technique) for the comparison of more than two samples.

It is designed to improve and facilitate the comparison of prices of commodities produced so as to aid in a faster and more accurate planning for the future and also to aid the authority and government in its price polices.

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CHAPTER ONE

INTRODUCTION TO RURAL DEVELOPMENT PROGRAMME

1.1 INTRODUCTION:

As trends in the quality of life in developing countries have recently become clearer, the growing significance of rural development has emerge. without sound rural improvement there can be no balance national economic development. Economic development requires the growth and modernization of both the rural and urban sectors. Indeed, in many developing countries, including Nigeria, such a large proportion of the total population is rural, that no national development can succeed without rural growth.

Rural and Urban sectors must form an integrated whole, they are essentially complementary. In a situation like Nigeria, Sustained urban development depends on agricultural expansion. No growth of our towns and cities can be satisfactory while the rest of the country is poverty-strickens depending preciously on the miserable returns of subsistence agriculture.

For a number of reasons, rural areas in most developing countries are at a disadvantage. Urban life becomes more attractive daily, particularly to the youths. Rural products command unfavourable terms of exchange. Traditionally, country dwellers are slow to accept, or even with for change; their aspiration are not high. In growing and dynamic economic like Nigeria's, these disadvantages are likely to continue unless special efforts are made for sound balance in our national development.

Rural development in the developing countries has tended to follow one of four patterns:

- (i) Sector approaches, addressed either to a whole sector such as agriculture or to a few projects within it.*
- (ii) Coordinated approaches, addressed to the economic development of all sectors within a given area.*
- (iii) Participatory approaches, designed to involve the residents, first in selecting local economic and social goals, and then in pursuing them, with some government aid.*
- (iv) Multi-purpose programmes, aimed at stimulating economic growth, fostering popular support for government, and promoting security.*

1.2 THE CONCEPT OF RURAL DEVELOPMENT

Until recently, "Rural Development" and "Agricultural Output" were considered synonymous. but agriculture is by no means the only possible occupation for people living

in rural areas, and accordingly a new and broader view has emerge which distinguishes rural from merely agricultural development.

One important element in this view is increased opportunity. It equates rural development with changes in social and economic structures, institutions, relationships and processes. A concienes of rural development not as mere agricultural and economic growth alone, but as the creation and fair sharing of social and economic benefits resulting from this growth. In this view is implied a massive effort to increase production, create and spread employment, and root out fundamental causes of poverty, disease and ignorance. This view implies a modernization which would not only increase the capacity but also change attitudes, replacing the sense of dependence on the natural environment by the desive and ability to manipulating

The ambit of rural development is therefore very wide indeed. It includes generation of new employment; more equitable access to arable land; equitable distribution of income, widespread improvement in health, nutrition, and housing, maintenance of law and order; creation of incentives and opportunities for saving, credit and investment. It also involve creating wider opportunities for individuals to realize their full potential through education and sharing in the decisions and actions which effects their lives. It is not sectoral, but comprehensive. In a nutshell, rural development is the result of many interacting forces.

1.3 NEED FOR CONCERTED EFFORTS IN RURAL DEVELOPMENT

In Nigeria, close to 80% of the people live directly or indirectly on the resources of land. At present, manpower in the rural areas is concentrated in agriculture. other occupations are lacking. It is important, therefore, to diversify the economy outside of the urban areas so that there will be employment openings for the excess manpower which is now engage in agricultural production. This step would lead to desirable geographical mobility. There is the danger that industrial development may turn out to be but a concentration of urban-based rural development would stimulate the growth of small-scale industries, which would in turn benefit fully from economic of sale and create localised markets in the rural sector.

Finally, there is a stong humanitarian reason for giving highest priority to rural development. Nigeria is now enjoying an increasing Gross National Product (GNO). The utility of an increasing national income is greatest if the increase is distributed among the

poorest strata of the population. The greater the population of GNP going to low income groups, the greater the effect of the increased GNP on the general welfare. This is an abstract statement: to make it concrete, consider how much more a family with an annual cash income of N12,000 will benefit by the addition of N1000 than will a family with an annual cash income of N80,000.

In the developing countries, opportunities are wanting to achieve a significant increase in per capital income. But to achieve this result policies and strategies must be adopted to improve the balance between urban and rural growth, between the development of agriculture and that of industry.

1.4 PROBLEMS OF RURAL DEVELOPMENT IN NIGERIA

The major problems of rural development in Nigeria can be discussed as follows:-

1.3.1 AGRICULTURE AND AGRARIAN REFORMS

i) Agriculture plays a vital role in the economy of Nigeria. It is growing and providing additional employment opportunities for growth, based on the existence of expanding markets, foreign and domestic, abundance of land and human resources as yet unused; availability of improved technology. But problems also exist. A large proportion of both export and food crops comes from holding so small that they produce only marginal returns. Incentives for production are low. Bottlenecks exist in transportation and distribution. Improved seeds, fertilizers, chemicals, credit and other necessities are in short supply.

ii) One present handicap is the traditional land tenure system which does not allow for individual ownership. Land is regarded as the joint property of the community. This puts many difficulties in the way of adopting new and improved practices, which are possible only in a system of individual. Banks have been unwilling to extend loans because they do not find satisfactory collateral such as the farmers are able to offer for security.

1.4.2 RURAL MANPOWER AND UTILIZATION

How are young people prepared to enter the labour market? In Nigerian public investment in formal education forms a substantial proportion of both national and State budgets. It should therefore be a matter for concern that the educational system has so far failed to produce the beneficial results needed in a predominantly rural economy. The nation

is full of 'school leavers'. The cities are rapidly filling up with young boys and girls who have gone through primary and secondary schools, obtained a diploma, learnt irrelevant subjects, and then found that no one wants to hire them to put into practice what they have learnt. This is clearly a matter of concern since over 70 percent of the population live in rural areas.

For a successful rural development, we need a radical re-thinking of current attitudes to education and a basic revision of curriculum. We need a new curriculum which will provide for rural as well as for urban children, and will lead to the highest educational levels for all students capable of reaching them. This reconstruction will be a major task.

1.4.3 RURAL LEADERSHIP

The success of a rural development programme does not depend on material resources alone. The human element is equally important. However desirable a given change, it will fail if it is arbitrarily imposed upon someone unwilling to accept it. A man ready for change only when he himself is convinced that he has a problem, and that he will have some share in solving it. Mature and able leadership in rural programmes is one of the best ways of bringing about this happy result.

The leader, known to and having influence with those whose life he wishes to improve, can indicate the direction of a proposed change, make clear its objectives and values, and involve those it affects in bringing it about. He can also pass on the wishes of the local people to high government officials. He can serve on programme planning or advisory committees or on task forces, and take part in voluntary organisations or service clubs. In all these activities, he will continually be creating wider and wider bases of support for the programmes.

1.5.0 STRATEGIES FOR RURAL DEVELOPMENT

Many developing countries including Nigeria, have tried to solve the problems of rural poverty and neglects in a number of ways, such as those highlighted below:-

1.5.1 COMMUNITY DEVELOPMENT

This term gained prominence during the colonial era when social welfare officers tried, by stimulating self help, to improve health, nutrition, and general community welfare. Its major objective was social development and most of its activities were geared towards social problems, such as juvenile delinquencies. Later the objective changed from social to community development. Properly understood community development can have a vital role

to play. The term *con* notes that the people themselves exert their own efforts, joining with governmental authorities, to improve their economics, social, and cultural conditions.

The effectiveness of a community development programme will depend largely on the extent to which government encourages local planning and participation. Integration and coordination are other features essential for success in community development. This strategy is fundamentally educational, political and sociological. Its greatest value is that it is well suited for new programmes among people who need them. But to be successful it can not work alone. In carrying out these programmes, it must rely on expertise from other agencies, and at this level, up to now, its programmes have generally floundered and fallen victim to various bureaucratic rivalries.

1.5.2 AGRICULTURAL EXTENSION

An agricultural extension programme deals directly with the improvement of agriculture. Its prime objective is to help farmers increase production by persuading them to adopt improved technical practices, to develop skills, knowledge, and attitudes favourable to change in the farmers and their families. It enables them to benefit from research and technology, and its ultimate aim is to raise their efficiency and thus achieve a higher level of living. Demonstration plots and model farms are frequently used as teaching devices.

1.5.3 INTEGRATED RURAL DEVELOPMENT

This is a recent strategy, but it is generally gaining ground in many countries, in contrast to former approaches. It is based on the premise that a combination of factors - not only the right technology and education, but also access to physical inputs and attractive markets is essential to get agriculture moving. The very concept of rural development demands an integrated, not an isolated or fragmentary application of knowledge and skills of all the relevant national services.

In other words, integrated rural development means a multi-purpose approach, as contrasted with the single purpose rural extension programmes. In this view programme of agriculture education and training, health and nutrition, rural electrification, cooperatives and the like must not be conceived in isolation.

Integrated rural development combines active participation of the people concerned with the establishment of an efficient institution and of administrative facilities supplying effective communication at all levels.

1.6.0 SIGNIFICANCE OF THE STUDY

The research aimed at helping the government and the citizen of Nigeria in improving the standard of living by finding ways to bring down the prices of agricultural commodities. The purpose of this project is:-

- i) To improve the standard of living in Katsina State and the country at large, such that the government will be able to control the prices of the agricultural products. Though efforts being made to control prices by some of the previous governments have prove abortine due to lack of proper planning. Thus, it is the researchers hope that the outcome of this write-up will help the authority concerned to know the rate at which the prices has been varying year to year.*
- ii) The research will also enable the government to know the measure to take into considerations in order to bring down the prices of fertilizer and agro-chemicals, so that the prices of agricultural commodities will naturally come down by itself.*

1.7.0 AIMS AND OBJECTIVE

The general belief is that Agricultural products are the most essential commodities in whenever one found himself. Therefore, it has a significant effect both on industries in terms of raw materials and community in term of food consumption.

- i) One of the main aims is to analyse the prizes of certain agricultural commodities in Katsina State with particular reference to maize, mullet, guinea-corn, groundnut and rice.*
- ii) Moreover the aim is to determine the rate of variation in prices of some commodities within a given period on yearly basis.*

1.8.0 LIMITATIONS

- (i) This project is limited to Katsina State of Nigeria due to time and financial constraints. But the data used from 1992 to 1996 covered all the 34 local governments in the State.*
- (ii) Also the project is limited to the following commodities; maize, millet, guinea-corn, groundnut and rice among other varieties of commodities produced in the state with the hope that these will give a fair result that will enable appropriate action to be taken by the authority concerned despite its limited scope.*

Besides, the result of this study could serve as an insider to future surveys on this or similar subjects.

CHAPTER TWO

RURAL DEVELOPMENT PROJECTS AT KATSINA AGRICULTURAL AND RURAL DEVELOPMENT AUTHORITY

2.1 INTRODUCTION:-

The Katsina State Agricultural Development Project (KTARDA) was created in may, 1988 as a result of the bifurcation of the former Kaduna State Agricultural Development Project(KADP) being jointly founded by the World Bank, the Federal Government and the State government. In July, 1989, the Katsina State Farmers Supply Company was merge with the then Katsina State Agricultural Development (project to create Katsina State Agricultural and Rural Development Authority(KTARDA). The principal aim of the Authority is to increase food production and farm income of mostly small scale farmers who form the majority, with Katsina State Farmers Supply Company (FASCOKT) as its commercial wing which is responsible for sale and distribution of Agricultural inputs.

The World Bank loan was initially to end in December 1993 but due to some important uncompleted projects which needed completion, it was extended to December 1994 it left a mass of rural infrastructure, a considerable large number of trained personnel and numerous potential small scale farmers who could not hide their urge for more and regular flow of appropriate technical information production packages and other logistical support for a sustainable incremental food production and farm incomes. In order to achieve these and in live with the National Development goals, and objectives, the Katsina State Government recognized the need to sustain the tempo created by the demised projects and approved negotiation for two bridging loans, the National Agricultural Technology Support Project (NATSP) and National Fadoma Development Project (NFDP).

2.2.0 GENERAL OBJECTIVES

2.2.1 *To increase food production of major rained and Fadoma Crops, farms incomes and living standards of mostly small scale farmers.*

2.2.2 *The principal aim of the two loans is field based ie. the small scale farmers and his farm through a systematic improvement of the quality and effectiveness of research and extension services for the benefit of some 500,000 resource poor farmers. In order to achieve this objective the following areas will be interviewed among others:-*

(a) *Strengthening the technology development and flow system through the newly established Research Extension Farmers input linkage apparatus so as to increase farmers participation, quality of feedback to and from researchers and a higher adoption rate.*

(b) *Integrate non-crop subsector into the farming system e.g Livestock, Fisheries, Agro-Forestry, Soil Conservation and off-farm gender specific activities.*

(c) *Exploit and support the development of animal drawn implements and their use on post planting operation to allenate labour problem.*

(d) *Support the formation and grooving of farmers groups for both male and female farmers to facilitate input procurement, marketing of farm produce and rearing of small ruminants poultry rabbits and dry season farming for both male and female farmers.*

(e) *Privatise the seed multiplication progamme through selected out - growers.*

(f) *Promote use of improved, simple and low cost technologies.*

(g) *Privatise drilling activities (200 tube wells and 200 wash bores) and support other State and Federal institution on Fadoma Development in the State.*

(h) *Improve inigation management through water users assoation.*

(i) *Support the planning, monitarng and evaluation unit by raising its capacity to facilitate co-ordination of project work plans, Data Collection and Processing for monitarng progress of implementation and impact studies and evaluation.*

(j) *Support Human resources development department for staff in service training at all level.*

(k) *Support management and financial administration.*

2.2.0 **ORGANISATIONAL STRUCTURE**

The Katsina State Agriculture and Rural Development Authority has its Headquarters at Katsina and is composed of three zones as follows:-

<i>ZONES</i>	<i>LOCAL GOVERNMENTS</i>	<i>HEADQUATERS</i>
<i>Zone I</i>	<i>Daura, Mashi, Mani, Katsina, Katsina, Kaita, Jibia, Rimi, Batagarawa, Bindawa, Zango, and Mai'adua.</i>	<i>Ajiwa</i>
<i>Zone II</i>	<i>Malumfashi, Kankara, Bakori, Funtua, Faskari, Kafur, and Danja.</i>	<i>Funtua</i>
<i>Zone III</i>	<i>Dutsinma, Safana, Batsari, Ingawa, Musawa, Kankia, Kurfu, and Matazu.</i>	<i>Dutsinma.</i>

(The total area covered is 2.3 million Ha. or 23,662 Km square) At the headquarters,

there are seven departments with identical ones at the zonal level and these are as follows:-

- 1. Agricultural Services*
- 2. Water Development*
- 3. Planning, Monitoring and Evaluation*
- 4. Human Resource Development*
- 5. Engineering Services*
- 6. Administration*
- 7. Finance and Supply.*

2.3.0 MAIN ACTIVITIES OF THE DEPARTMENTS

2.3.1 Agricultural Services Department :

The activities of the agricultural services department include the following:-

- (a) Strengthening the technology development flow system.*
- (b) To strengthen the media unit to complement and supplement the effort of (FNT) through Radio and Television.*
- (c) To reactivate the mobile training unit.*
- (d) Setting up an agricultural projects liaison committee to discuss issues of mutual cooperation, streamline extension activities and minimise parallel operation.*
- (e) To integrate non-crop subsector into the farming system e.g livestock, fisheries, agro-forestry, soil conservation and off-farm gender specific activities.*
- (f) To exploit and support the development of animal drawn implements and their uses.*
- (g) To privatise and supervise the seed multiplication programme through selected out growers.*
- (h) To support formation of farmers group for both males and females farmers to facilitate into procurement, marketing of farm produce and rearing of small ruminant animals.*

- (i) To conduct research activities in Crops, Livestock, Fisheries, Agro-Forestry, and farm mechanisation.

2.3.2 WATER DEVELOPMENT DEPARTMENT

The functions of the water development department includes:-

- (a) Drilling of Tubewells and Washbores.
- (b) Formation of Fadoma Users Association.
- (c) Construction of go-downs i.e Shades, Stores, access roads etc.
- (d) Construction of boreholes fitted with hand pumps, solar powered and windmills.
- (e) Construction of Concrete open wells to be used directly by the rural people.
- (f) Construction of earth dams for people and animals.

2.3.3 PLANNING, MONITORING AND EVALUATION DEPARTMENT

This department is vested with the following activities:-

- (a) Preparation of annual work plans and budgets.
- (b) Monitoring Projects Progress.
- (c) Monitoring allocation and use of inputs.
- (d) Conducts Special Studies on project activities.
- (e) Carry out Core Surveys which include:-
 - (i) Village Listing Survey.
 - (ii) Large Scale reconnaissance Survey
 - (iii) Crop and Area yield Survey
 - (iv) Market Price Survey
 - (v) Rainfall data Collection
 - (vi) Dry Season Farming Survey

2.3.4 ADMINISTRATION DEPARTMENT

The administration department perform the following activities:-

- (a) Establishment, grievances and disciplinary matters
- (b) Secretariat Services to the Various Committee
- (c) Security and Insurance to the Authority Properties
- (d) Allocation and Control of Vehicles
- (e) Co-ordination of Procurement and Supply of house/office equipments, stationaries/furnitures

- (f) *Maintainance of personal records*
- (g) *Operation of staff clinic and welfare services*
- (h) *Promotion industrial relation between the employee and the employer*
- (i) *Liason with relevant bodies outside organisation*
- (j) *Legal matters including various contractual obligations.*

3.35 **FINANCE AND SULLY DEPARTMENT**

The finance and supply department perform the following activities:-

- (a) *Preparation of budget and budgetary control, i.e to regulate the capital and recurrent expenditure*
- (b) *Reconciliation of bank account and zonal current account*
- (c) *Preparation and payment of monthly salaries and wages as well as bills and other charges*
- (d) *Preparation of monthly, quartely and annual report including of monitoring of IBRD, FGN and KTSG finances*
- (e) *Inssuance of good received Note and Store issue voucher for any incoming goods and out going goods.*
- (f) *Physical security of the store*
- (g) *Diversified control of stock ordering and usage*
- (h) *Careful decumentation of all stock movement and stock levels*
- (i) *Sourcing of both local and foreign supplies of goods and contractors for works*
- (j) *Preparing procurement plans, consultances service and Bid documennt for international and local tenders*
- (k) *Placing international and local purchased orders, as well as job orders*
- (l) *Liasing with othjer department in preparing technical preparation for contract both local and international*
- (m) *Conduct market survey for both prices of goods and works to be carried out by the authority*

3.3.6 **ENGINEERING SERVICES DEPARTMENT**

This department is responsible for the following activities in the authority:

- (a) *Maintanance of feeder roads.*
- (b) *Repairs and maintanance of all service vehicles and plant/equipment*

- (c) *Renovation and rehabilitation of all buildings*
- (d) *Formation of construction unit*
- (e) *Fabrication and demonstration of proto-type machines and implements*
- (f) *Strengthening linkage with agricultural services department in the field of farm mechanisation*
- (g) *Development of animal drawn implements.*

2.3.7 HUMAN RESOURCES DEVELOPMENT DEPARTMENT

The Human resources development department is vested with the following activities.

- (a) *Organising and participation in appropriate training programme*
 - i. *Short-term Courses (in-house, off-project-in-country and overseas).*
 - ii. *Long term Courses*
 - iii. *Special training for extension staff*
 - iv. *Animal praction training*
 - v. *Succession training e.t.c*
- (b) *Formulating man power development programme*
 - i. *Evaluation of training*
 - ii. *Youth development programme*
 - iii. *Production of animal training plan e.t.c*
- (c) *Running and maintenance of training centres*
- (d) *Training materials producion*
- (e) *Strengthening Headquarters training centres.*

2.4.0 GENERAL ACHIEVEMENTS

The general achievements of the authority includes:-

2.4.1 CONSTRUCTION WORKS:- *The authority has constructed the following:-*

- (a) *1 number Headquarter complex*
- (b) *45 number Senior staff quarters*
- (c) *105 number Intermediate staff quarters*
- (d) *45 number Junior staff quarters*
- (e) *1 number light vehicle workshop*
- (f) *4 number multipurpose store*

- (g) 5 number Rural feeder roads - 457.4 km
- (h) 5 number Rehabilitation roads - 102 km
- (i) 5 number Maintained roads - 187 km
- (j) 560 number Draining Culverts
- (k) 60 number soil conservation structures
- (l) 8 Earth dams
- (m) 215 open wells
- (n) 466 Boreholes
- (o) 1002 Tubewells
- (p) 1200 Washbores
- (q) 2 Animal traction training centres
- (r) 12 Fortnightly training centres
- (s) 1 Seed processing plant
- (t) 6 Fish culture ponds

2.4.2 ESTABLISHMENTS

The authority has established the following:-

- (a) 3 Administrative Zones with management
- (b) 6 sub-zonal Area offices
- (c) 57 extension Supervisors areas
- (d) 512 extension Circles/cells
- (e) 200 Co-operative Societies
- (f) 56 Fadama User Associations
- (g) 16 Outgrower farmers
- (h) 6 Mango growers farmers
- (i) 27 Shelter Belts (30' x 2000')
- (j) 63064 Wind breaks/Boundary
- (k) 69 Wood lots (3-5 hecteres)
- (l) 15 Fishermen co-operative association
- (m) 3 Pasture fields (50 Hc)
- (n) 10 Nurseries for raising seedlings across the State.

2.4.3 SURVEYS, SHOWS, VISITS AND COURSES

The authority has conducted the following:-

- (a) 50,000 farm visits
- (b) 96 field days
- (c) 46 Farmers tour
- (d) 2 Agricultural shows
- (e) 26 Mobile film shows
- (f) 36 Economical/Ecological Surveys
- (g) 200 Pasture Trails
- (h) 9354 Short term courses (in-house and off project)
- (i) 197 long term (OND/HND/PGD and Degree)
- (j) 207 Certificates
- (k) 36 Overseas training programmes e.t.c

2.4.4 PRODUCTIONS

The KTARDA has made the following productions:-

- (a) 3363476 Forest tree Seedlings
- (b) 275903 Fruits tree Seedlings
- (c) 20,000 Bales
- (d) 6 Newsletter Magazines
- (e) 205 Naduke weekly TV programme
- (f) 220 Kartau Sarkin Noma weekly Radio programme

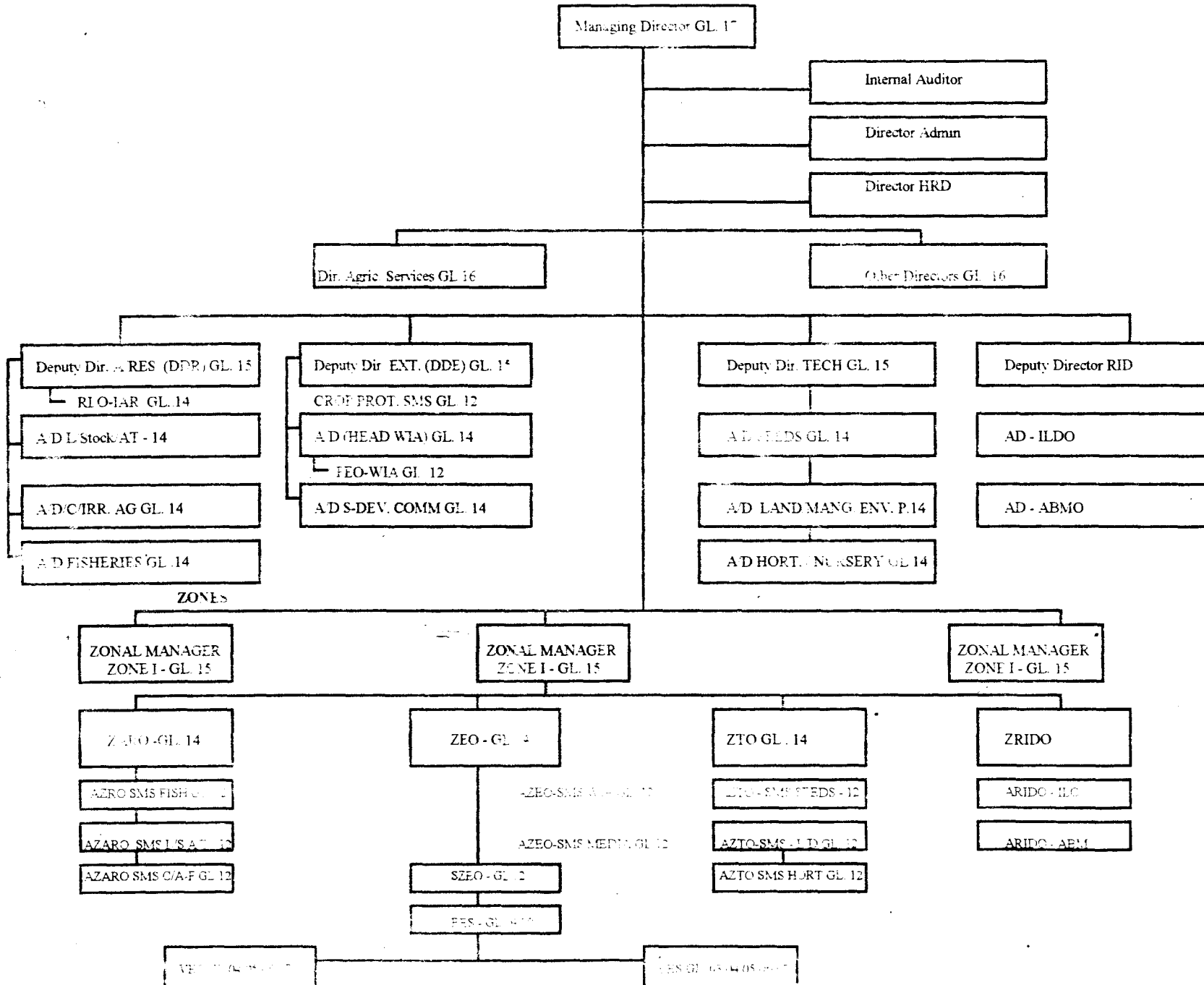
2.4.5 INTRODUCTIONS

The authority has introduced the following:-

- (a) 20 different livestock supplementary feed e.g porcoses, Urea, malasses, feed-block, Lab-lab, Stylo, Gamba, (Bales Kalgo/Gawo powder) etc.
- (b) 10 Local herbs for local Pest Control measures e.g Dilo leaves, Doddoya leaves, Gogamasu, Gwandar daji leaves and Duman Rafi leaves.
- (c) 2 different species of Vertica Grass for Biological control (Soil Conservation)
- (d) Various species or namentals for beautification e.g Bongobolia e.t.c
- (e) Various fish Culture Ponds for Small Scale farmers.

3.4 ORGANISATIONAL CHART

HEADQUARTERS



CHAPTER THREE

STATISTICAL ANALYSIS AND COMMODITIES' PRICES

3.1 ANALYSIS OF VARIANCE (Comparison of more than two Samples).

The appropriate procedure for testing the quality of several means of observation is the analysis of variance. It is probably the most useful technique in the field of statistical inference.

To determine whether 2 samples differ significantly, the F and T-test are more appropriate for such a statistical test. Whenever, there are more than two samples, these methods are unapplicable, and a different technique called analysis of variance is used instead.

3.1.2 ONE - WAY ANALYSIS OF VARIANCE.

This method should be used whenever there or more sets of readings are to be compared. First the mean value for each set of reading is calculated. Next the deviations (errors) for each set of readings are calculated as (reading - sample mean). Then the error square are summed, and the variances (of the errors) is evaluated by dividing the sum of errors squared by the number of degrees of freedom (number of degrees of freedom is equal to the total number of readings minus (-) the number of sets).

The grand mean of all the values is calculated from the sum of the values divided by the number of values. The residuals between the sample means and the grand mean are evaluated, and the sum of their squares is collected and variance of the sample means. subsequently, the F ratio is calculated as :

$$F = \frac{\text{Mean square for variance between sets}}{\text{Variance of the error.}}$$

3.2 ANALYSIS OF VARIANCE FOR THE PRICES OF MAIZE

For example, to compare the prices of maize during the years as per the data in appendix II. The mean for each of the years is computed as follows:-

For 1983,

$$\begin{aligned} \bar{x} &= \frac{\sum x_i}{n} \\ \bar{x} &= \frac{212+210+242+\dots+355+386}{12} = 301.33 \end{aligned}$$

For 1984,

$$\bar{x} = \frac{388+434+608+\dots+654+738}{12} = 728.17$$

For 1985.

$$\bar{x} = \frac{722+692+722+\dots+361+335}{12} = 608.75$$

For 1986.

$$\bar{x} = \frac{328+722+390+\dots+338+315}{12} = 444.67$$

For 1987.

$$\bar{x} = \frac{315+694+367+\dots+510+510}{12} = 459.08$$

Now we calculate the deviations (readings-sample mean) i.e $X - \bar{x}$ and this gives the following:

	JR	FB	MC	AP	MY	JN	JL	AG	ST	OT	NB	DB
1992	-89.33	-91.33	-59.33	-57.33	16.33	34.67	49.67	26.67	-1.33	35.67	83.67	84.67
1993	340.17	294.17	120.17	89.83	101.17	66.83	449.83	241.83	130.83	-59.17	-74.17	9.83
1994	113.25	83.25	113.25	85.25	151.25	182.25	162.25	104.25	216.75	256.75	247.75	275.75
1995	116.67	-76.67	-54.67	-21.67	32.33	76.33	80.33	51.33	21.33	109.67	106.67	129.67
1996	144.08	134.08	92.08	110.08	-66.08	-24.08	84.92	-55.08	9.92	59.92	50.92	50.92

TABLE 1.0

Then the squared deviation are calculated as $(X-\bar{x})^2$ and gives the following table.

DEVIATION SQUARED

MONTH	1992	1993	1994	1995	1996
JAN.	7979.85	115715.60	12825.56	13611.89	20759.05
FEB.	8341.17	86536.00	6930.56	5878.29	17977.45
MARCH	3520.05	14440.83	12825.56	2988.81	8478.73
APRIL	3286.73	8069.43	7257.76	469.59	12117.61
MAY	266.67	10235.37	22876.56	1045.23	4366.57
JUNE	1202.01	4466.25	33215.06	5826.27	579.85
JULY	2467.11	202347.00	26325.06	6452.91	7211.41
AUG.	711.29	58481.75	10868.06	2634.77	3038.81
SEPT.	1.77	17116.49	46980.56	454.97	98.41
OCT.	1272.35	3501.09	65920.56	12027.51	3590.41
NOV.	7000.67	5501.19	61380.06	11378.49	2592.85
DEC.	7169.01	96.63	74939.06	16814.31	2592.85

TABLE 2.0

$$\begin{aligned} \text{Sum of deviation Squared} &= \\ &= 7979.85 + 8341.17 + 3520.05 + \dots + 2592.85 + 2592.85 = 1208562.30 \\ v_2 \text{ (degree of freedom)} &= 60 - 5 = 55 \\ \therefore \text{the Variance of the error} &= \frac{\text{Sum of deviation squared}}{\text{Number of degree freedom}} \\ &= 1208562.30 / 55 \\ &= 21973.86 \end{aligned}$$

To Calculate the grand mean, we have,

$$\begin{aligned} \text{Grand mean} &= \frac{n \times 1 + n \times 2 + n \times 3 + n \times 4 + n \times 5}{N} \\ &= \frac{(301.33 \times 12) + (728.17 \times 12) + (608.75 \times 12) + (444.69 \times 12) + (459.08 \times 12)}{60} \\ &= \frac{30504}{60} = 508.4 \end{aligned}$$

To Calculate the residuals between the sample mean and Grand mean, we proceed as follows:-

	<i>Residual for the years are</i>	<i>Residual Squared</i>	<i>Residual Sqd x 12</i>
1992	301.33 - 508.40 = -207.07	42877.98	514535.82
1993	728.17 - 508.40 = 219.77	48298.85	579586.23
1994	608.75 - 508.40 = 100.35	10070.12	120841.47
1995	444.67 - 508.40 = -63.73	4061.51	48738.15
1996	459.08 - 508.40 = -49.32	2432.46	29189.55
			1292891.23

Table 3.0

∴ The sum of the residual Squared Calculated above/the number of degree of freedom, we obtain the mean square for the Variance between years as

$$v_1 = 5 - 1 = 4$$

$$\therefore \text{Mean Square for Variance between year} = \frac{1292891.23}{4} = 323222.81$$

Then the ratio of the mean square for between years variance to the mean square for the within years variance is given by

$$\begin{aligned} F &= \frac{\text{Variance for the mean square between years}}{\text{Variance for the mean square within years}} \\ &= \frac{323222.81}{21973.86} = 14.71 = 15 \end{aligned}$$

3.3 ANALYSIS OF VARIANCE FOR THE PRICES OF MILLET

For 1992,

$$\bar{x} = \sum xi/n$$

$$\bar{x} = \frac{285+276+280+---+403+417}{12} = 320.42$$

For 1993,

$$\bar{x} = \frac{434+468+642+---+962+958}{12} = 836.08$$

For 1994,

$$\bar{x} = \frac{996+981+992+---+419+374}{12} = 787.42$$

For 1995,

$$\bar{x} = \frac{421+376+405+---+331+344}{12} = 376.50$$

For 1996,

$$\bar{x} = \frac{345+365+368+---+529+529}{12} = 435.00$$

DEVIATIONS FROM THE MEAN

	JR	FB	MC	AP	MY	JN	JL	AG	ST	OT	NB	DB
1992	-35.42	-44.42	-40.42	-31.42	-8.42	-7.42	3.58	-18.42	-47.42	50.58	82.58	96.58
1993	402.08	-368.08	-194.08	69.92	-157.08	-65.08	346.92	205.92	189.92	125.92	125.92	121.58
1994	298.58	198.58	204.58	129.58	212.58	230.58	231.58	106.58	-334.42	-401.42	-368.42	-413.42
1995	44.50	0.50	28.50	12.50	3.50	16.50	51.50	26.00	-37.5	-67.56	-45.50	-32.50
1996	90.00	-70.00	-67.00	-71.00	-104.00	-83.00	54.00	80.00	46.00	117.00	94.00	94.00

TABLE 4.0

DEVIATION SQUARED

MONTH	1992	1993	1994	1995	1996
JAN.	1254.58	161668.33	43505.62	1980.25	8100.00
FEB.	1973.14	135482.89	37473.22	0.25	4900.00
MARCH	1633.78	37667.05	41852.98	812.25	4489.00
APRIL	987.22	4888.81	16790.98	156.25	5041.00
MAY	70.90	24674.13	45190.26	12.25	10816.00
JUNE	55.06	4235.41	53167.14	272.25	6889.00
JULY	12.82	120353.49	53629.30	2652.25	2916.00
AUG.	339.30	42403.05	11359.30	702.25	6400.00
SEPT.	2248.66	36069.61	111836.74	1406.25	2116.00
OCT.	2558.34	1585585	161138.02	4556.25	13689.00
NOV.	6819.46	15855.85	135733.30	2070.25	8836.00
DEC.	9327.70	14864.49	170916.10	1056.25	8836.00

TABLE 5.0

Sum of deviation Squared

$$= 1254.58 + 1973.14 + 1633.78 + \dots + 13689 + 8836 + 8836$$

$$= 1622597.88$$

$$v_2 \text{ (degree of freedom)} = 60 - 5 = 55$$

\therefore the Variance of the error = $\frac{\text{Sum of deviation squared}}{v_2}$

$$= 1622597.88/55$$

$$= 29501.78$$

$$\text{Grand mean} = \frac{n \times 1 + n \times 2 + n \times 3 + n \times 4 + n \times 5}{N}$$

$$= \frac{(320.42 \times 12) + (836.08 \times 12) + (787.42 \times 12) + (376.50 \times 12) + (435.00 \times 12)}{60}$$

$$= 33065.04/60 = 551.08$$

RESIDUAL BETWEEN SAMPLE AND GRAND MEAN

	<i>Residual for the years</i>	<i>Residual Squared</i>	<i>Residual Sqd x12</i>
1992	$320.42 - 551.08 = -230.66$	53204.04	638448.48
1993	$836.08 - 551.08 = 285.00$	81225.00	974700.00
1994	$787.42 - 551.08 = 236.34$	55856.60	670279.20
1995	$376.50 - 551.08 = -174.58$	30478.18	365738.16
1996	$435.00 - 551.08 = -116.08$	13474.57	161694.84
			2810860.68

TABLE 6.0

$$v_1 = 5 - 1 = 4$$

$$\therefore \text{Mean Square for Variance between year} = \frac{2810860.68}{4} = 702715.17$$

$$F = \frac{\text{Variance for the mean square between years}}{\text{Variance for the mean square within years}}$$

$$= 702715.17/29501.78 = 23.82$$

3.4 **ANALYSIS OF VARIANCE FOR THE PRICE OF GROUNDNUT**

$$\bar{x} = \sum xi/n$$

For 1992,

$$\bar{x} = \frac{387+420+421+\dots+514+584}{12} = 490.5$$

For 1993,

$$\bar{x} = \frac{741+910+1035+\dots+1037+1149}{12} = 1127.67$$

For 1994,

$$\bar{x} = \frac{862+922+991+\dots+807+814}{12} = 860.42$$

For 1995,

$$\bar{x} = \frac{1226+1173+2053+\dots+826+908}{12} = 1219.83$$

For 1996,

$$\bar{x} = \frac{896+954+1009+\dots+746+746}{12} = 1005.25$$

DEVIATION FROM THE MEAN

MONTH	1992	1993	1994	1995	1996
JAN.	-103.5	-386.67	1.58	6.17	-109.25
FEB.	-70.5	-217.67	61.58	-46.83	-51.25
MARCH	-69.5	-92.67	130.58	833.17	3.75
APRIL	-93.5	36.33	23.58	79.17	-30.25
MAY	-24.5	19.33	156.58	76.17	-86.25
JUNE	-18.5	70.33	-50.42	813.17	28.75
JULY	121.5	217.33	86.58	-44.83	432.75
AUG.	255.5	215.33	25.58	-145.83	359.75
SEPT.	-40.5	215.33	-153.42	-329.83	183.75
OCT.	-73.5	-79.67	-182.42	-534.83	-213.25
NOV.	-23.5	-90.67	-53.42	-393.83	-259.25
DEC.	93.5	21.33	-46.42	-311.83	-259.25

TABLE 7.0

DEVIATION SQUARED

MONTH	1992	1993	1994	1995	1996
JAN.	10712.25	149513.69	2.50	38.07	11935.56
FEB.	4970.25	47380.23	3792.10	2193.05	2626.56
MARCH	4830.25	8587.73	17051.14	694172.25	14.06
APRIL	8742.25	1319.87	556.02	6267.89	915.06
MAY	600.25	373.65	24517.30	5801.87	7439.06
JUNE	342.25	4946.31	2542.18	661245.45	826.56
JULY	14762.25	47232.33	7496.10	2009.73	187272.56
AUG.	65280.25	63166.77	654.34	21266.39	129420.06
SEPT.	1640.25	63166.77	23537.70	108787.39	33764.06
OCT.	5402.25	6347.31	33277.06	286043.13	45475.56
NOV.	552.25	8221.05	2853.70	155102.07	67210.56
DEC.	8742.25	454.97	2154.82	97237.95	67210.56

Sum of deviation Squared =

$$= 10712.25 + 4970.25 + \dots + 67210.56 + 67210.56$$

$$= 3239998.54$$

$$v_2 \text{ (degree of freedom) } = 60 - 5 = 55$$

\therefore *the Variance of the error = $\frac{\text{Sum of deviation squared}}{v_2}$*

v_2

$$= 3239998.54/55$$

$$= 58909.06$$

$$\text{Grand mean} = \frac{n \times 1 + n \times 2 + n \times 3 + n \times 4 + n \times 5}{N}$$

N

$$= \frac{(490.5 \times 12) + (1127.67 \times 12) + (860.42 \times 12) + (1219.83 \times 12) + (1005.25 \times 12)}{60}$$

$$= 56444.04/60 = 940.73$$

RESIDUAL BETWEEN SAMPLE AND GRAND MEAN

	<i>Residual for the years</i>	<i>Residual Squared</i>	<i>Residual Sqd x12</i>
1992	$490.50 - 940.73 = -450.23$	202707.05	2432484.60
1993	$1127.67 - 940.73 = 186$	34946.56	419358.72
1994	$860.42 - 940.73 = -80.31$	6449.70	77396.40
1995	$1219.83 - 940.73 = 279.10$	77896.81	934761.72
1996	$1005.25 - 940.73 = 64.52$	4162.83	49953.96
			3913955.40

TABLE 9.0

$$v_1 = 5 - 1 = 4$$

$$\underline{\underline{z}} = \text{Mean Square for Variance between year} = \frac{3913955.4}{4} = 978488.85$$

$$F = 978488.85/58909.06$$

$$= 16.61$$

3.5 ANALYSIS OF VARIANCE FOR THE PRICES OF RICE

$$\underline{\underline{z}} = \sum xi/n$$

For 1992,

$$\underline{\underline{z}} = \frac{494+570+532+---+664+655}{12} = 589.17$$

For 1993,

$$\underline{\underline{z}} = \frac{577+654+1010+---+609+728}{12} = 936.42$$

For 1994,

$$\underline{\underline{z}} = \frac{1072+1111+981+---+858+941}{12} = 1110.92$$

For 1995,

$$\underline{\underline{z}} = \frac{1109+1083+1079+---+1094+1360}{12} = 1176.00$$

For 1996,

$$\underline{\underline{z}} = \frac{1323+1314+1411+---+1772+1772}{12} = 1525.67$$

DEVIATION FROM THE MEAN SQUARED

MONTH	1992	1993	1994	1995	1996
JAN.	-95.17	-359.42	-38.92	13.00	-202.67
FEB.	-19.17	-282.42	0.08	-93.00	-131.67
MARCH	-57.17	73.58	-129.92	-97.00	-114.67
APRIL	-8.17	385.58	81.08	-124.00	212.67
MAY	-26.83	-56.42	91.08	-121.00	-128.67
JUNE	-22.17	-162.42	204.08	45.00	-29.67
JULY	52.83	534.58	237.08	192.00	252.33
AUG.	42.83	356.58	146.08	258.00	424.33
SEPT.	35.83	327.58	5.08	-115.00	39.33
OCT.	-97.17	-281.42	-172.92	-60.00	-388.67
NOV.	74.83	-327.42	-252.92	-82.00	246.33
DEC.	65.83	-208.42	-169.92	184.00	246.33

TABLE 10.0

DEVIATION SQUARED

MONTH	1992	1993	1994	1995	1996
JAN.	9057.33	129182.74	1514.77	169.00	41075.13
FEB.	367.48	79761.06	0.01	8649.00	17336.99
MARCH	3268.41	5414.02	16879.21	9409.00	13149.21
APRIL	66.75	148671.94	6573.97	15376.00	45228.53
MAY	719.85	3183.22	8295.57	14641.00	16555.97
JUNE	491.51	26380.26	41648.65	2025.00	880.31
JULY	2791.01	285775.78	56206.93	36864.00	63670.43
AUG.	1834.41	127149.30	21339.37	66564.00	180055.95
SEPT.	1283.79	107308.66	25.81	13225.00	1546.85
OCT.	944.01	79197.22	29901.33	3600.00	151064.37
NOV.	5599.53	107203.86	63968.53	6724.00	60678.47
DEC.	4333.59	43438.90	28872.81	33856.00	60678.47

Sum of deviations Squared

$$= 9057.33 + 367.48 + 3268.41 + \dots + 60678.47 + 60678.47$$

$$= \underline{2311574.27}$$

$$v: (\text{degree of freedom}) = 60 - 5 = 55$$

$$\therefore \text{the Variance of the error} = 2311574.27/55$$

$$= \underline{42028.62}$$

$$\therefore \text{Grand mean} = (589.17 \times 12) + (936.42 \times 12) + (1110.92 \times 12) + (1176 \times 12) + (1525.67 \times 12)/60$$

$$= 64058.16/60 = \underline{1067.64}$$

RESIDUAL BETWEEN SAMPLE AND GRAND MEAN

	<i>Residual for the years</i>	<i>Residual Squared</i>	<i>Residual Sqd x12</i>
1992	589.17-1067.64 = -478.47	228933.54	2747202.48
1993	936.42-1067.64 = -131.22	17218.69	206624.28
1994	1110.92-1067.64 = 43.28	1873.16	22477.92
1995	1176.00-1067.64 = 108.36	11741.89	140902.68
1996	1525.67-1067.64 = 458.03	209791.48	2517497.76
			5634705.12

TABLE 12.0

$$v: = 5 - 1 = 4$$

$$\therefore \text{Mean Square for Variance between year} = \frac{3913955.4}{4} = 978488.85$$

$$F = 1408676.28/42028.62$$

$$= \underline{33.52}$$

3.6 ANALYSIS OF VARIANCE FOR THE PRICES OF GROUNDNUT

$$\bar{x} = \sum xi/n$$

For 1992.

$$\bar{x} = \frac{189+186+195+---+387+368}{12} = 252.17$$

For 1993,

$$\bar{x} = \frac{372+445+620+---+945+650}{12} = 783.33$$

For 1994,

$$\bar{x} = \frac{675+675+613+---+352+273}{12} = 628.33$$

For 1995,

$$\bar{x} = \frac{300+274+280+---+336+247}{12} = 327.50$$

For 1996,

$$\bar{x} = \frac{258+267+276+---+489+489}{12} = 360.25$$

DEVIATION FROM THE MEAN SQUARED

MONTH	1992	1993	1994	1995	1996
JAN.	-63.17	-411.33	46.67	-27.50	-102.25
FEB.	-66.17	-338.33	46.67	-53.50	-93.25
MARCH	-57.17	-163.33	-15.33	-47.50	-84.25
APRIL	-48.17	86.67	87.67	-6.50	-84.25
MAY	-40.17	-177.33	167.67	-11.50	-118.25
JUNE	-24.17	-111.33	189.67	1350	-74.25
JULY	-3117	344.67	179.67	93.50	79.75
AUG.	-7.17	315.67	187.67	34.50	33.75
SEPT.	-12.17	293.67	-103.33	47.50	29.75
OCT.	98.83	132.67	-173.33	29.50	155.75
NOV.	134.83	161.67	-276.33	08.50	128.75
DEC.	115.83	-133.33	-355.33	-80.50	128.75

TABLE 13.0

DEVIATION SQUARED

MONTH	1992	1993	1994	1995	1996
JAN.	3990.45	169192.37	2178.09	756.25	10455.06
FEB.	4378.47	114467.19	2178.09	2862.25	8695.56
MARCH	3268.41	26676.69	235.01	2256.25	7098.06
APRIL	2320.35	7511.69	7686.03	42.25	7098.06
MAY	1613.63	31445.93	28113.23	132.25	13983.06
JUNE	584.19	12394.37	35974.71	182.25	5513.06
JULY	971.57	118797.41	39073.43	8742.25	6360.06
AUG.	51.41	99647.55	35220.03	1190.25	1139.06
SEPT.	148.11	86242.07	10677.09	2256.25	885.06
OCT.	9767.37	17601.33	30043.29	870.25	24258.06
NOV.	18179.13	26137.19	76358.27	72.25	16576.56
DEC.	13416.59	17776.89	126259.41	6480.25	16576.56

TABLE 14.0

Sum of deviation Squared

$$= 3990.45 + 4378.47 + 3268.41 + \dots + 16576.56 + 16576.56$$

$$= 1325022.26$$

$$v_2 \text{ (degree of freedom)} = 60 - 5 = 55$$

$$\therefore \text{The Variance of the error} = 1325022.26/55$$

$$= \underline{24091.31}$$

$$\text{Grand mean} = \frac{(252.17 \times 12) + (783.33 \times 12) + (628.33 \times 12) + (327.50 \times 12) + (360.25 \times 12)}{60}$$

$$= 28218.96/60$$

$$= \underline{470.32}$$

RESIDUAL BETWEEN SAMPLE AND GRAND MEAN

	Residual for the years	Residual Squared	Residual Sqd x12
1992	252.17 - 470.32 = -218.15	47589.42	571073.07
1993	783.33 - 470.32 = 313.01	97975.26	1175703.12
1994	628.33 - 470.32 = 158.01	24967.16	299605.92
1995	327.50 - 470.32 = -142.82	20397.55	244770.63
1996	360.25 - 470.32 = -110.07	12115.40	145384.86
			5634705.12

TABLE 15.0

$$v1 = 5 - 1 = 4$$

$$\underline{\underline{= \text{Mean Square for Variance between year} = \frac{608984.40}{4} = 25.28}}$$

$$F = \frac{608984.40}{24091.31} = \underline{\underline{25.28}}$$

$$F = \underline{\underline{25.28}}$$

•

CHAPTER FOUR

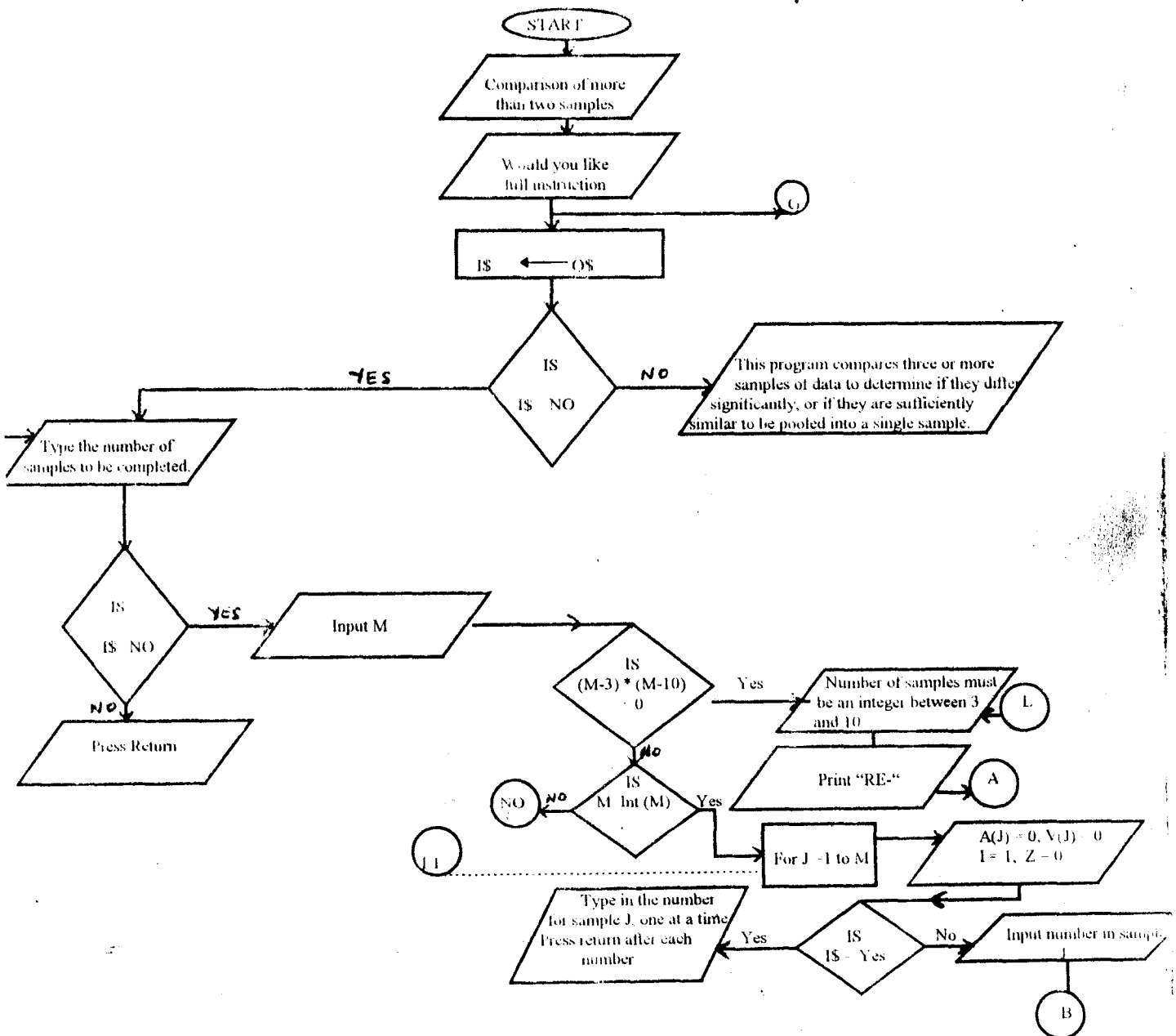
4.0 PROGRAM DESIGN AND TESTING

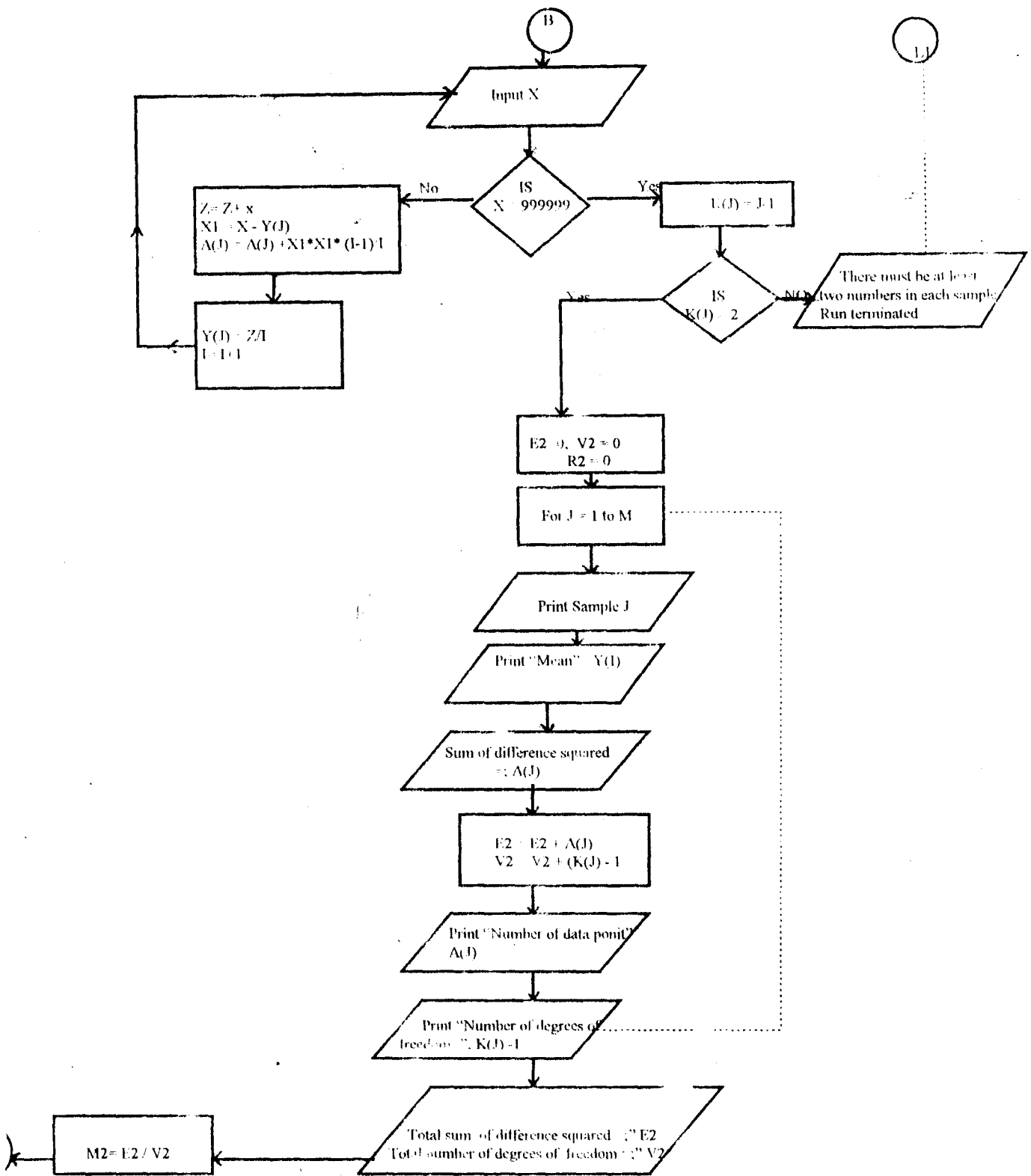
program written (appendix I) to perform the comparison of the prices of each of the selected commodities is designed and tested as in 4.1 and 4.22 through 4.25 of this chapter for proper understanding of the statistical analysis carried out in Chapter 3 of this research.

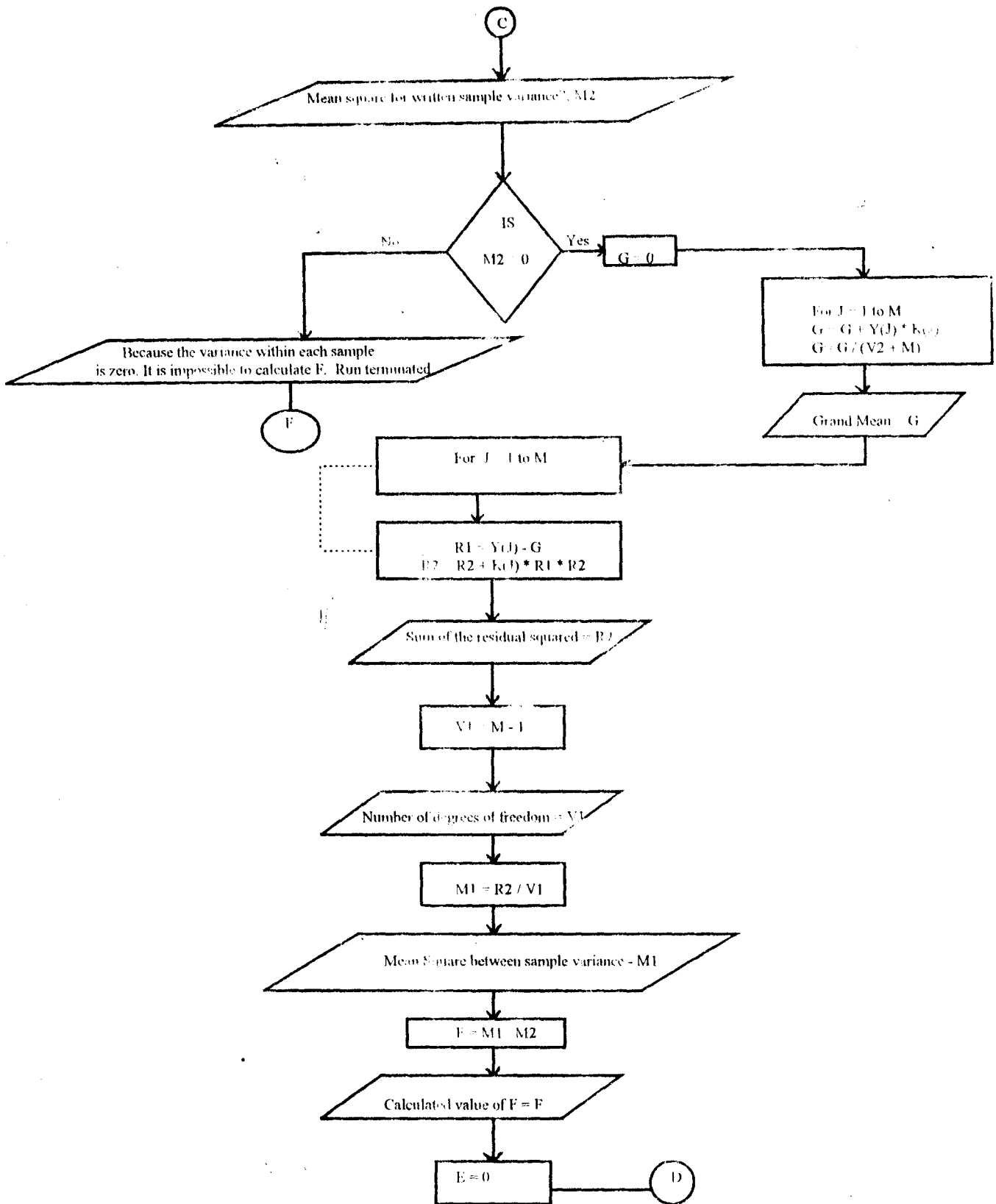
4.1 PROGRAM FLOWCHART

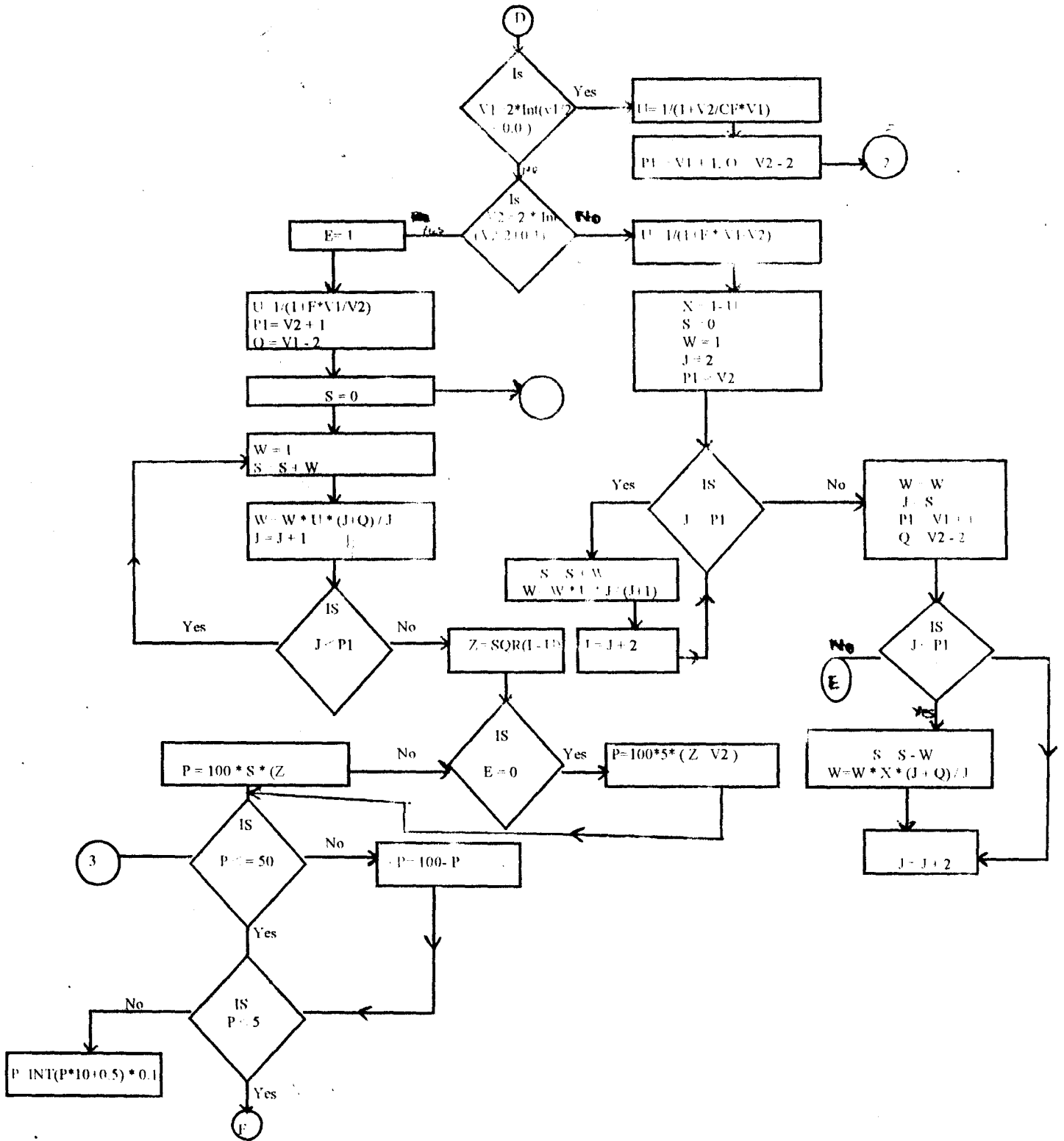
As programs become more complex, a flowchart is most helpful in planning, designing and executing a program. A flowchart is a graphical representation of an algorithm i.e., it is a visual device which gives the steps of an algorithm and also the flow of control between the various steps.

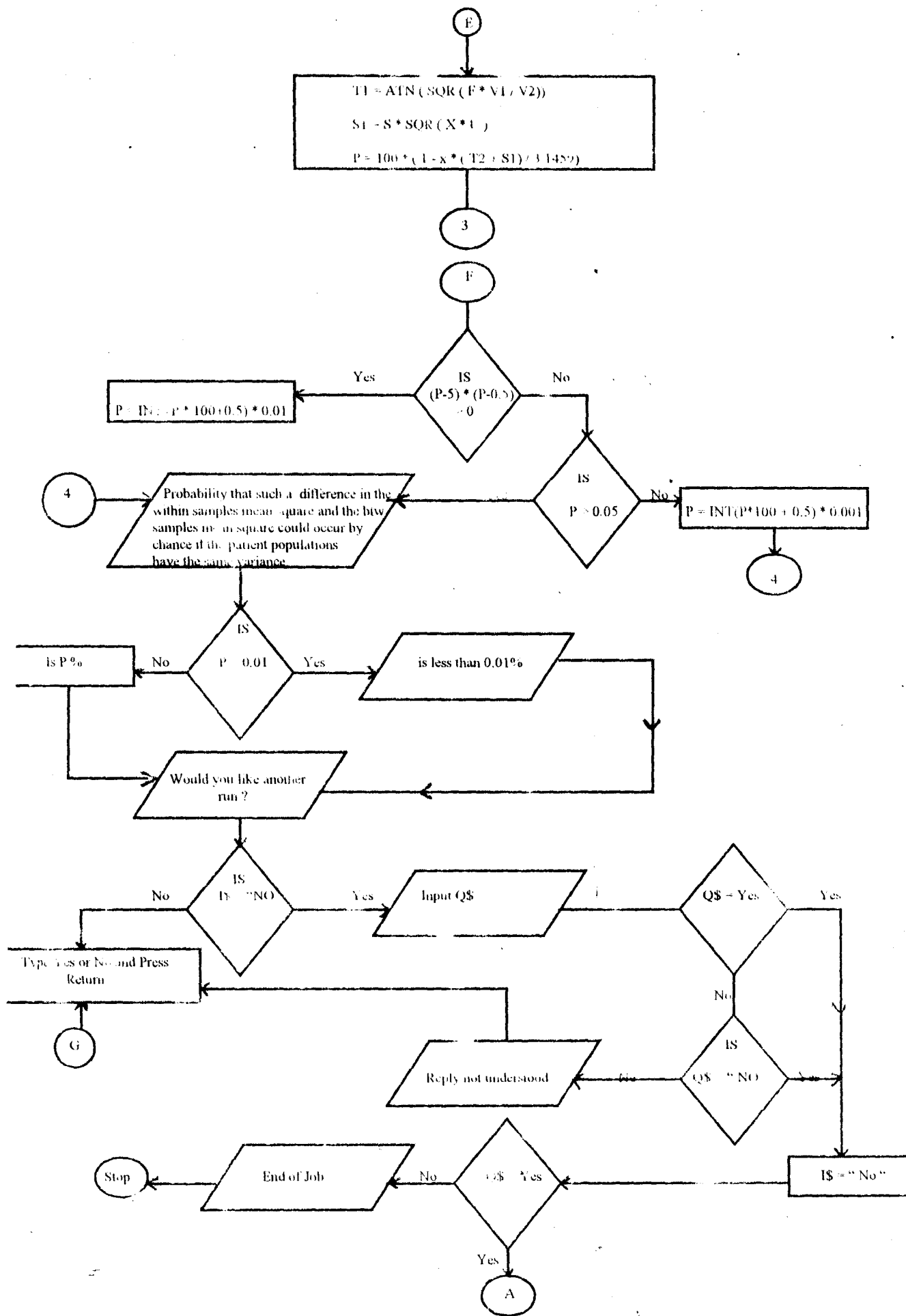
PROGRAM FLOWCHART











4.2 PROGRAM OUTPUT

The results of the computations for the selected commodities are as in section 4.2.1 through 4.2.5 with regards to the data on the prices of the commodities in appendix II of this research work.

4.2.1 COMPARISON OF MORE THAN TWO SAMPLE

MAIZE PRICES

WOULD YOU LIKE INSTRUCTION
TYPE YES OR NO AND PRESS ENTER KEY

SAMPLE 1

MEAN = 301.3333
SUM OF DIFFERENCES SQUARED = 43218.67
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 2

MEAN = 728.1667
SUM OF DIFFERENCES SQUARED = 526507.6
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 3

MEAN = 608.75
SUM OF DIFFERENCES SQUARED = 382354.3
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 4

MEAN = 444.6667
SUM OF DIFFERENCES SQUARED = 150616.7
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 5

MEAN = 459.0833
SUM OF DIFFERENCES SQUARED = 120608.9
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

TOTAL SUM OF DIFFERENCES SQUARED = 1223306
TOTAL NUMBER OF DEGREES OF FREEDOM = 55
MEAN SQUARED FOR WITHIN SAMPLE VARIANCE = 22241.93

GRAND MEAN = 508.4
SUM OF RESIDUALS SQUARED = 1292858
NUMBER OF DEGREES OF FREEDOM = 4
MEAN SQUARE FOR THE BETWEEN SAMPLES VARIANCES = 323214.6

CALCULATE VALUE OF $F = 14.53177$
PROBABILITY THAT SUCH A DIFFERENCE IN THE WITHIN SAMPLES
MEAN SQUARE AND BETWEEN SAMPLES MEAN SQUARE COULD
OCCUR BY CHANCE
IS .1369094 %

4.2.2 COMPARISON OF MORE THAN TWO SAMPLE

MILLET PRICES

WOULD YOU LIKE INSTRUCTION
TYPE YES OR NO AND PRESS ENTER KEY
REPLY '5' NOT UNDER STOOD. TYPE YES OR NO AND PRESS ENTER KEY

SAMPLE 1
MEAN = 312.0833
SUM OF DIFFERENCES SQUARED = 26330.92
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 2
MEAN = 836.0833
SUM OF DIFFERENCES SQUARED = 614018.9
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 3
MEAN = 787.4167
SUM OF DIFFERENCES SQUARED = 882592.9
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 4

MEAN = 376.5

SUM OF DIFFERENCES SQUARED = 15677

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 5

MEAN = 435

SUM OF DIFFERENCES SQUARED = 83028

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

TOTAL SUM OF DIFFERENCES SQUARED = 1621648

TOTAL NUMBER OF DEGREES OF FREEDOM = 55

MEAN SQUARED FOR WITHIN SAMPLE VARIANCE = 29484.5

GRAND MEAN = 549.4167

SUM OF RESIDUALS SQUARED = 2857683

NUMBER OF DEGREES OF FREEDOM = 4

MEAN SQUARE FOR THE BETWEEN SAMPLES VARIANCES = 714420.8

CALCULATE VALUE OF $F = 24.23038$

PROBABILITY THAT SUCH A DIFFERENCE IN THE WITHIN SAMPLES
MEAN SQUARE AND BETWEEN SAMPLES MEAN SQUARE COULD
OCCUR BY CHANCE

IS .1369283 %

4.2.3

COMPARISON OF MORE THAN TWO SAMPLE

GROUNDNUT PRICES

WOULD YOU LIKE INSTRUCTION

TYPE YES OR NO AND PRESS ENTER KEY

SAMPLE 1

MEAN = 490.5

SUM OF DIFFERENCES SQUARED = 126577

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 2

MEAN = 1127.667

SUM OF DIFFERENCES SQUARED = 400710.7

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 3

MEAN = 860.4167

SUM OF DIFFERENCES SQUARED = 118434.9

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 4

MEAN = 1219.833

SUM OF DIFFERENCES SQUARED = 2040166

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 5

MEAN = 1005.25

SUM OF DIFFERENCES SQUARED = 554110.3

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

TOTAL SUM OF DIFFERENCES SQUARED = 3239999

TOTAL NUMBER OF DEGREES OF FREEDOM = 55

MEAN SQUARED FOR WITHIN SAMPLE VARIANCE = 58909.06

GRAND MEAN = 940.7333

SUM OF RESIDUALS SQUARED = 3913970

NUMBER OF DEGREES OF FREEDOM = 4

MEAN SQUARE FOR THE BETWEEN SAMPLES VARIANCES = 978492.4

CALCULATE VALUE OF $F = 16.61022$

PROBABILITY THAT SUCH A DIFFERENCE IN THE WITHIN SAMPLES
MEAN SQUARE AND BETWEEN SAMPLES MEAN SQUARE COULD
OCCUR BY CHANCE

IS 0.1369207 %

COMPARISON OF MORE THAN TWO SAMPLERICE PRICES

WOULD YOU LIKE INSTRUCTION
TYPE YES OR NO AND PRESS ENTER KEY

SAMPLE 1

MEAN = 589.1667
SUM OF DIFFERENCES SQUARED = 39255.67
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 2

MEAN = 936.4167
SUM OF DIFFERENCES SQUARED = 1142667
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 3

MEAN = 1110.917
SUM OF DIFFERENCES SQUARED = 275226.9
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 4

MEAN = 1176
SUM OF DIFFERENCES SQUARED = 211102.1
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 5

MEAN = 1525.667
SUM OF DIFFERENCES SQUARED = 651920.7
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

TOTAL SUM OF DIFFERENCES SQUARED = 2320172
TOTAL NUMBER OF DEGREES OF FREEDOM = 55
MEAN SQUARED FOR WITHIN SAMPLE VARIANCE = 42184.95

GRAND MEAN = 1067.633
SUM OF RESIDUALS SQUARED = 5634713
NUMBER OF DEGREES OF FREEDOM = 4
MEAN SQUARE FOR THE BETWEEN SAMPLES VARIANCES = 1408678

CALCULATE VALUE OF $F = 33.39291$
PROBABILITY THAT SUCH A DIFFERENCE IN THE WITHIN SAMPLES
MEAN SQUARE AND BETWEEN SAMPLES MEAN SQUARE COULD
OCCUR BY CHANCE
IS 0.1369245 %

4.2.3 COMPARISON OF MORE THAN TWO SAMPLE GUINEA CORN PRICES

WOULD YOU LIKE INSTRUCTION
TYPE YES OR NO AND PRESS ENTER KEY

SAMPLE 1
MEAN = 252.1667
SUM OF DIFFERENCES SQUARED = 58689.67
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 2
MEAN = 783.3333
SUM OF DIFFERENCES SQUARED = 727890.7
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 3
MEAN = 628.3333
SUM OF DIFFERENCES SQUARED = 393996.7
NUMBER OF DATA POINT = 12
NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 4

MEAN = 327.5

SUM OF DIFFERENCES SQUARED = 25843

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

SAMPLE 5

MEAN = 360.25

SUM OF DIFFERENCES SQUARED = 118638.3

NUMBER OF DATA POINT = 12

NUMBER OF DEGREES OF FREEDOM = 11

TOTAL SUM OF DIFFERENCES SQUARED = 1325058

TOTAL NUMBER OF DEGREES OF FREEDOM = 55

MEAN SQUARED FOR WITHIN SAMPLE VARIANCE = 24091.97

GRAND MEAN = 470.3167

SUM OF RESIDUALS SQUARED = 2436593

NUMBER OF DEGREES OF FREEDOM = 4

MEAN SQUARE FOR THE BETWEEN SAMPLES VARIANCES = 609148.1

CALCULATE VALUE OF F = 25.28428

PROBABILITY THAT SUCH A DIFFERENCE IN THE WITHIN SAMPLES

MEAN SQUARE AND BETWEEN SAMPLES MEAN SQUARE COULD

OCCUR BY CHANCE

IS 1.369132 %

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 **CONCLUSION:-**

From the original prices of the five commodities shows how the actual prices use to fluctuate in each year from 1992 - 1996, the price fluctuations are without any definite pattern or uniformity in the fluctuations.

Prices variations can not be control, as a lot of effort had been done by the past governments to control it, but to no avail. The researcher has discovered that the prices can not be absolutely control, but the rate of fluctuations can be reducad to a barrest minimum. This could only be done after statistical survey on the prices, their causes, and the analysis of the prices. It is also discovered that the major problem that hinders such dynamic step is neglecting statistical advices based on such surveys.

Also from the ratio of the mean square for the between sets variance to the mean square for the within sets variance i.e the F - ratio for all the commodities considered proved that the calculated F exceeds the 5% value of 2.52 of the significance table for F - test. And this shows that there is less than a 5% chance that such prices could occur by chance if there were in reality no systematic difference in the years under study. Hence, the researcher thought on the causes of the price fluctuation in this country despite the mass agricultural production in Katsina state, and Nigeria in general. all tthese are due to the foolowing problem or causes.

5.11 **AGRO- CHEMICALS AND FERTILIZERS**

One of the contributing factor to the increase in the prices of agricultural commodities in the Katsina State, and Nigeria as a whole is the continous shortage of agro-chemicals and fertilizers. Small Scale Farmers used to find it difficult in purchasing them, hence, the high prices of Agro-chemicals and fertilizers. As a result the farmers find it necessary to sell their farm produce at higher prices, for them to balance the expenses incured in the production process.

5.1.2 **SMUGGLING :-**

Smuggling out of our Agricultural products is another factor that contribute immensely to the increase in the prices of these commodities in Katsina State being a border State in the Northern part of the country boardering some west Africancountries, some unpatriotic citizens exploit that opportunity to smuggle out these commodities to the neighbouring countries,

despite the anti-smuggle decree and tight custom guard. As a result food crops become less in the State, thus hike in their prices.

5.1.3 **HOARDING** :-

Hoarding is also a factor that is contributing greatly to the hike in the price through out the state. Some of the well-to-do in the state use to buy the products in bulk with the aim of selling out when their prices have increase from 100% - 30% or more. This result to the law of supply in economics which says " The lower the supply of commodity to the market, the higher the prices of that commodity ".

5.1.4 **TRANSPORTATION** :-

Due to the poor conditions of our roads and lack of sufficient vehicles to convey Agricultural Commodities form the rural areas to the urban area markets, the supply of these commodities tends to go below expectations. Hence, prices of such commodities will as well increase.

5.1.5 **STORAGE AND PRESERVATION** :-

Lack of proper storage and preservation of the agricultural product affect the produce and hence, they affect their prices as well. Some of the crops were being affected by insects and rodents. Examples are maize, groundnut e.t.c Again apart from being affected by insects and rodents, there is the problem of poor preservation in terms of drying the commodities to the required moisture before storing them. As a result stored commodities spoils and damage after some times.

5.1.6 **DEVALUATION** :-

The government's devaluation of Naira also determines the prices of commodities. It is generally noticed that when the value of Naira goes down, the prices of the imported agricultural commodities will go up. Hence, Naira value in the market determines the prices of agricultural produce.

5.2 **RECOMMENDATIONS** :-

It is a well known fact that increase in the prices of agricultural commodities in any country is a clear indication that, the standard of living of the citizens of that country will be very low. Therefore, it becomes necessary for this type of survey to be carried out. In view of the findings in this chapter, the researcher strongly recommends the following :-

- (i) The government should try as much as possible to make the needed agro-chemicals and fertilizers available and as well subsidised their prices to the reach of the small

scale farmers.

- (ii) *The federal government should note that the development of Nigeria's petro-chemical industry is long over due, for development of this industry will enable the various state governments to establish the Agro-chemicals and fertilizer producing industries in each of the states.*
- (iii) *Smuggling out of Agricultural commodities should be curred instantly. Therefore, the government should deal ruthlessly with any person caught as it dem fit. Also, the tight custom exercise should be improved upon, because there seems to be some loop-holes in the custom services.*
- (iv) *Government should employ all possible measures to stop the habit of hoarding throughout the country.*
- (v) *The Government should rehabilitate our poor roads so that transportation of agricultural products to the markets may be eased. Also government should allow the importation of Spare Parts of the vehicles used for the transportation of the product to be cheaper and easier.*
- (vi) *The government should educate farmers on storage and preservation techniques, so as to reduce the wastages as a result of insects, rodents and poor preservations.*
- (vii) *The devaluation of our Naira did a lot of harm to our market prices and nation's economy as a whole. Therefore, it should be discourage.*
- (viii) *An interest-free loan should be given to the farmers to assist them so that at the end, the prices of agricultural commodities will be reduced. In this research work, despite the data being a secondry one, the researcher find it difficult to compile the data because of its inconsistency. As a result, the authority concerned should take appropriate action towards consistency of the data by imposing much strickness in the supervision of the enumerators and the compilation of the data. This is so because wrong data will result to poor planning or rather erroneus data and destruction in the statistical analysis.*

```
10 DIM K(20), Y(20), Q&(20), I&(6)
20 PRINT TAB(15); " COMPARISON OF MORE THAN TWO SAMPLES"
30 PRINT TAB(15); "....."
40 PRINT
50 PRINT "WOULD YOU LIKE FULL INSTRUCTION"
60 GOSUB 1810
70 LET I$ = Q$
80 IF I$ = "NO" THEN 130
90 PRINT
100 PRINT "THIS PROGRAM COMPARES 3 OR MORE SAMPLES OF DATA TO"
110 PRINT "DETERMINE IF THEY DIFFER SIGNIFICANTLY, OR IF THEY ARE"
120 PRINT "SUFFICIENTLY SIMILAR TO BE POOLED INTO A SINGLE SAMPLE"
130 PRINT
140 PRINT "TYPE THE NUMBER OF SAMPLE TO BE COMPARED"
150 IF I$ = "NO" THEN 170
160 PRINT "THEN PRESS RETURN."
170 PRINT M
180 IF (M-3)*(M-10)>0 THEN 200
190 IF M = INT (M) THEN 230
200 PRINT "NUMBER OF SAMPLES MUST BE AN INTEGER BETWEEN 3&10."
210 PRINT
220 GO TO 140
230 REM START LOOP TO INPUT DATA
240 FOR J = 1 TO M
250 LET A(J) = 0
260 LET Y(J) = 0
270 LET I = 1
280 LET Z = 0
290 PRINT
300 IF I$ = "YES" THEN 330
310 PRINT "INPUT NUMBERS IN SAMPLE"; J
320 GO TO 350
330 PRINT "TYPE IN THE NUMBERS FOR SAMPLE" ; J; "ONE AT A TIME."
340 PRINT "PRESS ENTER KEY AFTER EACH VALUE."
350 PRINT "TYPE 999999 TO TERMINATE EXECUTION."
360 INPUT X
370 IF X = 999999 THEN 470
380 LET Z = Z+X
390 LET XI = X-Y(J)
400 REM CALCULATE SUM OF DIFFERENCES SQUARED
```

```

310 LET A(J) = A(J)+X1*X1*(I-1)/I
320 REM CALCULATE MEAN OF SAMPLE
330 LET Y(J) = Z/I
340 LET I = I+1
350 GO TO 360
360 REM K(J) = NUMBER OF POINTS IN CURRENT SAMPLE
370 LET K(J) = I-1
380 IF K(J) >= 2 THEN 530
390 PRINT
400 PRINT "THERE MUST BE ATLEAST 2 NUMBERS IN EACH SAMPLE."
410 PRINT "RUN TERMINATED ON THIS DATA."
420 GO TO 1700
430 NEXT J
440 LET E2 = 0
450 LET V2 = 0
460 LET R2 = 0
470 REM LOOP TO PRINT STATISTICS FOR EACH SAMPLE
480 FOR J = 1 TO M
490 PRINT
500 PRINT "SAMPLE"; J
510 PRINT "MEAN = "; Y(J)
520 PRINT "SUM OF DIFFERENCES SQUARED ="; A(J)
530 LET E2 = E2+A(J)
540 LET V2 = V2+K(J)-1
550 PRINT "NUMBER OF DATA POINTS ="; K(J)
560 PRINT "NUMBER OF DEGREES OF FREEDOM ="; K(J)-1
570 NEXT J
580 PRINT
590 PRINT "TOTAL SUM OF DIFFERENCES SQUARED ="; E2
600 PRINT "TOTAL SUM OF DEGREES OF FREEDOM ="; V2
610 REM CALCULATE MEAN SQUARE FOR THE WITHIN SAMPLE VARIANCE
620 LET M2 = E2/V2
630 PRINT "MEAN SQUARE FOR WITHIN SAMPLES VARIANCE = "; M2
640 IF M2 > 0 THEN 800
650 PRINT
660 PRINT "BECAUSE THE VARIANCE WITHIN EACH SAMPLE IS ZERO"
670 PRINT "IT IS IMPOSSIBLE TO CALCULATE THE TEST STATISTICS F. RUN ABANDONED"
680 GO TO 1710
690 REM CALCULATE GRAND MEAN G
700 LET G = 0
710 FOR J = 1 TO M
720 LET G = G+Y(J)*K(J)

```

```

830  NEXT J
840  LET G = G/(V2+M)
850  PRINT
860  PRINT " GRAND MEAN = " ; G
870  REM CALCULATE SUM OF RESIDUALS (SAMPLEMEAN-GRAND MEAN) SQUARED
880  FOR J = 1 TO M
890  LET R1 = Y(J) - G
900  LET R2 = R2+K(J)*R1*R1
910  NEXT J
920  PRINT " SUM OF RESIDUALS SQUARED = " ; R2
930  REM CALCULATE MEAN SQUARE FOR THE BETWEEN SAMPLE VARIANCE
940  LET V1 = M - 1
950  PRINT "NUMBER OF DEGREES OF FREEDOM = " ; V1
960  LET M1 = R2/V1
970  PRINT " MEAN SQUARE FOR THE BETWEEN SAMPLES VARIANCE = " : M - 1
980  REM CALCULATE THE TEST STATISTICS F
990  LET F = M1/M2
1000 PRINT
1010 PRINT
1020 PRINT " CALCULATED VALUE OF F = " ; F
1030 LET E = 0
1040 IF V1 = 2*INT(V1/2+0.1) THEN 1080
1050 IF V2 = 2*INT(V2/2+0.1) THEN 1130
1060 GO TO 1310
1070 REM CALCULATE PROBABILITY IF V1 IS EVEN
1080 LET U = 1/(1+V2/(F*V1))
1090 LET P1 = V1+1
1100 LET Q = V2-2
1110 GO TO 1170
1120 REM CALCULATE PROBABILITY IF V2 IS EVEN
1130 LET E = 1
1140 LET U = 1/(1+F*V1/V2)
1150 LET P1 = V2+1
1160 LET Q = V1-2
1170 LET S = 0
1180 LET W = 1
1190 LET J = 2
1200 LET S = S+W
1210 LET W = W*U*(J+Q)/J
1220 LET J = J+2
1230 IF J < P1 THEN 1200
1240 LET Z = SQR(1-U)

```

```

1250 IF E=0 THEN 1280
1260 LET P = 100*5*(Z**V1)
1270 GO TO 1540
1280 LET P = 100*5*(Z**V2)
1290 GO TO 1540
1300 REM CALCULATE PROBABILITY IF V1 & V2 ARE BOTH ODD
1310 LET U = 1/(1+F*V1/V2)
1320 LET X=1-U
1330 LET S = 0
1340 LET W = 1
1350 LET J = 2
1360 LET P1 = V2
1370 GO TO 1410
1380 LET S = S+W
1390 LET W = W*U*J/(J+1)
1400 LET J = J+2
1410 IF J<P1 THEN 1380
1420 LET W = W*V2
1430 LET J = 3
1440 LET P1 = V1+1
1450 LET Q = V2 - 2
1460 GO TO 1500
1470 LET S = S - W
1480 LET W = W*X*(J+Q)/J
1490 LET J = J+2
1500 IF J < P1 THEN 1470
1510 LET T1 = ATN(SQR(F*V1/V2))
1520 LET S1 = S*SQR(X*U)
1530 LET P = 100*(1 - 2*(T1+S1)/ 3.14159)
1540 IF P <= 50 THEN 1570
1550 LET P = 100 - P
1560 REM ROUND OFF ANSWER
1570 IF P < 5 THEN 1590
1580 LET P = INT (P*10+0.5)*0.1
1590 IF (P - 5)*(P - 0.5) > 0 THEN 1610
1600 LET P = INT (P*100+0.5)*0.01
1610 IF P > 0.05 THEN 1630
1620 LET P = INT (P*1000+0.5)*0.001
1630 PRINT " PROBABILITY THAT SUCH A DIFFERENCE IN THE WITHIN SAMPLES"
1640 PRINT " MEAN SQUARE AND THE BETWEEN SAMPLE MEAN SQUARE COULD"
1650 PRINT "OCCUR BY CHANCE"
1660 IF P < 0.01 THEN 1690

```

```
1670 PRINT "IS" ;P; "%"  
1680 GO TO 1700  
1690 PRINT " IS LESS THAN 0.01%"  
1700 PRINT  
1710 PRINT  
1720 PRINT "WOULD YOU LIKE ANOTHER RUN?"  
1730 GOSUB 1800  
1740 LET I$ = "NO"  
1750 RESTORE  
1760 IF Q$ = "YES" THEN 130  
1770 PRINT "END OF JOB"  
1780 STOP  
1790 REM ***** SUBROUTINE TO CHECK REPLIES*****  
1800 IF I$ = "NO" THEN 1820  
1810 PRINT "TYPE YES OR NO AND PRESS ENTER KEY"  
1820 INPUT Q$  
1830 IF Q$ = "YES" THEN 1870  
1840 IF Q$ = "NO" THEN 1870  
1850 PRINT "REPLY" ; Q$ ; " NOT UNDERSTOOD."  
1860 GO TO 1810  
1870 RETURN  
1880 END
```


APPENDIX II

COMMODITIES PRICES IN (00) NAIRA PER TONNE

MAIZE PRICES IN NAIRA PER TONNE

<u>YEAR</u>	<u>JR</u>	<u>FB</u>	<u>MC</u>	<u>AP</u>	<u>MY</u>	<u>JN</u>	<u>JL</u>	<u>AG</u>	<u>ST</u>	<u>OT</u>	<u>NB</u>	<u>DC</u>
1992	212	210	242	244	285	336	351	328	300	337	385	386
1993	388	434	608	818	627	795	1178	970	859	669	654	738
1994	722	692	722	694	760	791	771	713	392	352	361	335
1995	328	722	390	423	477	521	525	496	466	335	338	315
1996	315	694	367	349	393	435	544	404	469	519	510	510

MILLET PRICES IN NAIRA PER TONNE

<u>YEAR</u>	<u>JR</u>	<u>FB</u>	<u>MC</u>	<u>AP</u>	<u>MY</u>	<u>JN</u>	<u>JL</u>	<u>AG</u>	<u>ST</u>	<u>OT</u>	<u>NB</u>	<u>DC</u>
1992	285	276	280	289	312	313	324	302	273	371	403	417
1993	434	468	642	906	679	771	1183	1042	1026	962	962	958
1994	996	981	992	917	1000	1018	1019	894	453	386	419	374
1995	421	376	405	389	380	393	428	403	339	309	331	344
1996	345	365	368	364	331	352	489	515	481	552	529	529

GROUNDNUT PRICES IN NAIRA PER TONNE

<u>YEAR</u>	<u>JR</u>	<u>FB</u>	<u>MC</u>	<u>AP</u>	<u>MY</u>	<u>JN</u>	<u>JL</u>	<u>AG</u>	<u>ST</u>	<u>OT</u>	<u>NB</u>	<u>DC</u>
1992	387	420	421	397	466	472	612	746	450	417	514	584
1993	741	910	1035	1164	1147	1198	1345	1379	1379	1048	1037	1149
1994	862	922	991	884	1017	810	947	886	707	678	807	814
1995	1226	1173	2053	1299	1296	2033	1175	1074	890	685	826	908
1996	896	954	1009	975	919	1034	1438	1365	1189	792	746	746

RICE PRICES IN NAIRA PER TONNE

<u>YEAR</u>	<u>JR</u>	<u>FB</u>	<u>MC</u>	<u>AP</u>	<u>MY</u>	<u>JN</u>	<u>JL</u>	<u>AG</u>	<u>ST</u>	<u>OT</u>	<u>NB</u>	<u>DC</u>
1992	494	570	532	581	616	567	642	632	625	492	664	655
1993	577	654	1010	1322	880	774	1417	1293	1264	655	609	728
1994	1072	1111	981	1192	1202	1315	1348	1257	1116	938	858	941
1995	1189	1083	1079	1052	1055	1221	1368	1434	1061	1116	1094	1360
1996	1323	1394	1411	1313	1397	1496	1778	1950	1565	1137	1772	1772

GUINEA CORN PRICES IN NAIRA PER TONNE

YEAR	JR	FB	MC	AP	MY	JN	JL	AG	ST	OT	NB	DC
1992	180	186	195	204	212	228	221	245	240	351	387	367
1993	372	445	620	870	606	672	1128	1099	1077	916	945	650
1994	675	675	613	716	796	818	826	816	525	455	352	273
1995	300	274	280	321	316	341	421	362	375	357	336	247
1996	258	267	276	276	242	286	440	394	390	516	489	489

KEY:-

JR - JANUARY, FB - FEBRUARY, MC - MARCH, AP - APRIL, MY - MAY, JN - JUNE, JL - JULY
AG - AUGUST, ST - SEPTEMBER, OT - OCTOBER, NB - NOVEMBER, DB - DECEMBER.

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