MANAGEMENT INFORMATION SYSTEM IMPLICATIONS FOR THE PENSION FUND COMMISSION.



MGT 550 MBA PROJECT

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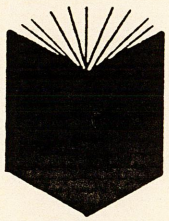


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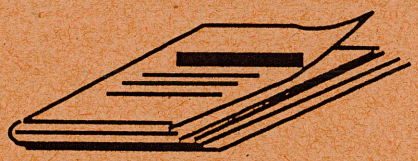


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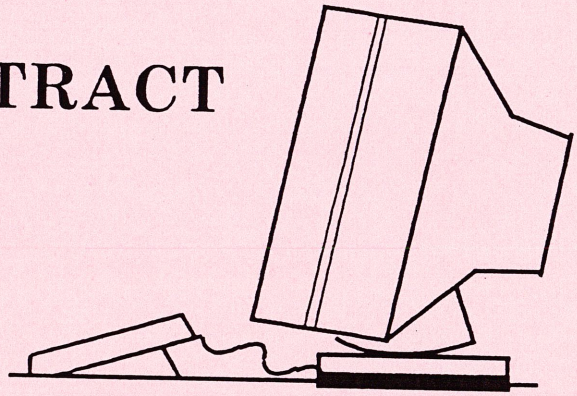
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Finally my deepest gratitude to my family: my parents for their spiritual wishes, to my wife Sediqa and my children for their emotional support, patience, and understanding.

ABSTRACT



ABSTRACT

Management information systems (MIS) are an indispensible managerial tool for improving overall organizational performance. Among other purposes it serves, MIS aids problem finding and solving. Implementation of MIS, however, is problematic. Many MIS projects are installed and never used, and thus are considered implementation failures. Recognition of the reasons behind these failures may help reduce the number of failing projects. This project attempts to study the factors that explain success in MIS implementation, and draws some generic implications or guidelines for MIS implementation. Upon this, a strategy for MIS introduction and implementation into the Pension Fund Commission (PFC) in Bahrain is presented.

The project consists of different but sequentional sections , obeservations, recommedations, and a conclusion. In the first section, a profile about the PFC is presented encompassing the functions the PFC performs. The Pension Fund Commisssion's need for an MIS is addressed.

In the second section, a profile about the retirement and the provident fund schemes is historically made clear.

In the third section, a short-cut about managing the public institution has been presented.

In the forth section, systems prior to management information system were discussed.

In the fifth section, the major approaches to MIS implementation are discussed and clarified briefly.

The sixth section, analyzes the factors that account for MIS successful implementation and builds upon these factors to offer some general implications.

The seventh section, presents the strategy, extends caustions regarding possible disruptive effects of the proposed system and suggests several corresponding strategies to deal effectively with these possible side effects.

The nineth section deals with the current situation at the PFC, observations and recommendations.

The eighth section focuses on the implication of the MIS for the Pension Fund Commission.

Finally, in the conclusion some thoughts with respect to future research are suggested.

In writing this project, two sources of information on the PFC were used. The first is a manual of the ogranization and functions of the Pension Fund Commission. The second is my personal observations during the year I had worked for this organization (1990).

1.1 INTRODUCTION

Management information systems (MIS) have become an integral component of many modern business, especially on the executive decision-making level. Without the timely and accurate information such a system provides, even the best executive is severely hampered when studying high-level considerations.

This project simply delivers a step-by-step process for develeping and installing a realistic management information system tailored to the specific needs of The Pension Fund Commission.

Terms and symbols important to data processisng operations -- both manual and computer-operated -- are defined, and figures are used to explain design requirements and controls.

The manner in which the three critical levels of MIS interact is dealt with in words and figures. A cogent analysis reveals how strategic objectives representing overall organization direction depend on the contribution of functional areas which in turn draw the resources of operating units which implement the plans, policies and procedures dictated by the higher levels.

THE PENSION FUND COMMISSION

1.2 HISTORICAL VIEW

The Retirement Scheme was first established in Bahrain in 1929, until 1942, the previous employment Scheme had been applied in the order of employment seniority to the employees of the government sector, who were employed at the time when such Scheme was in force with effect from 1st January, 1959, provided that they were contributors in the Retirement Benefits Scheme for Civil Employees.

Under this Scheme, a sum of money was appropriated at the rate 6,25% of the insured's total wages in accordance with his period of service to be paid to him thereafter in the event of the termination of his employment for any reason, or to his heirs on his death subject to an interest at the rate of 8,5% per annum to be made by compound interest at the end of every year efective from 1st January 1959.

Provident Fund Scheme

This sheme together with the previous Employment Scheme came into force in 1930 in order to insure the employee under the following conditions:

1. The insured is employed in the government sector on a permanent basis.

2. The insured is under the age of twenty five.

3. The employee is not a contributor to any other Employment Benefits Scheme for Civil Employees.

4. The employee whose monthly income is not less than 35 BD. for males and 33 BD. for females provided that he/she has

passed a probationary service period of six months.

The said scheme was set up to insure wide coverage of the employees in the government sector.

Under the said scheme a monthly contribution at the rate of 6,25% was deducted from the employee's wage if he satisfied the aformentioned conditions.

The government contribution was at the same rate of 6,25%.

The said subscriptions gether with the government contribution of 6,25% were paid with a minimum compound interest of 3% per annum to him or his heirs therafter upon termination of his employment for any reason provided that the minimum service period shall not be less than one year. Otherwise he shall entitled only to his susbsciptions.

The provident cash scheme together with the retirement benefits scheme for Civil Employees remained in force from 1st January 1955 until 1st October, 1975, when both schemes were repealed.

Retirement Benefits Scheme for Civil Employees

This scheme came into force on 1st January 1955 and was repealed on 1st October 1975 along with the Provident Fund Scheme in order to cover a wider sector of employees, to include better insurance benefits than the previous scheme and to insure the employee, subject to the following conditions:-

1. The employee is a Bahraini national.

2. The employee is employed on a permanent managerial, clerical, medical, nursing, teaching or mechanical work.

3. The employee must be under the age of twenty five or over the age of forty five.

4. The employee must be medically fit in order to contribute in the scheme.

5. The employee must have completed one year's service prior to the following January.

Under this scheme, a monthly contribution, at the rate of 6,25% was deducted from the wage of the insured, who fulfilled the aformentioned conditions. The government contribution was at the rate of 17,75% of the employee's wage.

Retirement Entitlements

Retirement to Pension Case

The contributions of both the government and the insured were paid to him at a minimum compound interest rate of 3% per annum. The interest was compound only on the basis of the insured's contribution at the termination of employment upon his attaining the ordinary pensionable age (fifty five for male and fifty for females).

Death Case

If the insured dies during the service period a sum of money shall be paid to his heirs in one of two ways, whichever is the better:

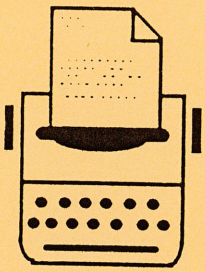
1. A lump sum amounting to 30 months wages shall be added to his contributions at a compound interest rate of 3% per annum from the date of his contribution in the scheme until the day of his death.

2. A sum amounting to the one paid to him as if he has been pensioned off on the day of his death.

Resignation Case

If the employee resigned after having worked for one year or more taken from the date of his contribution in the scheme, the contributions at an annual 3% compound interest were to be paid as well as the government contributions which were calculated on the basis of age and service period on the day in which his resignation was accepted, in accordance with the following schedule:

Case	Age and contributory period in the scheme	Govt. Contribution without an int.(%)
1	From 25 to under 30 year's old	100
2	From 30 to under 35 year's old	150
3	From 35 to under 40 year's old	175
4	From 40 to under 45 year's old (less than 5 contributory years prior to the age of 40)	175
5	From 40 to under 45 year's old (more than 5 contributory year's prior to the age of 40)	200
6	From 45 to under 50 year's old (less than 5 contributory year's prior to the age of 45)	200
7	From 45 to under 50 year's old (more than 5 contributory year's prior to the age of 45)	237,5
8	From 50 to under 55 year's old (less than 5 contributory year's prior to the age of 50)	225
9	From 50 to under 55 year's old (more than 5 contributory year's prior to the age of 50)	275



CHAPTER I

From this review of the previous retirement scheme may be noted that they are merely saving schemes prescribing the payment of the contributions deducted from the insured's wage as well as the government contributions and a 3% compound interest per annum payable to the insured or his heirs at once without seeking an alternative for the salary on the absence from work aimed to insure his and his family's future against sudden unexpected circumstances to which he might be subject.

Law No. 13 of 1975 with respect to the regulation of Retirment pensions and Gratuities for government employees and the Acts in amendment thereof

This Law came into force on 1st October, 1975. The provision of the Law were applied to the employee provided they meet the following conditions:

1. The insured is a Bahraini national.

2. The insured is employed in the government sector on a permanent basis.

3. The insured must be an employee of a specific grade on the State Budget or on the budget of public departments or municipalities or institutions issued on the Prime Minister's order.

The insured must have attained the age of eighteen and must not be more than sixty.

The Bahraini legislator to the initiative by promulgating Law No. 13 of 1975, which regulated the payment of pensions and Retirement Gratuities and thereby formed the basis of the modern

Social Insurance Scheme in the State of Bahrain with a view to keeping in line with the conceptual progress of this Scheme, by specifying a pension payable to the insured upon termination of his employment for any reason, or to his beneficiaries when employment is terminated due to his death.

Along with the basic rights of insurance, Law No. 13 of 1975 included the following benefits of insurance:

Benefits of Insurance against old-age, Permanent disability and Death

1. A retirement pension shall be settled on the basis of 1/50 of the latest basic wage (the average wage of the last two year's) and shall not be in excess of 80% of the said wage of less than BD.80 for the pensioner and BD.15 for the beneficiary.

2. A pension at the rate of 40% of the latest monthly wage or a pension due for the service period which is included in the retirement whichever is the better, in the event of the termination of employment by reason of death or any natuaral disability.

3. A gratuity at the rate of 15% of the latest conributory wage for every year preceded by forty year's of service included in the retirment, with a maximum of seven year's following the forty year's.

4. A gratuity at the rate of 3% of the annual wage (the latest wage due for the insured on employment leave multiplied by 12) for every year of service included in the retirment.

5. A death grant equivalent to six month's wages if the

eceased is in employment or to a grant of six month's pension if he is a pensioner.

6. A funeral expenses grant equivalent to three month's wages if the deceased is in service or to a grant of 3 month's pension if he is a pensioner.

7. A marriage grant equivalent to eighteen month's pension with a minimum of BD.300 on the marriage of the insured's widow or daugthter or grand-daughter or sister.

8. A gratuity amounting to one month's wage in the event of the termination of employment of the insured for every year of service prior to attaining the age of eighteen.

9. The application of the retirement benefits scheme for Civil Employees to the contributors in the scheme thereof.

10. Inclusion of previous service period prior to 1.10.1975 (when Law No.13 of 1975 came into force) in the service period reckoned within the retirement period of all the employees in service during the enforcement of the said Law (in a sense that the Law was applied with a retroactive effect) without paying the contributions due for this period.

11. The addition of an assumed period of five year's to the one included in the retirement in the event of termination of employment by reason of cancellation of the post or due to non-disciplinary dismissal.

12. The addition of a half to the amount of the due retirement gratuity upon the termination of employment by reason of cancellation of the post or non-disciplinary dismissal. (The

pension shall not be paid to an employee whose period of services is less than ten year's).

13. The addition of an assumed period of five year's to the one included in the retirement provided that the resulting period shall not exceed the remaining year's prior to attaining the age of sixty and that the whole service period shall not exceed forty year's in the event of the facilitated resignation (retiring on early pension upon the request of the insured who is pensioned off at the age of fifty five).

14. On computing the service period in case of pension or gratuity a fraction of a year shall be counted as one complete year.

15. The beneficiary shall be entitled to combine more than one pension beyond any limits in the following cases:

a. The widow shall combine her own pensions with the pension due to her husband as stipulated by the provisions of the Law No.13 of 1975.

b. Both sons and daughters shall receive combined pensions due to both parents.

c. Father and mother shall receive combined pensions due to them provided that the latter shall not exceed the settling wage of the higher pension.

d. The disabled husband shall be entitled to combine his own pension with the pensions due for his wife.

16. If the beneficiary's share of a pension is less than the stated minimum amount of pension (BD.15) the share shall be

supplemented in order to reach this minimum provided that the lump sum of all the beneficiaries shall not exceed 80% of the latest basic wage on the basic of which the pension was calculated, this being the relative maximum pension (In a sense that the pension amounting to 40% of the latest monthly wage on the insured's death or on his natural disability might reach 80% of the average wage of the last two year's if the shares of the beneficiaries exceed the value of the minimum pension of BD.15).

Benefits of Insurance against Accindent during Employment

1. Financial benefits during the treatment period:

a. Compensation equivalent to the wage payable for the whole period of the insured's absence from work due to an accident during employment.

b. Transportation expenses by an ordinary or a private vehicle inside or outside Bahrain.

2. Benefits in kind during the treatment period:

a. Provision of medical services, of however specialised, in a private room.

b. Diagnostic examinations.

c. Treatment at hospitals and public or private recovery centers.

d. Provision of medicines and the required medical materials.

e. Provision of artificial limbs or any medical fittings.

3. Financial benefits following the treatment period:

a. A pension for an accident during employment equivalent to 80% of the contributory wage on the termination of employment.

b. A pension for an accident during employment without the termination of employment in the event of disability which amounts to 30% or more of total permanent disability.

c. A lump sum compensation in the case of disability that shall not reach 30% of the total permanent disability.

4. General Benefits:

a. Extension of the term "Insurance for Accindent during Employment" to include strain or fatigue at work in any of the clinical cases mentioned in para of the annexed schedule No.2 of Law No.13 of 1975 with respect to the regulation of pensions or gratuities of government employees.

b. Extension of the term "Permanent Disability" to include incurable and mental diseases deemed to resulted in permanent disability.

c. Inclusion of the period of absence as a result of an accident during employment in the service period reckoned within retirement without the payment of an insurance subscription against old-age, disability and death for that period.

d. Combination of both the retirement pension with the pension for an accident during employment provided that the resulting sum shall not exceed the settling wage of the pension or the higher wage on the basis of which any of the two pensions shall be settled.

e. Extension of the period of insurance protection for an accident during employment to one year to be computed from the date of termination of employment should the insured show any symptoms of an occupational disease during this period whether he was not employed or employed by another employer where he would not have shown any symtoms of the said disease.

f. If the partial permanent disability amounting to 30% or more of total permanent disability shall lead to termination of employment of the injured employee due to the lack of work appropriate to his condition, the disability shall be regarded as total permanent disability and his pension shall be settled on this basis (80% of the contributory period).

g. The Pension Fund Commission is obliged to ensure the preceding aformentioned rights even if a person other than the employer is responsible for the injury without prejudice to the rights of the injured person.

3. Pension Commutation Scheme:

The Pension Commutation Scheme gave the insured the freedom to claim commutation of his pension. Upon the commutator's death and the pension due to the beneficiaries to be appropreated, thereby assuming that no part of the pension shall be commutated. The payment of pension commutation installments shall cease during the period in which the commutator is without pay provided that the period of installment is increased to equal the time when the payment cease.

Settement of the pension due to the beneficiaries of a missing insured person

On the occurance of the disappearance during or due to the course of performance of the insured's work the pension is paid on the assumption of the termination of employment due to death caused by an occupational accident (at the rate of 80% of the contributory wage).

1.3. General about PFC Organization

The Pension Fund Commission has been established by the Amiri Decree No.13 of 1975, regarding the regulation of pension & retirement indemnities for the Civil Service employees and workers.

The activities of the Pension Commission are:-

1. To implement the Pension plan as per the articles of the Amiri Decree.

2. To implement the former plans replaced by the Amiri Decree viz:-

   a) Provident Fund Scheme (PF)
   b) Retirement Benefit Scheme (RBS)
   c) Past service plan

The Pension Fund Commission main source of income is the deductions from salaries of employees and contributions from their respective mininstries.

The Pension Fund Commission has also investments in fixed deposits, bonds & shares of reputed Bahrain companies. The return on these investments is the second source of income. The Pension Fund settles accounts of each emplyee at the time of leaving service and also pays the monthly pension to eligible pensioners/beneficiaries.

ORGANISATION

The Pension Fund Commission activities are divided into the following Directorates and Sections:-

1. Admin. & Services Directorate
2. Pension Rights Directorate
3. Accounting Operations Directorate
4. Investment Section
5. Legal Affairs Section

Each directorate/section performs a specific set of activities.

Admin. & Services Directorate:

The main functions of this Directorate are as follow:-

1. Participate in developing of policies necessary to manage the PFC in respect of Personnel, Computer Services, and Internal Auditing.
2. Work out implementation plans that help reach the PFC objectives.
3. Participating in discussion, particularly in designing & drawing the PFC organization chart.
4. Supervising personnel studies & research & the range of the most possible use of the computer facilities.
5. Preparing the PFC administrative budget.
6. Supervising the retaining of agreements & contracts that may

be signed between the PFC and others & also develop a system that facilitate retrieving them which should result in maintaining the legal rights of the PFC.

7. Work together with the Accounting Operations Directorate in working out plans & programs related to the financial supervision.

8. Find a remedial solutions to the different technical or administrative problems.

9. Developing training programs to the PFC employees & pursuing the progress reports of the trainee.

10. Spot check to the PFC stores & submit a period reports to the General Director in respect of their security & safe.

11. Cooperate with the external auditors to revise the PFC accounts & implement their suggestions & recommendations that are accepted by the BOD.

12.Supervice the preparation of payroll, recruitment, promotions, re-assignments, allowances, and different types of leaves.

Pension Rights Directorate

This directorate maintains a Card Index of all present and past Bahraini employees in the Civil Service. It also maintains separate card indexes for employees participating in PF scheme or RBS scheme. All new appointments or transfer are informed to this directorate by either CSB of respective ministries/directorates. On an employee leaving service due to any reason this section calculates the period and service and averange basic salary for person and indemnity purpose.

All actions relating to disbursement and deductions at the time of leaving service are also recorded in this directorate. The section also maintains a record of all correspondence received from CSB/Ministries. The data maintained in this directorate is of permanent nature.

This directorate also maintains records of all retired employees eligible for pension and records of their beneficiaries/dependents. The monthly disbursement lists are also liaisoned based on which Income/expenditure section issues cheques to Banks. A lot of statistical reports are prepared which form the basis for further statistical analysis in the statistics section. It also provides information to Social Research Section.

Accounting Operations Directorate

This directorate manages all cash inflow & outflow. The directorate receives a report from the Ministry of Finance at the beginning of each month listing all employees in each ministry. These lists show the employees' basic salary and contributions to Pension Fund by employee and by ministry for the month. The directorate informs each ministry the amount due for that month and mentions receipts during the month. The directorate also maintains records of changes in those lists during the month and at the end prepare a reconcilliation statement for each ministry to arrive at exact amount due from ministry during the monhth. Besides this the directorate handles all payments made to employees leaving service and monthly pension payments.

Also all other types of receipts and payments are handled.

Investment Section

This Section maintains all books of accounts and records of all ivestments. It records all details of fixed deposits, bonds & shares. The original certificates are in the custody of this section. It keeps track of maturity dates of deposits and takes necessary action. Supervising the current accounts of the PFC and directing the surplus to the investment portfolios. It also analyzes the PFC's portfolio and submit periodical reports to the the General Director in respect of the level of interest & the comparison that has to be made between time and another about the external & internal investments. Pursuing the changes occurs on the shares prices and also the yield made by each category.

Legal Affairs Section

- Preparing & writing laws, resolutions, circulations, and agreements published by the Pension Fund Commission.

-Preparing of studies and researches related to the law No.13 of 1975 and other related decrees that are necessary to legal and perfect implementation of the law.

-Preparing of comparison studies in the pension fields and reporting of proposals and recommendations which are thought to be necessary to keep the insurance system abreast to the modern applications.

-Study of rules and instructions related to the activities

of PFC to avoid any contradiction with what would be published in form of laws or implementation instructions.

-Pursuing of procedures to implement the conditions of contracts/agreements made between the PFC and other parties.

-Representing the PFC in courts.

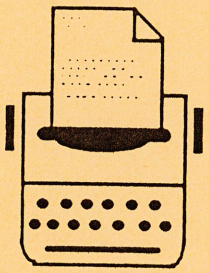
-Representing the PFC in committees that are formed to study legal proposals and/or researches related to insurance.

-Participate in study of claims and aggrievances that are usually submitted to the General Director of the PFC.

-Prepare & perform presentations to explain the Law No.13 of 1975, and other related laws in order to enlighten the government employees to the benefits they would be entitle for during and upon the termination of their services.

-Gives legal opinions about any related matters.

CHAPTER II



CHAPTER II

2.1 SYSTEMS PRIOR TO MANAGEMENT INFORMATION SYSTEM

Systems prior to mangement information systems were backward looking, that is, they concentrated on producing various types of historical reports, particularly accounting reports. They were not designed to produce relevant information for controlling current operations or planning future operating conditions.

<1> Custodial Accounting System

<2> Responsibility Reporting Systems

<3> Integrated Data Processing Systems

Each of the systems is discussed below.

Custodial Accounting System

These systems were concerned with producing historical reports with special accent on accounting reports. Generally, these reports were produced long after the period they represented. Hence, hence, they were produced too late for meaningful analysis of current operations and failed to report information by functional areas.

Responisbility Reporting Systems

These systems were concerned with preparing historical accounting reports that tied in with the level of responsibility for operating departments of an organization. Under responsibility reporting, the manager could be held accountable for unfa-

vorable deviations of controllable costs form the predetermined plans or the budget. However, they failed to take into account the integration of an organization's subsystems.

Integrated Data Processing Systems

These systems integrate related subsystems in order to reduce the duplication of data files as well as to improve the coordination of an organization's functions with one another. However, timely reports that could better facilitate the management functions were still lacking in integrated DATA PROCESSING (DP) systems.

PAST AND CURRENT MANAGEMENT INFORMATION SYSTEMS

The manager's ability to plan and control current as well as future organization activities was not being enhanced under these systems. A broader perspective was needed to satisfy management needs. Over time, various types of MIS's were developed, among them the following types survived the toughest management problems:

<1> Integrated Management Information Systems

<2> Real-time Management Information Systems

<3> Distributed Data Processing Systems

<4> Decision Support Systems

Integrated Management Information Systems

These systems stress the integration of related subsystems. Essentials include producing historical managerial reports as

well as taking over routine dicision making. Transactions that affect more than one functional area are captured once only and processed in a manner appropriate for all users of the information.

Real-time Management Information Systems

These systems provide the capability to send data into a computer system as soon as they come into being and are able to feed back information to the appropriate source in sufficient time to change or control the operating environment.

Distributed Data Processing Systems

Data-processing systems are computerized information systems developed to process large amounts of data for routine business transactions such as payroll and inventory. Data-processing systems relieve the tedium and time-consuming aspects of manually performing necessary operational transactions, although people are still needed to input data to computerized systems.

The systems run programs on an automatic basis at regular intervals. They require very little decision making once they are set up. Data processing systems support the day-to-day activities of the business.

Decision Support System

The Decision Support System (DSS) depends on a database as a source of data. A DSS emphasizes the support of decision making in all of its phases, although the actual decision is still the

exclusive province of the decision maker. Decision support systems are closely tailored to the person or group using them.

Problems Hindering MIS development

A number of authorities have found that lack of top management involvement contributes to poor MIS performance. Lack of participation by top management has been attributed to a number of reasons:

. inability to communicate adequately with computer and systems personnel
. lack of appreciation of the potential of computer systems
. feeling threatened by the computer
. and unwillingness to spend the time required.

Alienation form MIS is fostered when top management feel that MIS threatens their prerogatives. Top managers, however, have few grounds for such fears since their decision making and judgement roles will not be replaced by computers, but rather enhanced.

The number two ranked major problem was the cost and complexity of a data base management system. In order to minimize this problem an organization should have a database administrator whose functions are to:

. educate users on the database management system (DBMS)
. to provide adequate DBMS documentation
. to develop dynamix ongoing audits of DBMS

. to develop security and control measures

Third major problem refers to the planning prior to systems analysis, design, and implementation. The fourth major problem is recruiting qualified computer personnel. The fifth major problem is that some companies have failed to develop adequate strategies for extending the computers to other units of the company.

GUIDELINES FOR SUCCESSFUL MIS DEVELOPMENT

The problems discussed above that tend to hinder the successful development of MIS can serve as a background for developing appropriate general implementation guidelines. These guidelines point out the need to:

. involve top management from an overall standpoint in the planning phase as well as in the succeeding phases of an MIS project.

. provide adequate presystem planning that focuses on getting started on an MIS project.

. get the appropriate functional managers and their support personnel involved in the detailed aspects of the MIS project.

. obtain the assistance of the database administrator to facilitate the proper planning of MIS data as well as operational data.

. recruit qualified MIS personnel from within or form outside the organization to undertake the MIS project.

. provide the capability to extend the management informa-

tion system into functional areas.

MIS DEVELOPMENT PROCESS

The following table describes the phases in the development of a management information system.

PHASE	OVERALL OBJECTIVE
feasibility study	determine the appropriateness of making a systems change.
system analysis	define what the system must do.
system design	define how the system will work.
equipment selection	select appropriate hard/software.
systems implementation	provide the user with a fully operational system.
periodic review	insure the system continues to meet the user's needs effectively.

SYSTEM ANALYSIS FOR EFFECTIVE MIS

Study of the Present System

System analysis, being a detailed survey of the present system, involes a comprehensive investigation of these areas under the supervision of a feasibility manager:

Review historical facts to identify the major turning points and milestones that have influenced the organization over time. Current and future plans should also be examined.

Analyze inputs to identify where source documents are used to capture originating data. An understanding of the nature of the document, which is contained in it, who prepared it, where it was initiated, when it was completed, and its distribution is important since outputs from one area serve as inputs for others.

Review methods and procedures to understand the relationship between inputs, files, and outputs. The series of procedural steps by which MIS operations are accomplished can be examined to determine what action is required, and who must do it, and when it must be done.

Review files maintained to understand the number and size of files maintained by departments, where they are located, who usses them, the amount of time it takes to refer to a file, and the mumber of times they are generated. The maintenance of files is a function of their value vs. cost of storage and must satisfy legal requirements.

Analyze outputs to determine how well present reports are

meeting the organization's needs. The questions of what information is needed are ones that must be answered; additional questions concerning the sequence of the data, how often the form is used, how long it is kept on file, and the like must be investigated.

Review internal controls to indicate control points critical to maintaining efficient MIS operations. Locating these control points allows one to visualize the essential parts and the overall framework of a system

Analyze present personnel requirements to pinpoint the present personnel by type, skill, and pay scale; these data are obtained from personnel records, monthly reports, and interviews. Every effort should be made to understand thoroughly this most important element of MIS operations since these same people will normally be involved in the new system.

Review present work volumes to identify average and peak work loads, as well as periodic totals. Where work volumes are low and processing precedures complex, the feasibility of applying new computer and peripheral equipment is unlikely. On the other hand, where large work volumes require straightforward processing, the chances of using new equipment are very high. Additionally, work volume analysis is helpful to determine whether a particular work station is a control, storage, or terminal point in a system.

Review other requirements and considerations to help locate important items that may be critical to the present system.

Items such as the effects of exceptions and errors on the present system, seasonal or other cyclical characteristics, current production facilities, and present financial resources should be investigated if critical to current operations.

Use data flow diagrams to trace the origin of input data through each phase of processing and communication, into files, and finally out of files for desired outputs, many in form of reports.

PROPOSE MIS ALTERNATIVES

A most important task of the project team is to develop feasible MIS alternatives. An integral part of each alternative is developing projections of savings, costs, and tangible benefits. Likewise, consideration is given to intangible benefits. A thorough analysis of these facts by both the project team and the user review group finally leads to the recommendation of the best MIS alternative.

SUBMIT EXPLORATORY SURVEY REPORT TO TOP MANAGEMENT

Once the project team and the user review group have selected an MIS alternative, an exploratory survey report to the executive steering committee is prepared that states this recommendation. The content of this report focuses on and adequate description of the selected MIS alternatives, particularly in financial terms and in comparison to other feasible alternatives.

2.2 SYSTEM DESIGN FOR EFFECTIVE MIS

Determine new MIS requirements

Systems design, devising new system approaches, centers on determining the requirements for a new system. This initial step in systems design for effective MIS takes into account the information compiled to date on the present system, as well as that contained in the exploratory survey report to top management. After systems analysts have reviewed appropriate data, they must specify the following:

- new policies consistent with organization objectives
- planned inputs
- new methods and procedures
- data files to be maintained
- output needs
- internal control considerations
- equipment considerations

The foregoing requirements for a newly designed system are not complete until the human factors are considered.

Designing the new system

It is recommended that a methodical approach to systems design be undertaken initially during this critical phase. Recommended is a structured design method that uses the modular or building block approach wherein major system functions are successfully complete, the systems analyst creates a structure for the functional modules that is capable of operating within whatever hardware constraints are imposed. The net result of the

modular approach is that duplicated modules, i.e. MIS tasks are eliminated, and the complexity of the overall system is reduced.

Documenting the new system

An important last step when designing a new system is the preparation of data flow diagrams and/or system flowcharts. Likewise, documentation is needed for those items determined during the systems design phase (refer to the listing above). Throughour the entire systems project, there must be proper documentation.

EQUIPMENT SELECTION PROCESS

Equipment selection should be undertaken by the MIS study group upon completion of systems design. Basic steps are to determine equipment manufacturers, submit bid invitations to manufacturers, evaluate manufacturers' proposal, and select equipment manufacturer(s).

Four major aspects of equipment selection are:

1. Determine equipment manufacturers.

2. Submitting bid invitations: Bid invitations should include:

. general company information-overview of the organiation and MIS operations.

. future management information systems plans-areas to be implemented, completion dates, and so forth.

. new systems specifications-planned inputs, data

handling methods and procedures, files to be maintained, output needs, and other important items.

. new data flow diagrams-for each functional area to be implemented plus an overview of the proposed system.

. data requested of each manufacturer-proposed computer hardware and processing times, site preparation requirments, manufacturer's assistance, and other similar information.

3. Evaluate manufacturers' proposals. The criteria that can be developed for evaluation purposes includes:

.extent of automation proposed

.throughput performance

.type of equipment

.rental, purchase, or other basis

.equipment delivery

.manufacturer's assistance

.availability and quality of software

4. Select equipment manufacturer(s). The task of the selection process is relatively easy if the equipment proposed is identical. If the equipment proposals are somewhat dissimilar, the selection process can be difficult. Whether the proposals are somewhat alike or totally different, the dilemma can be resolved through a matrix table or the weighing method. The manufacturer(s) scoring the highest number of points is (are) selected.

2.3 IMPLEMENTATION OF MANAGEMENT INFORMATION SYSTEMS

Implementation of the new management information system begins after the formal signing of the equipment contract. The feasibility study typically takes one third and systems implementation two thirds of total necessary time.

Preparatory work must be undertaken before day-to-day operation of the new system can begin. It includes:

- Scheduling the installation
- Selecting qualified personnel
- training personnel
- realigning of personnel
- determining physical requirements and alterations
- testing and accepting the new equipment
- programming and testing
- converting files

Operation focuses on day-to-day running of the new system. Even though computer programs and operational procedures have been tested, there is no way of duplicating actual operations with all their exceptions and irregularities except by following these steps:

.Run parallel operations. Feed both systems (old and new) the same input data for comparison of updated files and output results.

. Convert to the new system. After files have been

converted and the new systems's reliability proven, shift one area from the existing system to the new one.

. Provide for necessary change. Make those minor program and system adjustments deemed necessary for improving operations.

. Schedule equipment and personnel. Establish daily equipment schedules that involve organization personnel to operate the equipment efficiently.

. Develop alternative plans in case of equipment failure. Give preference to critical jobs during equipment downtime.

REPRESENTATIVE IMPLEMENTATION PROBLEMS

Throughout the implementation process, numerous problems can plague the MIS project. Sample problems, and representative ways to overcome them so as to increase the chances of a successful MIS implementation, are as follows:

. lack of clearly defined MIS objectives for implementation. An aboslutely essential starting point for implementation is as MIS plan based upon clearly defined MIS objectives.

. lack of clear cut implementation plan from the beginning. If MIS objectives are clearly defined, the next logical step is the development of a clear-cut implementation plan to accomplish the predetermined objectives.

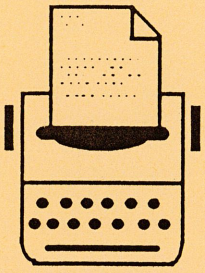
. ineffective leadership of the MIS project during the implementation phase. To overcome this typical problem, experi-

enced leaders should be selected over inexperienced MIS personnel for critical implementation activities.

. inadequate trainig of operations personnel to undertake the implementation phase. This problem is generally solvable by making it mandatory for implementation personnel to attend MIS training during working hours vs. optional attendance.

. failure to enlist the help of special skills in selected areas of the implementation process. The MIS person in charge should utilize the implementation plan as a guide to determine when and where specialized skills are needed rather than ignoring the need for them.

The foregoing list, which is representative of implementation problems, centers heavily on "people's problems". Failure to consider the human element can make the best laid plans go astray in implematimg a management information system.



CHAPTER III

3.1 THE NEED FOR MIS

MIS can serve one or a combination of purpose for an organization. It be: "A decision and planning tool; An analog or model of the organization; An information bank; and A problem finding and solving aid; since I will be concerned with the last function only explanation of the problem finding and solving concept is necessary.

This concept is built around the idea of measuring organization performance on a continuous basis against some established standards determining what deviations have occurred from these standards and taking correrective actions to bridge the gap between the actual performance and the desirable performance. This process is synonymous with the use of feedback mechanism to convey information to employees about their performance.

Drucker (1973) for instance has suggested that to be successful public organizations should among other things measure their performance and feed these measurements back to improve their performance. This idea has further been developed by utilizing the concept of learning organization. They define a learning organization as one that "takes periodic readings on its performance and makes adjustments so that performance is improved.

In this project feedback is used to indicate the process of

communicating information (or the information communicated) to employees concerning their performance and the processes or procedures they followed in carrying out their duties. Building a feedback system for control purposes requires the following procedures:

1. Determining the activities to be controlled and gathering data on these activities.
2. Establishing standards against which progress or bakwardness in these activities can be measured.
3. Measuring performance in these areas and communicating the results of measurements to managers and employees.
4. Taking the necessary actions to satisfy the desirable objectives which were prespecified.

This process is depicted by the following figure:

Data Collection	Standards Setting	Performance Measurement	Taking Action

The first three components of this process symbolize the problem finding phase of the MIS function adopted in this project.

Taking actions represents the problem-solving phase.

The power of the control system and feedback mechanism is acknowledged by a fairly large number of scholars and researchers

who have with performance improvement. Kaufman (1973) for instance argues that the major contribution of administrative feedback lies in the fact it enables managers to control deviations from the preestablished objectives. This is to be accomplished through clarifying instructions improving training and reshaping incentives so that employees will no longer have the tendency to depart from these objectives. Nadler (1976) suggests that feedback can serve the following functions: as an error-correction device; a useful tool to identify and solve problems; and a tool for goal clarification and motivation. Control combined with its components of feedback and corrrctive action is "a fundamental and indispensible part of mangement task.

Providing employees with data about their performance can bring about change in their behavior. Nadler (1976) suggests that such data can both energize and direct behavior. This point is supported by others. Informtion in its opertional context can serve both as a process activator by clarifying requirements for employees and as a feedback mechanism by providing a base upon which a judgment of whether these requirements were met can be made.

MIS can serve different levels within the organizational hierarchy. TO determine the desirable level a framework of managerial functions within the different hierarchical levels is needed. Such a framework was developed by Robert Anthony (1965). Anthony has grouped managerial activities into three categories

and argued that each is sufficiently different and requires distincive planning and control systems. The first category is strategic planning: "The process of deciding on objective of the organization on changes in these objectives on the resources used to attain these objectives and on the policies that are to govern the acquisition use and disposition of these resources."

The second category is management control. The process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the oganization's objectives."

The last category is operational control which is "the process of assuring that specific tasks are carried out effectively and efficiently." It should be recognised however that as Anthony has noticed there is not such a clear-cut line between these categories. In fact activities among a certain category may overlap with other in neighboring category.

The proposed system will be concerned with controlling activities at the Pension Fund Commission performed at the operational level. Operational control is performance oriented; it attempts to minimize the unfavorable deviations of the organization's actual performance of at least some aspect of the organization's operations from planned performance. Minimizing of unfavourable deviations is facilitated be measring and evaluating actual performance on a continuous basis and making appropri-

ate adjustments to operations as unfavorable operating events occur."

Emphasis on operational level is justified upon several grounds. The most important are as follow:-

1. Most information needs of an organization reflect activities performed at this level.

2. Considering the operating manager's needs facilitates acceptance of a new information system.

3. If a management information system is to show its direct payoffs attention should be focused on improving operational perforamance since it is in this area where direct benefits can be noticed.

Other reasons were added by Newman (1975). They include:

1. The techniques developed during the process of setting standards and creating measuring schemes can be applied in different areas as well.

2. The availability of a large quantity of relevant historical experiece and records to help in the process of establishing standards of acivities in this level.

3. It is often possible to have (and even consider) the opinions of those persons controlled by the system and for these persons to learn to work with the new system.

In the case of the Pension Fund Commission the activities performed at the operational level constitute a great quantity of work performed by the PFC. Controlling these activities takes a great deal of time and effort of the PFC's executives. Introducing the proposed system into the PFC would save these executives time and thus enable them to give considerable attention to planning developing organization and other important functions. Specifically the proposed system is inteded to serve two objectives:-

1. To increase organizational and employee productivity at the PFC through taking periodic reading on their performance finiding the obstacles if there are and that impede productivity increase and suggesting the necessary actions to be taken.

2. To smooth the internal processes and operations of the organization insure smooth flows of information both vertically and horizontally and insure trusty and benevolent interpersonal relationships-all meant to create a healthy system.

These points will be elaborated on in another section of this project. For now it suffices to say that through collecting data on organizational and employee performance and internal process and functioning the introduction of the MIS into the PFC is expected to have positive effects on the overall performance of the organiztion.

3.2 APPROACHES TO STUDYING MIS IMPLEMENTATION

There are different approaches to studying MIS implementation. This section will review the most widely known approaches to MIS implementation. Keen and Morton (1978) and Ginzberg (1978) distinguish between three different approaches. The first is the discriptive model of implementation. In this approach researchers/practitioners who have been in the computer field for long time draw upon their broad experience some general principles and guidelines for implementation.

The second is the factor apporach. It is based on surveying large samples of impementation projects-both successful and unsucessful ones-and trying to identify the general factors (or variables) that appear to be associated with successful implementation. Keen and Mortan(1978) contend that although the factor approach helped clarify some of the variables relevant to implementation there are no "absolute" facotors that can explain implementation. They concluded that only five factors plausibly agreed-upon to have substantial impact on the likelihood of success:-

> "Top management support.
> A clear felt need by the client.
> An immediate visible problem to work on.
> Early commitment by the user and conscious staff invovlement.
> A well-institutionalized OR/MS or MIS group."

Ginzberg (1975) examined 14 factor studies which identify 140 distinct factors as having an important correlation with success. He found that only 15 factors (11% of the total factors) appeared in 3 or more of 14 studies examined. One hundred and two factors (73%) appear in only 1 study.

The third is the process approach. This approach views MIS implementation as a process of organizational change. This approach is based on Lewin's (1952) and Schein's (1961 that was indicated bye Huse Edgar F.-1982) theory of changes which states that change consists of three stages: unfreezing; moving; and refreezing. Zand and Sorensen (1975) defined these phases as follows: "(1) unfreezing-behavior that increases the receptivity of the client system to a possible change in the distribution and balance of social forces; (2) moving-altering the magnitude direction or number of driving and resisting forces consequently shifting the equilibrium to a low level; and (3) refreezing-reinforcing the new distribution of forces thereby maintaining and stablizing the new social equilibrium."

Ginzberg (1978) differenciates between two theoretical bases serve as a source of the process approach: planned change approach and the innovation process approach. The former is based on Lewin/Schein theory of change as discussed above and the latter depicts a sequence of steps to be followed in the process of adopting an innovation. These steps-vary from model to

model-including problem recognition developing a solution to the problem trying the solution and finally if it works sustaining the solution. This last step is considered the application phase of the innovation. Ginzberg contends that the process approach helps us view the implementation of MIS as an entire process rather than seeing it as only a stage in MIS development. This would result in considering the problems that might be encountered in an earlier stage and thus developing a better understanding of the nature of these problems. It is clear that Ginzberg and Keen and Morton are advocates of this approach.

Gremillion (1982) on the other hand distinguishes between another set of approaches to MIS implementation. Specifically system planning approach; the systems engineering approach; and MS/MIS implementation approach.

The first approach system planning approach concentrates on the ".... interfaces between technology and the tasks and structure of the organization." This approach attempts to identify in some details the tasks performed by the organization and the structure of this organization and then develop appropriate computer-based tools to those tasks and structure. Implementation in this approach refers to the entire process as it does in the process change approach.

The engineering approach emphasizes the design of the technological tool itself and fucuses on "... how to build a "well designed" information system providing a body of techniques for

those designing and implementating systems. This implementation has a specific meaning and refers to the installation and operation of a computer into an organization.

The final approach the MS/MIS implementation approach cencentrates on "... the relationships among the technological tools and the persons and structure of the organization."

The work of Schultz and Slevin (1975) aptly represents this model. He brings out the concept of an implementation gap-a large numbers of models developed and never used. The thrust of this approach is on trying to get organizations to successfully use the models and tools developed by the researchers.

3.3 The Approach Adopted by This Study:

Viewing an organization as an open system and thinking of this project as an organizational developmental effort this project will adopt a combination of the process and factor approaches. A combination of these two approaches it is my belief will pave the way for easier and streamlined implementation.

To summarize this approach the introduction of a new system into an organization is viewed as an organizationl change and has to be dealt with accordingly. Therefore utilization of the findings of the process studies is warranted. Meanwhile the factor studies have offered several useful and helpful insights into the study of MIS development and implementation. Conse-

quently an effort of MIS introduction into an organization should take into consideration benefiting from the findings of these two approaches.

3.4 FACTORS EXPLAIN SUCCESS IN MIS IMPLEMENTATION

Overview:

This section will review factors believed to have a significant impact upon the implemenatation of a management information system.

Motivated by their suspicion that all the "principles" about management information system held by MIS professionals have no systematic bases Powers and Dickson (1973) conducted a study to find out what organizational and procedural factors account for MIS success.

Sixteen factors were selected for an in-depth study in the field. Data were collected by interview with MIS director project manager implementators and users. Four criteria were adopted to measure MIS project succuss: completion on time within budgeted cost to user satisfaction and with favourable impact on the computer operations function.

Among the factors examined only ten were found to be significantly related to at least one criterion of project success.

These ten factors and their relations to the four criteria are shown in Table No.1. The table indicates that there was no factor affecting multiple criteria consistently. It also shows that no factor was positively related to completing projects at budgeted cost. It is clear from the table that user satisfaction as a criterion of success was influenced very differently by the factors than were the other criteria.

The main finding is that "A tremendous difference exists between what factors MIS professionals believe to be important to MIS project success and what factors a depth study shows to actually be related to successful projects." (Powers and Dickson 1973).

Two weaknesses can be reported about this study. First although the study was initiated to examine the views held by MIS professionals it hypothesized its own factors and did not review them from MIS literature. Second among the success criteria adopted in this study only user satisfaction is extensively used in implementation research. Time cost and computer operations however have not been widely employed in this research. Therefore it is difficult to draw conclusions upon a study that applies unrelated criteria (Lucas 1981). It is the belief of some scholars that due to its methodological weaknesses it is difficult to generalize the study's findings.

TABLE 1
RELATIONSHIP OF FACTORS TO SUCCESS CRITERIA

Opinion Rank	Factor	Success Criterion: Time	Cost	User Satisfaction	Computer Operations
1	Participation by operating management in desing, formal approval of specification, and continued review of project.				
7	Organization level of top computer executive.				
12	Documentation standards used and enforced.				
14	Low turnover of project personnel.				
16	Source of origination of project (MIS staff or user).				
20	Length of experience in the organization of project personnel.				
23	High level of programming language used for project.				
31	High formal educational level of project personnel.				
32	Separation of analysts and programmers for large projects.				
33	Overall size of organization system staff.				

The 0.10 level of significance was used for all statistical tests.
"a": Rank of the Factor among the 34 factors examined.
"b": Indicates that the factor contributed to success on the criterion.
"c": Indicates that the factor detracted from success on that criterion.

Source: Richard F. Power and Gary W. Dickson, "Mis Project

The factors (or variables) relevent to MIS implementation research are classified into two categories: dependent and independent. The most popular dependent variables referred to in the literature of MIS implementation are indicators of actual or intended use of a system. Multiple dependent variables however may sometimes be used in a study which increases the reliability of the study especially when different sources to collect data are used (Lucas 1981). An independent variable on the other hand can be employed to influence dependent variables. For example involvement in system design and implementation (an independent variable) may result in high levels of the system use on part of the users (a dependent variable) (Lucas 1981).

These two sets of variables are reproduced in Table No.2. The indepenent variables are those related to successful implementation as defined by MIS researchers. These variables fall into several classes. The policies and practices of the information services department affect positively or negatively (depending on the policies and practices of this department) the implementation effort. Involvement on part of the users in system design and implementation is important as well as having favourable attitudes on part of those users toward the system. Personal and situational factors can make a differnce toward the system and so can the technical quality of the system. Management appriciation and support of the system is essential to insure successful implementation and high levels of system use. The dependent variables included in the table on the other hand

TABLE 2
VARIABLES ASSOCIATED WITH IMPLEMENTATION STUDIES

Independent Variables
Information Services Department Policies System desing practices Operations policies
Involvement User origination of systems Involvement and influence Appreciation
Situational and Personal Factors Personality type Business history Social history Structural factors Past experience
User Attitudes Expectations Interpersonal relations
Technical Quality of Systems Quality Model characteristics
Decision Style Cognitive style
Management Actions Consultant/client relations Support Location of researcher Managerial style
User Performance
Dependent Variables
Implementation Frequency of inguiries Reported use Monitored frequency of use User satisfaction

Source: Lucas, H. "Information System Concepts for Management." 1978, by McGraw-Hill, Inc. p.79.

are used to measure implementation success and refer to frequent use of a system intended use and/or user satisfation with the system.

In this project however the factors are grouped into the following categories:-

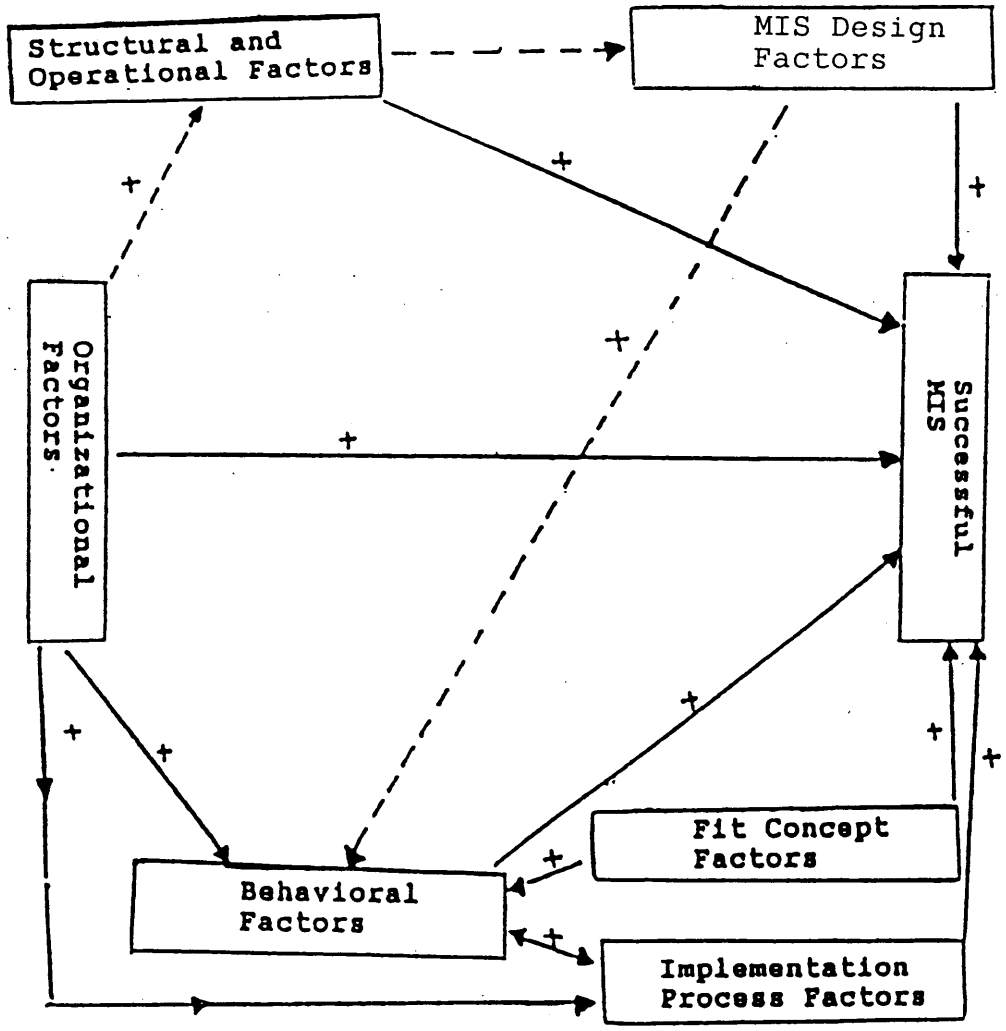
1. Organizational factors
2. Behavioral factors
3. Structural and operational factors
4. MIS design factors
5. Fit concept factors
6. Implementation process factors

Figure No.1 portrays these factors and the relationships between them. As show in the figure the relationships between these sets of factors are hypothesized to all be positive. In the remaining of this section I will discuss each set of factors separately and then explain the relationships between them. Finally some generic implications for successful MIS implementation will be offered.

3.4.1 Orgnizational Factors:

This set includes such factors as organizational size and maturity availablity of resources organizational climate centralization and formalization and management involvement and support. It has been argued that the likelihood of successful

FIGURE 1
FACTORS INFLUENCING MIS SUCCESS AND
THE RELATIONSHIP BETWEEN THEM



→ : Direct Causal relationships

---► : Indirect Causal relationships

implementation is increased when the organization is more centralized more mature and possesses the resources needed to implemment the system. There has been some argument over the organizational size. The likelihood of successful implementation is higher when the size of the organization is large Robey and Zeller (1978) reported that a small size of the organiztion can be a determinant of a successful system.

Robey and Zeller's (1978) study was conducted at two neighboring plants of a division of a large corporation. The plan was to introduce an identical MIS into these two departments. The result was adoption and success by a department and rejection and failure by the other department. The authors' findings indicate that there were some differences between the two departments in terms of departmental size complexity formalization centralization and management support. It's clear from the findings that selected strucutal variables can impact implementation. It was found that the rejecting department is larger and includes a large number of "occupational specialities" than in the case of the adopting department.

Another factor is that the rejecting group suffered high complexity which made it difficult for them to handle conflict and smooth implementation. There was also the fact that the group which rejected the system had very few formal rules to manage the activities of members whereas the adopting department was relatively more formal. In addition the authors showed that

the adopting department had more centralized authority that the rejecting one. Finally management support is the last category where differences between these two groups existed. In the adopting department the project was highly supported by management which resulted in successful implementation and high level of use. By contrast management support was lacked in the rejecting department and conflict over the benefit of the system and the accuracy of its outputs existed. Table No.3 depicts these differences.

Organizational factors included also supportive organizational climate. It suggested that for an MIS to succeed the organizational climate has to be supportive and enhancing positive attitudes toward MIS (Cammann and Nadler 1976) suggest that conrol system (here is referred to as MIS) should be in harmony with organizational climate structure and reward system.

Among organizational factors management support is probably the most acknowledge factor to influence MIS implementation (Ginzberg 1981). It is considered by some scholars a prime prerequisite to successful implementation of MIS and without it the whole effort should be abandoned.

There are several reasons why an MIS planner should obtain top management support at an early stage of system development.

First if convinced top management can influence subordinates' positions and thus generate favouable attitudes on part of the users toward the system. Top management support is needed

TABLE 3

ORGANIZATIONAL DIFFERENCES BETWEEN ADOPTING AND REJECTING DEPARTMENTS

ORGANIZATIONAL CHARACTERISTICS	ADOPTING DEPARTMENT	REJECTING DEPARTMENT
Size	Small	Large
Complexity	Relatively less complex	More complex
Formalization	Relatively more formal	Less formal
Centralization	Relatively more centralized	Decentralized
Management Support	Supported by Management	No management support

Source: Robey, D. and Zeller, R., "Factors Affecting the Success and Failure of an Information System for Product Quality." Interfaces, vol. 8, No. 2, February 1978, pp. 70-75.

also to obtain the financial resources required to implement the new system. Finally it is needed to help in "crossing organizational boundaries and in restructuring activities."

Management support may take different forms. Management should first clarify objectives and set priorities of the system (Lucas 1975). It should also create and maintain favourable attitudes toward the system and develop team spirit to lead the organization with enthusiasm into new effort (Lucas; 1976). Management must be willing to devote enough time and effort to the new system. It should also explain to the affected groups the benefits of the system to facilitate its acceptance. Providing the needed resources especially manpower is top management responsibility.

It's also important that management influence users and information service department to coordinate their effort toward the ultimate goal of the organization (Lucas 1975)

Managers' association with MIS is influenced by their appreciation understanding motivation and perception of MIS. The implications of this arguement are clear; MIS designer-who very often is a management scientist-should attempt to have managers at the organization or which the system is being developed understand appreciate be motivated to and have favourable perceptions of the MIS. This can be accomplished by selling the system to management i.e. management to be persuaded by the prospect payoffs of the system and convinced that the system will be for their advantage.

Management should recognize the need for the new system and should be committed to it as well. Finally management should be skilled in using the system.

3.4.2. Behavioral Factors:

This set of factors refer to creating a favorable behavioral climate and felt need for the system user attitudes and perceptions user involvement and user participation and commitment.

Developing a favourable behavioral climate is necessary for alleviating behavioral problems that might be encountred in the implementaion stage (Alter 1978). According to "Alter" such a climate can be created by utilizing strategies such as MBO . top management support participation and involvement of users and education.

Related to this point is the perceived need for the system. The greater the felt need for the system and the lower the fear about it the greater the likelihood of success (Zand and Sorensen 1975).

Favourable user attitudes and perceptions of the system are strongly correlated to success in MIS projects (Cerullo 1979). User involvement in the entire process is a problematic issue. While many believe it is essential for sucess in MIS projects (Ginzberg 1978; Zmud 1979; Lucas 1976;) still others are doubtful about if.

In their critical study Ives and Olson (1984) concluded

that:

1. Research on user involvement is rarely based on strong theory.

2. Emperical research has not convincingly demonstrated the benefits of user involvement.

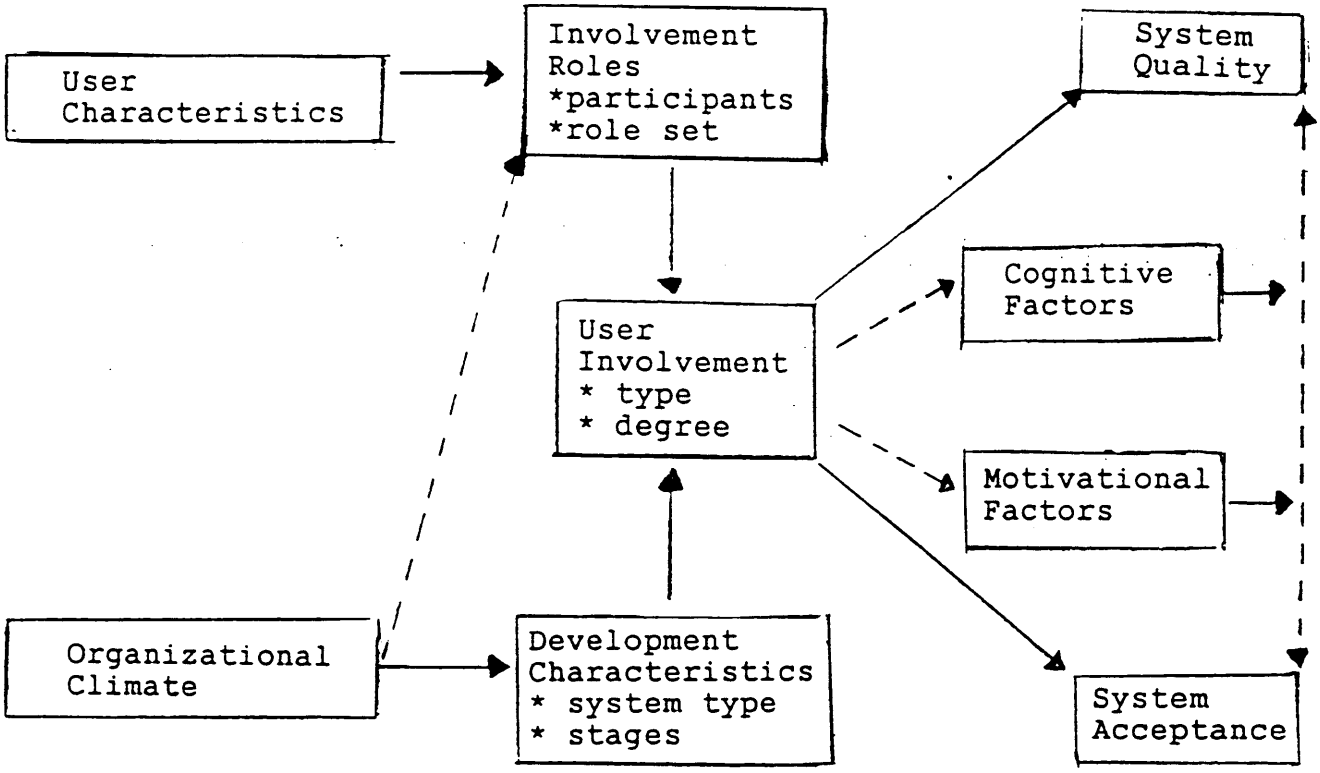
3. The majority of studies on user involvement has been methodologically flawed to the extent that few conclusions can be made about user involvement's relationship to system success."

The authors reviewed 22 studies and found that only 8 studies claim to demonstrate a positive relationship between user involvement and system success seven others present mixed results and the rest present negative or nonsignificant results. The authors call for finding regorous measurement and methodology as well as a regoruos conceptual foundation. Accordingly they have developed their model on user involvement. Figure No. 2 depicts their model.

According to the model two sets of conditional variables affect user involvement. The first set represents those who should participate and their assumed roles. People who should participate are those who will be the principal users of the system. The second set concerns development process characteristics. Under this set two conditions may affect user participation: System type and stages of development. For some systems

FIGURE 2

A DESCRIPTIVE MODEL OF USER INVOLVEMENT



Source: Blake Ives and Margrethe H. Olson, "User Involvement and MIS Success: A Review of Research, "Managment Science, vol. 30, No. 5, May 1984; 586-603.

involvement is necessary to insure acceptance of the system whereas for others it is inappropriate as in systems that demand high technical expertise. For a certain stage of development user participation is advocated as in the initiation and installation stages. But during the physical develepment of the system it may be less important. These two sets of variables are influenced by organizational climate and user characteristics.

User involvement may vary from direct where all users are involved to indirect in which user representatives participate in the process. The degree of participation refers to "the amount of influence the user has over the final product." (Ives and Olson 1984). In this sense the degree of involvement is a continum begins with "no involvement" and ends with involvement by strong control".

As to the outcomes of this process the model presents two sets of variables: System quality and system acceptance. These two variables are affected by two intervening factors: cognitive factors which intervene between participation and system quality and motivational factors which intervene between involvement and system acceptance. Cognitive factors refer to understanding the system better assessment of its needs and evaluation of system attributes. Motivational factors inculde "increasing user perceived ownership of the system decreasing resistance to change and increasing commitment to the new system (Ives and Olson 1984).

By contrast others as cited above consider user involvement essential if the system is succeed. Lucas (1975) for instance asserts that user involvement "is important not only in developing favourable attitudes but also in creating an understanding of models."

High percentage of turnover among MIS personnel is expected to adversely affect the system. Lowering the level of conflict and decreasing the sense of power loss between users are believed to increase the likelihood of success (Cerullo 1979).

To incorporate behavioral dimensions into a a control system Newman (1975) has suggested the followings:

1. The control system should be related to accepted goals to the people to whom the system is designed.

2. The standards to be set should be tough but attainable to promote a sense of accomplishment.

3. Competition of attention should be decreased.

4. Detailed description of the system is not recommeded in order to allow self adjustment and encourage self-control.

3.4.3. Structural and Operational Factors:

This element of factors describe effective modes of communication greater degree of system integration providing training and education programs and location and policies of MIS department.

Effective communication between people involved in the development effort should be established to enhance the likelihood of success (Rodriguez 1978). A management information systems should be highly integrated into the whole system so that it would be able to function properly (Gizberg 1978).

Conducting training and education programs for both management and users is important to insure their understanding of how the system works (Lucas 1975; Nadler 1976).

Locating the MIS department is not an easy decision and thus deserves great attention. Before determining the appropriate placement of the MIS staff argue Reif and Monezka (1973) the following issues ought to be considered:

1. Ability to provide organization-wide service.

2. Acceptability by operating segments.

3. Simplicity of organizational structure.

4. Capabilities of existing personnel

Reif and Monezka (1973) also added two other points to be considered in the location decision: whether the MIS department will be a captive or an independent one and the level of the MIS department in the management hierarchy. MIS staff should be as close as possible to the chief officer of the organization and not lower than two levels below him.

The policies adopted by the MIS department should be supportive and enhancing since the success of the system is significantly influenced by the relationship between users and the MIS department (Lucas 1975).

3.4.4. MIS Design Factors:

Including under this set are factors as having an explicit statement of goals to be achieved formal documentation of the plan assigning project team or steering committee considering user requirements flexibility and adaptability and using modules in desiging a project.

A statement to describe the purpose of the system should be made clear to let everyone know what is being conducted Nadler 1976). The project plan should be formally and completely documented in order to have management approval of the plan.

Assigning a project team of steering committee is highly suggested to hold someone responsible for following up the entire project. Dividing the project into manageable modules is strongly recommended to smooth the implementation stage contends that use of modules can help in building less complex systems achieving the interim goals and providing management with interim payoffs.

The design of the system should be flexible and adaptable to allow necessary modifications during the implementation phase.

The system should consider user requirements and be responsive to the manager's personal and organizational needs (Mintzberg 1975; King 1979).

The MIS should be designed in such a way to prevent some of its disruptive behavioral consequences (Mintzberg 1975). "The MIS may be a vehicle for bureaucratic control (but) it may promote rigidity narrowness and a lack of free mevement... (To prevent this) MIS should first and foremost be for the manager - and that means he must have a full control over it." (Mintzberg 1975). Information about organizational process as well as organizational performance should be included in the design of MIS.

3.4.5. Fit Concept Factors:

The greater the fit between MIS overall desing and organizational and indiviual characteristics the greater the likelihood of success. Two aspects of this fit: individual and organizational.

Individual fit refers to considering manager's cognitive style and differnt needs of managers.

Organizational fit on the other hand indicates the degree of integration with the overall system and the extent to which the MIS reflects the organization's view of the world.

In 1975 Schultz and Slevin developed the Behavioral Model

Building Theory which rests on three basic concepts:

1) a successful model and what determines success;

2) technical validity; and

3) organizational validity.

They define a successful model as one that "... adequately represents the phenomenon being modeled and is used for the purpose for which it was designed.

Schultz and Slevin suggest two main factors to determine the probability of success:

1) technical validity "... referring to the capability of the model in solving the problem"; and

2) organizational validity referring to "... the compatibility of the model with the organization."

This fit is multidimensional which means it occurs at three levels: individual small group and organizational.

Ravinder Nath (1989) argues that an introduced system should fit well with employee expectations and values in order to lead to greater efficiency and job satisfaction.

3.4.6. Implementation Process Factors:

The factors relevent to this element are favorable handling of the implementation process insuring management support during this stage good relationships between the client and researcher utilizing participative approach creating a change climate and frequent review meetings.

Successful MIS system is related to the quality of the implementation process (Ginzberg 1975). Favorable handling of this process is expected to increase the likelihood of success. Prior to this is the creation of a climate of change to overcome any resistance the system might face. This change however should not be forced: otherwise it would be counterproductive (Guimaraes 1981).

Managment support of the change effort and good relationships between the client and researcher are important in facilitating the implementation process. User initiation of and participation in the system will enhance the liklihood of successful implementation (Alter 1980)

The user of a participative approach is strongly argued for. This argument is based on the fact that every change effort generates some conflicts of interests among people involved in the effort and these conflicts are to be recognized negotiated and solved to the interests of all parties involved. The best possible way for those people to solve their conflicts to their

interests is to be represented at the negotiation process. Therefore a successful change strategy would be one that utilizes a participative approach.

They identify three levels on a continuum of user participation:

1. Consultative participation in which most of the decisions are left to a traditional systems design group although there is a great deal of consultation and discussion with employees at every level.
2. Representative participation requires a higher level of participation from a user group. The design team is composed of representatives of all grades of the user department.
3. Consensus participation involves all staff in the user department to participate continuously throughout the development process.

This approach is expected to result in developing a sense of ownership of the system among users which is important at successful implementation (Lucas 1975). During the implementation stage frequent review meetings should be held with all affected parties to assess what has been accomplished and what has been learned through this process (Lucas 1975 and Cerullo 1979).

An "implementation risk analysis" is a strategy suggested by Alter (1980). Such an analysis "... begins with the identification of a 'ideal implementation situation'. Deviations between

the existing circumstances and the ideal are identified as risk factors i.e. conditions that decrease the likelihood of successful implementation. For each risk factor that is relevant a corresponding implementation strategy should be devised." He contends that following this approach will reduce uncertainty and thus facilitate the implementation process.

In a study to examine what factors occur frequently at the implemtation process and to assess their importance in determining implementation success of failure (Ginzberg 1981) has found that three factors stand out:

1) Commitment to the project;

2) Commitment to any change required by the new system; and

3) Insuring that the project is well defined and plans are carefully specified.

3.5 RELATIONSHIPS BETWEEN THESE FACTORS

The factors presented in this section were grouped into six general categories: oranizational factors behavioral factors structural and operational facotrs MIS design factors fit concept factors and factors related to the implementation process itself. Each category and the factors included in it were discussed indiviually. Having completed this my purpose now is to turn to a discussion of the relationships between these factors.

These relationships as mentioned before are hypothesized to all be positive. In other words each set of factors is expected to positively influence the other set which is affected by it and these sets of factors combined and being favourable are expected to result in successful implementation of MIS.

Favourable organization facotors for instance are expected to stimulate users' attitudes toward the system and thus generate favorable behavioral factors. Organizational factors affect two other sets of factors too. If convinced by the payoffs of the system the chief executive can create a climate in which the implementation process will be favorably handled. He can also smooth the structural and procedural elements of implementation. Lastly favourable orgainzational factors are expected to result in successful implementation.

Behavioral factors while influenced by organizational factors are also affected by three other sets of variables. The characteristics of the system if desirable will favorably attract users to participate in system implementation therefore resulting in favourable behavioral climate. If the system to be introduced into an organization is compatible with organizational and individual needs it will be welcomed. Hence the better the fit between the systems and organization and idividual requirments the more favourable the behavioral climate will be. The implementation process affects and is affected by behavioral factors. Favourable handling of implementation process and

avoiding disturbances during this process will result in high level of employees' participation and involvement in the implementation effort. Favorable attitudes held by the affected groups toward the system to be introduced on the other hand will facilitate the system implementation. Being favorable these sets of factors combined with each other will result in successful implementation of MIS.

3.6 IMPLICATION FOR SUCCESSFUL IMPLEMENTATION OF MIS:

For an MIS project to succeed several prerequisites are to be met. The following suggestions constitute a synthesis of findings of the studies reviewed and discussed in this section:

1. Management has to support and be committed to the new system during the entire process. It should express its support to the system through devoting enough time and effort providing sufficient resources e.g. money and manpower and through creating a climate of change to facilitate the introduction of the new system.

2. Management should issue an explicit statement of purposes and goals of the new system. These goals need to be realistic and put in operational terms in order to be achievable. Conveying these goals to system developers and users requires building effective modes of communication between management developers and users of the system. By so doing management can effectively persuade the affected groups of the benefits of the

propsed system and promote favorable attitudes and perceptions on the part of those groups toward the system to facilitate the introduction of the new system.

3. Management should assign responsibilities and divide work among people involved in the process coordinate their efforts and develop team spirit to lead the organization with enthusiasm into its new effort. People involved should be invited to participate in the design and implementation as to create a sense of ownership of the system among users. Those users should be trained to work with the new system.

4. The new system should fit organizational and individual characteristics to insure system acceptance and integration with current structure. To facilitate system design and implementation modules can be used in these two phases of system develepment. The implementation process should be favorably handled to ensure smooth progress and avoid harmful interruption. To help accomplish this frequent review meetings and check points during the implementation process should be conducted.

3.7 A STRATEGY FOR SYSTEM DESIGN AND IMPLEMENTATION

Building on what have been mentioned in this project this section will present an MIS implementation plan for the PENSION FUND COMMISSION with emphasis on managerial actions and describe an ongoing feedback system. Information needs of PENSION FUND COMMISSION will be discussed and problems of implementation

specific to this organization will be identified. And finally a strategy to address these problems will be presented.

As stated in the first section the proposed system is introduced to aid in finding and solving problems relevant to organizational performance and process at the PFC. This is accomplished through utilizing an ongoing feedback system. The suggested system as mentioned before is concerned with activities performed at the operational level of this organiztion. Extending this program to include areas beyond this level is left to the organization to consider in the future as it gains knowledge and experience with the new system.

Introduction of the system should be carefully handled and each step is to be deliberately conducted in order not to generate undesirable effects. The theory of change discussed earlier has been utilized to introduce social and organizational change for several years and has proved to be highly effective in terms of the resulted success of the introduced system.

Accordingly the strategy presented in this section is built around this theory capitalizing on the major contribution to it. The model on Figure No.3 represents this strategy. The model is inspired by the work of Lewin (1952); Ginzberg (1975); Zand and; Nadler (1977); and Pounds (1969).

The model is composed of five phases:

1. Initiation-associated with unfreezing.

FIGURE 3
A MODEL OF SYSTEM DEVELOPMENT AND IMPLEMENTATION USING THE THEORY OF CHANGE

	Unfreezing	Moving	Refreezing
Initiation	Disconfirmation of unfavored patterns of behavior; establishing a felt need for change; minimizing threat or obstacles to change; maximizing psychological and organizational support to move or change in the right direction; creating a climate for change; and gaining management support and commitment.		
Diagnosis	Collecting data for purpose of diagnosis (with the involvement of employees in this step and all the forthcoming steps); problem finding; problem definition; motivating employees to search for alternatives; agreement on action (change); and creating a perception of payoffs.		
Planning	An explicit statement of purposes and goals to be achieved (in operational terms); building effective modes of communication between manager and employees ivolved; gaining user commitment; introducing the concept of MIS; explaining how it works; training employees how to collect data, how to input data, and how to read feedback reports; training managers how to communicate data, and how to use the system; assigning task force; dividing work among people ivolved; setting up a schedule; and determining information needs.		

FIGURE 3
(continued)

	Unfreezing	Moving	Refreezing
Action		Data collection, data analysis; data integration; system design; testing the system; approving the system; putting the system into use; progress monitoring; insuring system fit integration.	
Evaluation/ Termination			Continous evaluation (during implementation and afterward by both management users); making necessary modification or adjustment; strong support to system using (confirmation); and linking system use to the reward system (internalization).

2. Diagnosis-associated with unfreezing.

3. Planning-associated with unfreezing and moving.

4. Action-associated with moving.

5. Evaluation/Termination-associated with refreezing.

These phases will be discussed in some detail in the following page. The stages that compose the change theory (unfreezing moving and refreezing) will not be referred to explicitly in this discussion. Rather they will be implied when discussing phases of the model with which a stage is associated. For instance talking about initiation diagnosis and planning implies that unfreezing is discussed too and so forth.

3.7.1 Initiation

Initiation is the phase in which preparation for the new system begins. In as much as many later efforts in system development are highly affected by the way this phase is conducted a great attention should be paid to it.

The emphasis in this phase is on making the organization ready for change. This requires the creation of favorable attitudes perceptions and climate for change. The organization must be ready for change from the outset (Zand and Sorensen 1975). Change however needs to be self-motivated (Keen and Morton 1978).

There are different policies that can be employed to promote

such climate. The removal of supports for the old attitudes the saturation of the environment with the new attitudes to be acquired a minimizing of threat and a maximizing of support for any change in the right direction.

Similar policies are suggested by Zand and Sorensen (1975). They include lack of confirmation (one no longer receives positive communication); Disconfirmation (receiving negative cues about one's patterns of behavior); Comparing current individual and organizational performance to a better one achieved in other areas or to better performance theortically achievable; and providing psychological support to reduce apprehension and anxiety of change. Nadler (1977) argues that providing employees with feedback about their performance can be a powerful tool to energize and direct their behavior. Implied in this argument is that energizing behavior is a prerequisite to directing behavior.

The implication of this discussion for PFC is that management has to realize that the introduction of MIS into the organization is an organizational change and thus preparation for this change has to precede. In this respect management can do serveral things to promote a sense of necessity of change. It can measure organization performance on a random basis and communicate these measurements to employees to create such feeling. It may choose to communicate these points to employees verballly on an individual basis. Still it may prefer to hold meetings with employees and discuss the matter openly with them and ask for

employees' comments. Employees should be encouraged to participate in the discussion and express their views plainly. The purpose of these and other similar actions is to let people at units where change is needed share the sense that the current level of performance is not as satisfactory as it should be and that searching for ways of improvment is necessary.

3.7.2 Diagnosis

This phase starts with collecting some data on individual and organizational performance. Employees' involvement and participation are essential at this phase and the rest of the phases as well. Therefore employees should be involved and participate till the last phase of the project. Nadler (1977) has pointed out that research "... indicates that the perceptions people have at the time of data collection about possible uses of that data in the future affect the direction of energy (generated by data collection).

This implies that employees should be assured that there will be no harmful consequences of this data collection and that this collection is for purposes of improving organizational performance.

Later in this phase the organization should be able to determine what problems it has if there is any in terms of performance and processes. A problem says Pounds (1969) exists when a difference "... between some existing situation and some

desired situation occurs. Therefore "... the process of problem finding is the process of finding differnces". This model of problem finding (Pound 1969) compared to structures proposed by other is shown in Figure No.4.

Two observations should be made about this model. First "Elements of managerial activity will be referred to as operations. An operator transforms a set of input variables into a set of output variables according to some predetermined plan." (Pounds 1969). To use the example he gave laying-out a production schedule is an operator that takes several input variables such as machine labor and product requirments to produce a prespecified outcome.

Second the process of problem finding in this model with which this project is concerned is composed of four phases:

(1) selecting a model to define differnce

(2) using the model to compare current situation of productivity and other managerial activities to a desired one

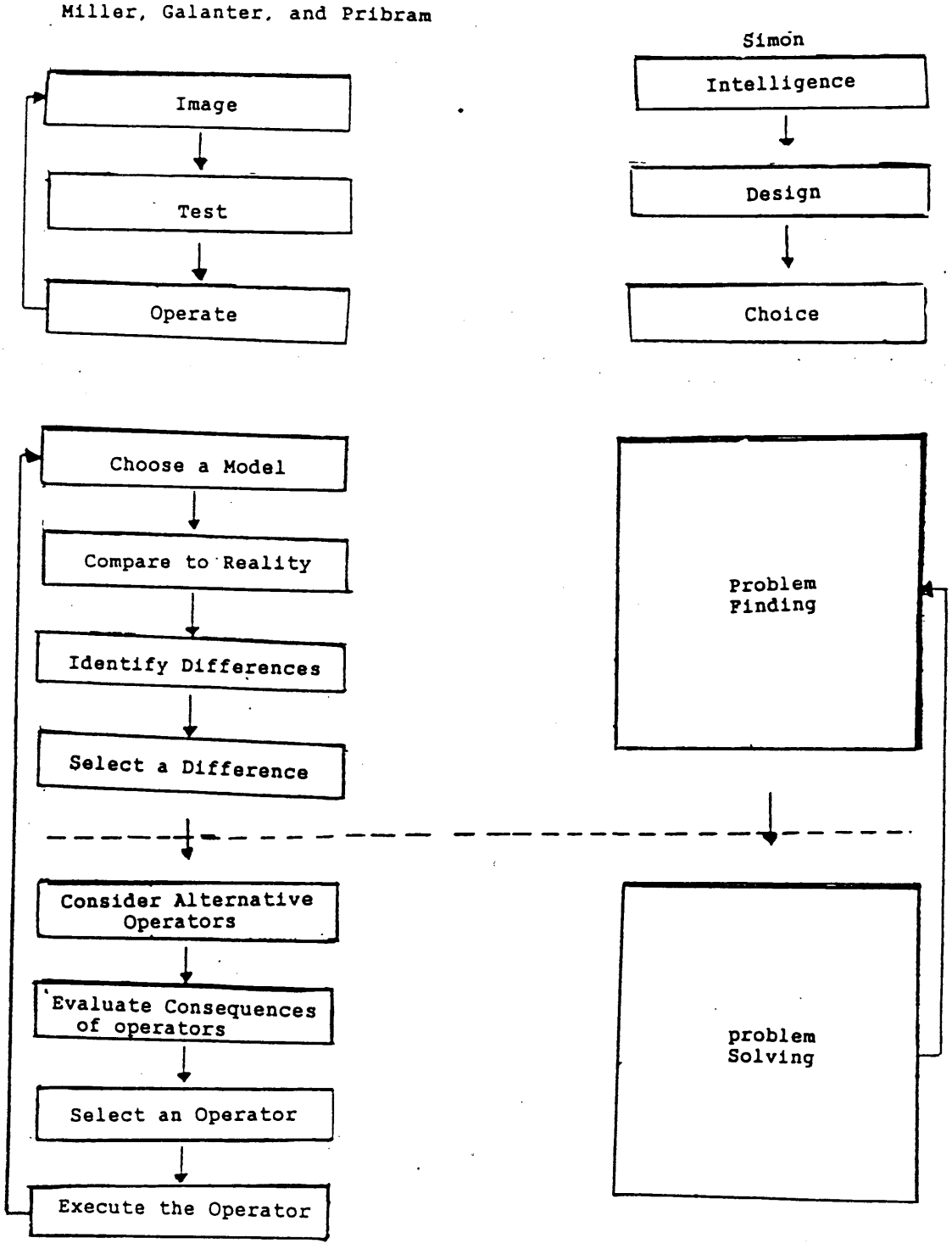
(3) identifying differences between the current situation and the desired one and

(4) selecting a difference to decide on a collateral strategy.

This model serves fairly well in this period of system development. The PFC can follow the processes described above to determine problems and areas of weaknesses and decide where to concentrate. Before leaving diagnosis an important point should

FIGURE 4

FLOW CHART OF MANAGERIAL BEHAVIOR



Source: William F. Pounds, "The Process of Problem Finding," Industrial Management Review, Fall, 1969, p.6.

be mentioned. For change to occur key individuals at the organization should be "... highly motivated to bring about such change and (should be) successful in motivating others in the organization to perceive the potential payoffs " associated with the new system.

3.7.3 Planning

Planning begins with issuing an explicit statement of purposes and goals to be achieved by the introduction of the new system. The goals should be realistic specifically defined and put in operational terms to be achievable. The statement for instance may require that information flow between directorates and units of the PFC should follow a certain manner or that productivity in directorates where change is needed should increase to a certain level. The goals should be reached at jointly by management and employees to ensure employees' commitment to them.

To facilitate information transfer and discussions over the relevant issues building effective modes of communication is required. These modes of communication are important to generate an atmosphere of trusty and benevolent relationships between management and employees involved in the process which is essential to increase the likelihood of successful implementation. Effective communication may serve other functions too. By using management skills of influence and persuasion it can motivate

employees to increase their efforts. To these may be added the removal of barriers which could be found at the current communication channels.

People at the PFC need to be ready at this point of time to receive positive cues to direct their energy. This is probably the most suitable time to introduce the concept of MIS explaining how it works and answering questions about it. This should be deliberately carried out so as to create favorable perceptions of the new system. Conducting a seminar to introduce MIS to employees might be helpful though it is not too essential. Instead management can do this in a meeting with the involved groups which may support system acceptance. Management of the PFC should also obtain employees' commitment to MIS at this early time to smooth progess in project implementation in later stages. This commitment needs to be maintained throughout the entire process. Considering employees needs when designing and implementing a system and their full participation in these two stages are believed to be highly effective in obtaining their commitment to the system to be introduced. Management at the PFC is recommended to try both approaches to have committed employees from the outset and throughout the effort.

Transferring the concept of MIS into practical knowledge requires conducting training and education sessions which is the next step. Training facilitates learing generates favorable user attitudes and makes user involvement easier. Employees thus

should be trained how to collect data about areas desired to be incorporated into the proposed system-be it organizational performance organizational processes or something else. They should also be trained how to input data to generate needed reports and how to read feedback reports upon distribution to them.

Management on the other hand needs a rather different set of training programs. They should be trained how to communicate data back with their comments once data are submitted to them how to use the entire system and how to employ it to the interest of the PFC. Related to training sessions is the development of a user manual to help user understand how the system works and therefore how to use it.

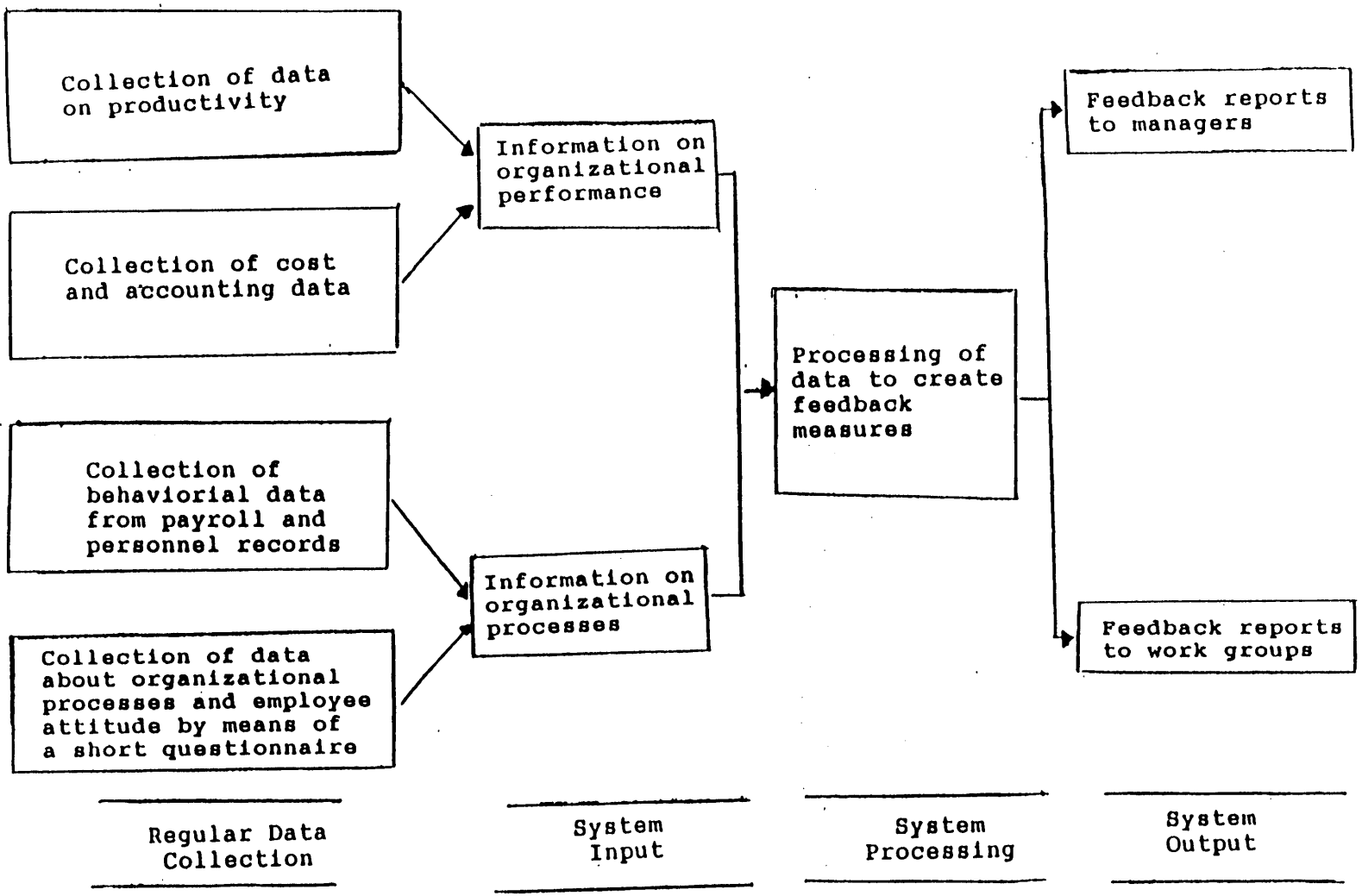
Comes after training sessions is assigning of a task force to be responsible about activities that follow. The task force should include representatives of directorates and sections affected by the new system and representatives of management as well. The task force duties may encompass developing a schedule to guide MIS team and those involved in the process decide what information to include in the system what information to distribute what types of inforamation to be fed and what information to appear in the feedback reports (Nadler 1976). The task force may also suggested a preliminary design of the proposed system based on their views and understanding of the system. This design is not final. It is only a suggestion.

Before moving to the next phase it is the task force responsibility to make sure that everyone involved in the process at this time unerstands the new system and that everyone in the MIS team knows where the PFC is heading to. Specifically it should be clear that the PFC is developing a system to control those activities performed at the operational level.

3.7.4 Action

This is the stage in which the proposed system is to be designed and put into use. Nadler Mirvis and Cammann (1976) developed a model of an ongoing feedback system for a midwestern bank to include information on organizational performance and organizational processes. Figure No.5 depicts their model. The authors suggest four phases to build the system: data collection system input system processing and system output. First data on productivity and cost and accounting are to be gathered to generate information on organizational performance. Likewise to generate information on organizational processes data have to be collected from payroll and personnel records and on orgainational processes and employee attitudes. As information gathering on these two areas is completed the next step system processing can be undertaken to create feedback measures. Once the measures are developed they can be applied and the resulted reports can be distributed to managers and work groups which is the last step.

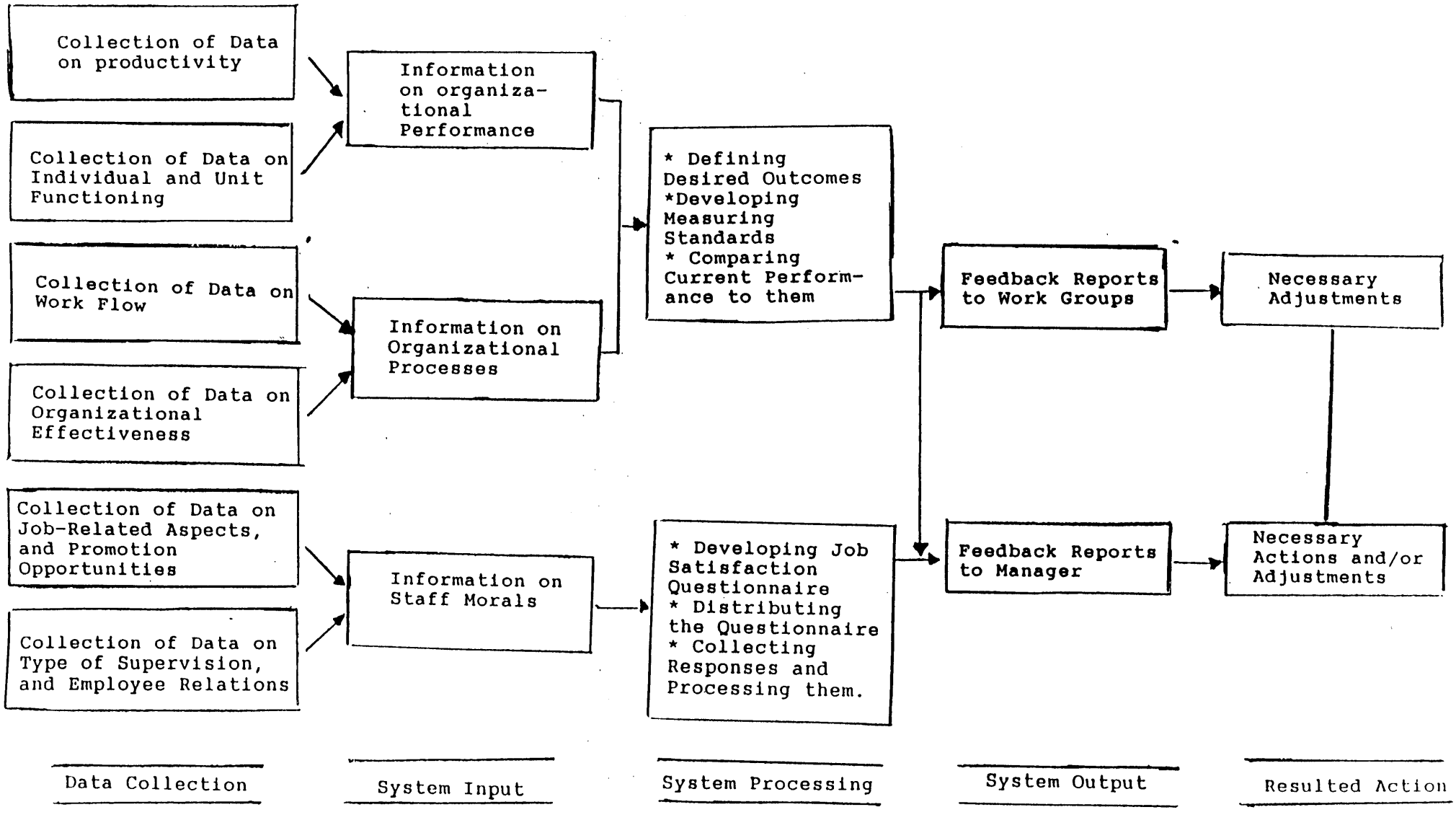
A MODEL OF AN ONGOING FEEDBACK SYSTEM



Source: David Nadler, Philip Mirvis, and Cortandt Cammann, 1976, "The Ongoing Feedback System: Experimenting with A New Managerial Tool," Organizational Dynamics, Vol. 4, No. 4, p.66.

FIGURE 6

A SUGGESTED MODEL OF AN ONGING FEEDBACK SYSTEM



To adjust this model to the case of PFC a refined one has to be developed. A complete model however should include information on organizational performance organizational processes and staff morale. This model is shown on Figure No.6. Since this project deals only with organizational performance and organizational processes there will not be much talk about staff moral. What is necessary to mention here is that to decide what information to gather on staff morale the model drawm upon some of the recent findings of job satisfaction studies. Hopkins (1983) for instance conducting research on job satisfaction in the public sector concluded that job characteristics especially job quality which is composed of indicators of variety of tasks planning skill freedom decision making and learing new things; job environment; fairness of promotion; type of supervision; and employee relations are the most important determinants of job satisfaction.

There are two other points to be mentioned about staff morals. The first is that work groups as clear in the model shall not be provided with information on staff morale. The reason is that the side effects of this provision will outweigh its positive ones if there is any. The second is that the model does not imply that staff morale can only be measured by a questionnaire. In fact other indicators might be utilized too. For example direct observation turnover rate absenteeism rate can all be simultaneously employed. The questionnaire however will probably be the most accurate measure.

To build the feedback system suggested for PFC several phases should be followed. For pupose of convenience and to help build a lesser complex system the system to be developed in accordance with the proposed model can be divided into manageable modules whose integration with one another should be highly effective (King 1979; Ein-Dor and Segev 1981).

Data collection is the step to begin with. This should be carried out in a formal and documented manner. Given that the system to be developed will focus on organizational performance and organizational processes the information needs of the PFC will be related to these two areas. The PFC thus needs to gather information on current level of productivity in units where change is needed individual unit and organizational functioning work and information flow between directorates and divisions and organizational effectiveness. The result of this step will be the information base (system input) upon which the proposed system will be built.

There are different methods of data collection. Questionnaire interview observations and examining of organizational archives i.e. various documents records and written materials the organization keeps. Since the scope of the new system is limited to organizational performance and process it appears that examining organizational archives is probably the most appropriate method to build the data base for this system. Data

gathering should be the responsibility of the task force.

As the job of data gathering is finished data analysis and integration can be undertaken by the task force. The purpose of this step is to filter the information gathered and to decide what pieces of it would be useful and helpful in system design. In other words the task force should decide what pieces among this information will be used to measure and control organizational performance and organizational processes. The result will be filter information ready to build upon in the next step system processing.

In system processing several steps need to be pursued to accomplish this task. Upon the data collected in the previous step which would necessarily include some historical information on the PFC's performance and processes and with help of expert's judgment the task force should establish the desirable levels of improvement standards. The first two criteria indicates that a standard can be achieved by the vast majority of people at the organization and the third refer to the relative importance of a given level of performance to the organization. The final procedure in system processing is to compare the current state of affairs in organizational performance and processes to the selected standards and determine what deviations have occurred.

The next step in building the system will be to decide how to present data to managers and employees. For data to be presented they should be relevant and meaningful to the recipients

understandable descriptive and relatable to real-life events valid limited-not overloaded comparative include standards to which a comparison can be made and extracted from existing information.

The most known method of data presentation is probably feedback reports. To be effective a feedback report should include easy-to-read and not too much information; encompass some graphs portraying to help translate data to figures easier to read and understand than solid data; and have current performance compared to the selected standards to show what change took place and in which direction.

The contents of these reports should be related to the areas controlled i.e. these reports should contain information on individual and ogranizational productivity; individual unit and organizational function; work and information flows between directorates and units; and organizational effectiveness. Once formated the reports should be distributed to managers and employees in the concerned units containing the information needed to be communicated to them. The next and final step in the feedback cycle is to take necessary actions of adaptations to match real achievements in the two areas to the preestablished standards which were agreed at and committed to earlier.

At this point of time and following course of events prescribed in this section the system should be developed. The

next move is to test the system to verify that it works as planned. A sample testing seems sufficient. If the system proves to be working and understood other activities continue as prespecified; otherwise necessary modifications can be unertaken to assure the system's appropriateness to the purposes for which it was created.

The system then is to be approved by both management and employees to ensure both sides' committment to it. A final yet important point about Action Stage is still to be posited. Progress through this stage and others as well should be monitered step by step to ensure successful development and implementation of the system (Alter and Ginzberg; 1978). Frequent review meetings can be held to insure this progress.

Through its effort to develop and implement the proposed system PFC may encounter some difficulties or implementation problem which are related to system design implementation process attitudes toward the system and resources needed to develop and operate the system. These problems will be discussed in the following pages and a strategy to address them will be offered.

First the mission the goals and function of this organization may not be clearly understood by the employees at the operation level where the proposed system will be introduced. This is true because these things may have never been explained to those employees nor have their contribution to the overall organizational performance been shown to them. The expected

outcome of this situation is a sense of isolation with no commitment to the organization.

Second performance of the employees will become visible and the privacy will be threatened which may result in rejecting the new system or even trying to sabotage the whole effort.

Third the payoffs of the proposed system may not be fully appreciated by some of the middle-management members resulting in less time and effort devoted to the system by these members. Furthermore this innovation may be seen by those members and others as additional work requiring extra money personnel and time which could reduce the level of enthusiasm needed to boost the new system.

Fourth organizational behavior problems such as user understanding of system output duplication of input and output frequent changes in the system and information overload (Lucas 1975) may be ignored in system design and implementation which may decrease the level of the use.

Fifth the current modes of communication may not be as effective as they have to be. The effect this fact has upon system implementation is that it may slow down information transfer decrease the likelihood of building trusty relationships between management and system's user and thus lessen management capability to motivate employees to increase their efforts.

Finally the organization definitely lacks some of the essential resources to design implement and operate the program.

PFC does not suffer from shortage or even absence but only from people experienced in MIS field and lacks skills knowledge and experience to design and implement the proposed system.

Although these problems were dealt with either directly or indirectly in the discussion of Planning and Action phases an integrated strategy to tackle these problems will be offered below. Management has first to clarify to employees at the operational level the mission goals and functions of the organization and reassure them that their contribution is important to the accomplishment of the organization goals and mission and that improvement in this level will positively affect the performance in the other levels of the organization. Raising up employees' commitment and sense of belonginess toward the organization is important to increase their involvement and commtiment to the new system.

Second employees' involvement and participation in system design and implementation are important for several reasons. Participation develops favorable attitudes among users toward the system and creates as understanding of the model to be implemented (Lucas 1981). It also motivates employees to increase their efforts and provides relevant information needed for system design. Furthermore participation provides the opportunity to consider users' needs which is important to insure user accept-

ance of the system. More important employees' participation in establishing standards for work measurement is essential to have their agreement and commitment to these standards. Without employees' agreement and commitment such standards will never be applied. Employees need to be reassured that the system will not be used for a punitive or evaluative purpose; rather improving organizational performance and processes is the overall purpose of this system (Nadler 1976).

Third top management support is significant for the success of the effort. Without this support the system may never be implemented or used. Top management should devote sufficient time and effort for the system provide needed resources persuade middle managers of the advantages of the system and work to surmount other obstacles that might be faced in system implementation and use.

Fourth it appears that the problem of lacking manpower resources needed to design and implement the program is most likely solved by conducting training sessions to provide people involved in the effort with the necessary skill knowledge and experience to build and implement the proposed system. The types and contents of these training sessions were discussed earlier in the Planning stage of this section. It's possible however that the organization may choose to contract outside experts to do the job for it. Training employees however remains more beneficial for the organization and its employees in the long run than other options.

Fifth organizational behavior problems have to be considered by system developers and implementors in each step of system development. Once trained and equipped to to do the job the task force should be capable enough to cope with these and other sorts of problems. Top management involvement to provide assistance in this types of issues is necessary however. Frequent review meetings discussed before should also be held with top management at regular times to review progress and ensure smooth implementation. Rewarding users and linking system use to rewards system are helpful to broaden system use.

Finally prior to system design and implementation building effective modes of communication between managers system developers and system users is necessary to help facilitate information transfer and discussions over implementation procedures and issues provide management with the opportunity to influence employees' attitudes toward the system and to serve other purposes as discussed in the Planning stage.

3.7.5 Evaluation and Termination

The stage of change theory which is assoociated with this phase of system development could be the most significant one in the process since it is in this stage that the change is to be stabilized and the new patterns of behavior are to be reinforced (Zand and Sorensen 1975). Therefore it deserves a great deal of attention.

System evaluation can have two forms: continuous evaluation during implementation phase was discussed ealier and a post implementation evaluation with which I will be dealing here. As a first step in this process a committee comprised of qualified personnel and some management members should be appointed to do the evaluation (Cerullo 1979; Multinvich and Vlahovich 1984).

A key factor to successful evaluation is the availability of a plan or a statement at the initial phase of system development to aid the appointed committee assess real accomplishments of the system comparing them to the stated objectives in the initial plan (Multinovich and Vlahovich 1984). The committee can use different strategies to do the evaluation. It may conduct a questionnaire among people involved in the effort use some performance related measures and gather data on the quality of system usage (Nadler 1976).

The things to be evaluated may include attitudes value perceptions and information usage (King 1975; and Rodriguez 1978). They can be evaluated in terms of whether they have changed from pre-system period through system development to post-implementation period; and whether user behavior is different from the non-user (Rodriguez 1978).

To the above-mentioned list of things to be evaluated my be added overall system usage and performance quality.

The criteria of succcessful implementation is a source of dispute. User expressed satisfaction is suggested as a criterion for success (Ginzberg 1979). Still others argue that system use is the most significant criterion since the system will be intensively used only if it meets the necessary requirements (Ein-Dor and Segev 1981). Lucas (1975) distinguishes between systems whose use is voluntary and others whose use is mandatory. In the former high levels of use can be adopted as a sign of successful implementation. In the latter user's evaluation i.e. user satisfaction can be employed.

To evaluate the proposed system the committee is advised to adopt both user satisfaction and system use a criteria for assessing the degree to which implementation has succeeded. The committee thus should develop a short questionnaire to ask users how do they feel about the system how satisfied are they with the system and to what extent they believe the system has succeeded in measuring organizational performance and organizational processes.

The committee should also gather some data on the level and quality of system usage.

Once responses to the questionnaire are received and analyzed and the data on the level and quality of system usage are collected and analyzed the committee should arrive at its judgement about system implementation and register it in a written report. It should then submit its report with its recommenda-

tions to top management. It is therefore top management's decision whether to continue system or do necessary adjustments and modifications. User's expressed opinion however should be taken into account when making this decision.

In the remaining of this section some possible dysfunctional consequences of performance measurement will be discussed and a corresponding strategy to address these consequnces will be presented.

3.8 Possible Disruptive Effects:

Introduction of a performance measurements system into an organization may generate undersirable consequences for overall reoganizational performance. This point seems to be underscored in the research on MIS as a control system. Some researchers and scholars however have acknowleged this fact and tried to deal with it explicitly.

Mintzberg (1975) for instance acknowledges that MIS "... may promote rigidity narrowness and a lack of free movement. Newman (1975) has pointed out that a control system may generate sensitivity to factors measured and reported creating a strained climate in which employees try hard to meet desired objectives. He also notes that a lack of confidence in the measurment system will result in a feeling that the rewards system is probably inequitable.

Camman and Nadler (1976) have argued that external control systems may bring about several undesirable results. First improvement in performance measure may not be parallel with commitment to doing a better job on the part of organization members. Second emphasis will be directed towards behaviors that are measured while forgetting unmeasured behaviors regardless of their importance. Third the flow of valid information might be reduced especially negative information. Finally such a system may result in excessive caution and thus justification of actions becomes the primary concern of subordinates.

Finally it is useful to state that control systems can produce rigid bureaucratic behavior invalid information and resistance to the control system.

3.9 A Corresponding Strategy:

To cope effectively with these dysfunctional consequences the organization has first to acknowledge the importance of them and anticipate them. Second corressponding strategies have to be devised and be ready to use at any point of time. The concept of "implementation risk analysis" developed by Alter (1980) can be effectively used in such cases. Alter points out that implementation risk analysis starts by identifying an ideal implementation situation. Deviations from the ideal situation (here referred to as dysfunctional consequences) are identified as risk

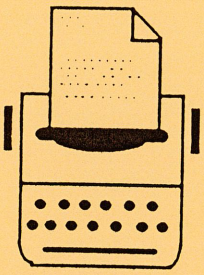
factors. For each risk factor a corresponding implementation strategy is to be created. Thus by anticipating these consequences and devising corresponding strategies to deal with them the organization should be able to alleviate their disruptive effects.

In addition to the following this type of analysis other policies can work too. Research indicates that as mentioned earlier use of the theory of change to manage the introduction of organizational and individual change is highly effective Zand and Sorensen 1975). It is hoped that following the proposed strategy which has drawn upon some of the major findings of this theory would help the organization master those undesirable effects. The movement through the development and implementation processes should be smooth and very carefully managed so as not generate any disruptive feelings.

To deal with the problem of rigidity and narrowness Mintzberg (1975) suggests that the MIS should be flexible and responsive and that managers should understand MIS components and the way it works and have full control over it.

User's participation in system design and implementation has been widely suggested to create a sense of ownership of the system on part of system users. This would reduce his apprehension and anxiety of the system. Nadler Mirvis and Cammann (1976) have pointed out as mentioned before that reassuring

employees that the system will not be used for a punitive purpose can help too. This approach can also be adapted. These strategies were among the major elements of the implementation plan presented in this section.



CHAPTER IV

4.0 OBSERVATIONS & RECOMMENDATIONS

Information -the logical output of a system- is of vital importance to the managers of the Pension Fund Commission to achieve short, itermediate, and long-range goals. Management at the PFC needs a fairly accurate measurement of its income and cost factors for various time periods. It must maximize its income through optimum collection of contributions and/or investment yield while it minimizes the cost of operations and services. In short, PFC management wants a combination of high and steady contribution cost that will provide a highest return on invested capital. Given adequate information on these essential facts, the PFC can rely more on deductive and analytical methods than on guesses and intuitive judgement, which it is forced to employ when many of the relevant facts are missing. Many wrong decisions have been the result of insufficient or inadequately processed information.

There is and continues to be an awarness in society that accurate and timely information is a vital resources of any organization and that an effective management information system is a means of providing the needed information. The PFC is finding that information is a source of competitive power. It gives them the ability to outmanuever its rivals at critical times, especially when introducing new products. If the PFC's management information system does not produce the information

necessary for PFC management to handle its operations effectively, an "out-of-control" condition may result from which the PFC may never recover. See page No.128 which highlights the implication for management information system for the Pension Fund Commission. PFC that is subject to experience a difficult time over the years should verify this fact.

Thus The need for an effective management information system is of paramount concern to the PFC now and in the future. Because the PFC does not operate in a vacuum, it must coordinate its operations with the Government and private sector universe. Of prime importance is information about society/markets in which it operates, current knowledge of it contributors and source of supply. Increasing in pensioners, rising operation costs, and other relevant factors signal the need for an information system that describes the PFC's economic evironment and coordinates the external environment with the internal factors to provide management information.

The management information system, in addition to recognizing environmental trends external to the PFC, must treat changes that have occurred and will yet occur in the internal environment. Advancements in the behavioral sciences, continuing developments in management seciences, and increasing utilization of paperless computer output terminals must be reflected in the design of the management informantion system. Interdepartmental approaches have transcended the traditional, functional lines of

business in complex system. Still other advances in development have been made regarding methods, procedures, computer equipment, and data communications equipment. By no means is this listing of internal factors complete, but it does serve to exemplify what is causing the PFC's MIS to change.

The changes taking place inside and outside the PFC generally do not stand alone; each advancement tends to affect and overlap another. As a result, an effective management information system capable of integrating these advances with the needs and capabilities of the PFC is needed. More frequent and more accurate information leads to better decisions, thereby enhancing managerial and operational efficiency.

An important element that has smoothed the transition from earlier systems to management information systems is improved computer software. The trend toward interactive, business-oriented software that started some time ago at the PFC is expected to continue throughout the nineties and beyond. The need for software programs that solve the PFC problems will increase dramatically as computer access becomes more economical. Custom-made computer programs (written by company programers) are just one way to assist the PFC's management in decision making. The more promising approach (as I believe) is the use of software packages (written by outside sources) whereby the managers at the PFC can be at the center of the decision-making process. From this perspective, the accent is on answering a whole series of ad

hoc "what if?" questions as they arise in the normal course of the PFC business. This important thrust in computer software is a prerequisite to effective management information systems.

Today the amount spent on computer software in the PFC MIS is inversely related to the hardware. As hardware costs progressively fall (as they have been and are currently doing), software costs -as component of the total cost equation- tend to escalate. Equipping computers with flexible, easy-to-use application software is going to be an even greater problem for the PFC in the future than it is today, for two reasons. Applications are becoming more complex, and application software must be truly easy for the unschooled user to employ.

The PFC as a user does not have capabilities and/or enough time to develop their own software programs, or find that the costs involved in the internal development of software programs are prohibitive. This is partially due to the shortage (and it will apparently get worse) of trained software development personnel, which is forcing the PFC to pay very high salaries for qualified personnel. As a result of this problem, demand increases for "off-the-shelf" software. The move to buy or use software developmed by specialized software and service firms will accelerate. It will be wasteful -even impractical in terms of dinars and lead time- for the PFC as a user to develop software that already exists and can be easily tailored for specific needs.

When software can be purchased as an off-shelf item, the PFC would receive several benefits. These include the choice of a variety of offerings; reduced risk by buying the expertise and experience of the vendor; and curtailment of expenses by buying a software package that includes maintenance. In the future, the PFC would reap even more advantages from packaged software because many vendors are starting to direct more attention as well as research and development expenditures to this area. Because the PFC as a user is computerizing more and more applications as the cost of hardware comes down, more and more sophisticated software products would in demand. Currently, many software packages are offered by vendors. The top management of the PFC should consider available software packages from equipment vendors plus those available from software vendors to ensure an effective management information system.

As part of my audit I have undertaken a review of the general controls within the Commission's Computer Services Section. Specifically, this covered the following areas:-

a) segregation of duties

b) the framework for developing and implementing new applications

c) the framework for programme maintenance

d) access to data files

c) execution of programmes

f) the arrangement for minimising the effect of a disaster on significant accounting applications.

A number of points came to my attention during the course of my review which are outlined below in summary form:-

1) Documentation should reprepared for the system as soon as possible.
2) The password system should be improved to reduce the risk of unauthorised access to the system.
3) The computer room disciplines need to be improved.
4) The system level security requires review.
5) A fully documented and tested contingency plan should be prepared as soon as possible.

The review was carried out to enable me to determine whether a controlled environment exists for an effective management information system. Since the computer facilities plays a vital roll in this regard, it should be relied upon to detect all weaknesses in the computer system.

4.1 ORGANIZATION AND ADMINISTRATION

4.1.1 Division of duties

Observation

It has been noted during the course of review that the organizational structure of the computer section does not provide for the maximum segregation of duties that would be desirable. For instance programmers have access to the computer and are able to run and amend programmes.

Segregation of duties is of paramount importance to prevent errors and irregularities. In particular, failure to segregate progrmming and operations may mean that unauthorised or untested alterations could be made to the PFC's production programmes. Similary, programmes could be executed proper authorisation leading to irregularities in the computerised records.

Recommendation

This was pointed out as a matter of record only, since, given the limited number of personnel currently in the department, any other practical arrangement of duties would not significantly improve segregation. Consequently it is stressed that there should exist adequate user section controls e.g. matching of input to output, regular printing and checking of master file contents and independent reconciliation of control totals to compensate.

If staffing levels increase in the future then it is recommended that an independent review of the duties assigned to staff be carried out to ensure that the maximum possible segregation of duties consistent with operational efficiency is achieved.

4.2 Ensuring adequacy of controls within systems developed

Observation

Although the computer system was introduced in June, 1985 the PFC is currently relying on its handwritten records as the computerised records are consider relatively unreliable. There

is an unreconciled difference between the computerised records and those that are maintained by hand.

This suggests that responsibility for ensuring that adequate application controls (e.g. batch controls, edit checking or reporting and correction of input and output errors) are incorporated into system is not clearly assigned to any one party.
It is assumed to be that of the users, who are expected to have designed the necessary controls within their system requirements to ensure system's integrity.

It is crucial that adequate controls are built into systems to ensure that data is correctly and completely processed to produce accurate information. As such, the reponsibility to ensure that there are adequate controls should be clearly defined and assigned.

Users should be capable of developing suitable manual control procedures, but may be fully aware of computerised control procedures e.g. edit cheking, exception reporting or reporting of relevant control totals. As such, this responsibility should not be totally assigned to the users, but the computer section should also have responsibility.

Recommendation

Responsibility for ensuring that adequate controls exist in the systems developed should be clearly assigned. An independent review by a senior member of staff could be performed to ensure

that adequate consideration has been given to the inclusion of appropriate control procedures. This review should be carried out before the final approval of the computerised accounting system and a decision taken to dispense with the handwritten records.

4.3 Physical access to computer room

Observation

It has been noticed that staff members other than the computer operations staff have access to the computer room. These include programming staff and certain users, who wish to collect urgent printouts. The computer section is usually left unlocked at the end of the official working time.

The risk of accidental damage to computer hardware is thus increased.

Recommendation

Access to the computer room should be restricted to computer operations staff. The combination to gain access to the computer room should be known only to operations staff. Access by other staff members should be minimised. All such visits should be made only with a member of lthe computer operations staff.

The Computer Section should also be kept locked when the computer operator is not present.

4.4 Internal Audit

Observation

There is only a limited computer audit expertise within the Commission. Consequently the effectiveness of any internal audit function in areas where computerised systems are used is severely restricted.

Recommendation

Training should be provided for members of internal audit involved in the reviewing of computerised systems, to enable them to have a full understanding of how the system work, the implications of this and the computer audit technique available to them.

4.5 PROGRAMM DEVELOPMENT AND MAINTENANCE

4.5.1 Standards

Observation

It is important to have formal procedures covering programm development and maintenance. Without such procedures there is a risk that some programm changes may not valid and authorised or that some programm changes may not properly tested prior to being placed in the live system. It is important to provide documented evidence of the user's requirements, the authority to the system development staff to make the change and the users' testing and acceptance of the change.

It has been noticed that informal standards exist in this area including the use of a "modification form". However, this

form contains no details of the testing or the final approval of the modification.

Reommendation

It is recommended that formal standards be issued covering programm development and maintenance.

It would be normal for written standards to include procedures to ensure:-

i) Addition of new or revised applications to the production library is only carried out after all approvals have been made and a conversion timetable has been established.

ii) The programm unit initiates the process but should not perform the actual transfer from the test to production library.

iii) Implementation of the new applications is done when the user accepts the application based on testing and data processing approves the application based on testing and responsiveness to specifications and objectives.

iv) Training procedures exit to ensure that user and EDP personnel have the information they require to use the new application (e.g., new forms, output capabililities).

v) Procedures exist for project approval at key development points by users and data processing management.

vi) New applications are subjected to testing by users, data

processing and internal audit. Test data and results being retained with application documentation.

vii) Application documentation and user manuals are complete and up to date.

Once promulgated it is suggested that these standards be monitored and reviewed by the Computer Section Management.

4.5.2 User manuals

Observation

It is important that every facility available on a system is comprehensively documented in a user manual. This is particularly important in the case of a newly computerised system as user checking procedure could easily be omitted in error by inexperienced or untrained staff. User manuals are also important as they provide training for new staff in the event of experienced staff leaving.

It has been understood that user manuals have been fully prepared for all of the applications currently being run on the computer.

Recommendation

It is recommended that the PFC considers providing additional temporary resources to create detailed user manuals and to ensure that user department staff are fully familiar with the controls and checks they should be applying to computerised output.

The monitoring of adherence to the standards suggested in para 2.1 above should ensure that they are updated on a timely basis.

4.6 ACCESS TO PROGRAMMES AND LIVE DATA FILES

4.6.1 Password system

Currently a single password is issued to each user directorate which grants full access to an application e.g. pension accounting. This password is shared by all staff members requiring access to that particular application. Any person with knowledge of the password can update, or enquire into, the contents of the data files. The passwords are not changed regularly.

On-line system access can be effectively restricted only if controls over the use and issue of passwords are adequate. Confidentiality of passwords must be preserved.

This means that passwords should not be shared but should, instead, be unique to individual users.

If passwords are not changed regularly, a compromised password may result in the system being exposed to unauthorised activity for an unnecessary length of time.

The above factors significantly impair the effectiveness of the password system and so increase the risk of unauthorised access to data files and programmes. The impact of unauthorised

access is that fraudulent or unauthorised changes could be made to data files which may remain undetected by the user directorate.

Recommendation

It is recommended that a senior member of management be nominated Security Officer and that his duties include, the following:-

a) Ensuring that passwords are made unique to each user. This means that all current users should be given an unique password as soon as is practicable and that when a new user requires access or when users join or leave their passwords should be added or detected. This should be carried out only by the Security Officer and only upon written notification from heads of user directorate.

A user performing a sensitive function should be prevented from having further system access as soon as that person gives notice of his or her intention to leave. If a person is to be dismissed then access should be withdrawn prior to the individual being notified of his or her termination of employment. 'User' in this context include data processing staff as well as members of user directorates.

b) The implementation of procedures to change passwords regularly.

c) Implement a mechanism to detect any attempts to gain unauthorised access to the system. Special programs may be

written to analyse the various logs produced to provide a more meaningful analysis of exceptional circumstances, e.g. to indicate attempts to gain unauthorised access to the system. Exception reports such as these should be reviewed by a senior member of the data-processing staff divorced from computer operations.

It may be worthwhile to carry out an exercise to identify what management considers as sensitive or confidential information related to the PFC's business operations. A risk analysis could then be performed to identify the consequences of an unauthorised disclosure of the information so identified. Management can then decide on what level of security needs to be implemented to effectively prevent unauthorised access.

4.7 Access rights of programmers

Observation

It has been noticed that the programmers have unrestricted access to both the object and source of the production programmes and the live data files. Under these conditions it would be possible for a programmer to change the progrommes and the data files in either an unauthorised or fraudulent manner. This may remain undetected by the user directorate.

Reommendation

It is possible to avoid this situation without making great demands on the data processing directorate. Programmers could be restricted, for instance by the use of passwords and menu security or the removal of the compiler or the source programme, to

working on test programs and data files which have been copied across from the production library. The programmers would not be given access to the production library, or to the live data files. When new programmes or amended programmes are ready to be transferred to the production library, only the Director can give instructions to the Head of Computer Services to perform this task.

4.8 CONTINUITY OF OPERATIONS

4.8.1 Contingency planning

Observation

It is noted that absence of a formal contingency plan. It has been declared that all computer operations staff members are aware of what procedures are required to be followed in cases of a total system failure or a disaster. There are many NCR computers in use by the various Ministries, which could be made available should the need arise to have hardware back-up. However, no formal arrangement have yet been made with any Government body.

It is important to have a formal contingency plan and to ensure that it is operational to minimise the downtime and resulting disruption to daily processing. Without formal agreement with a potential back-up site, it can be difficult to obtain the required level of computing resource, in the case of loss of facility.

Recommendation

It is recommended that a formal contingency plan be drawn up. It would take into account disaster back-up sites that are currently available within the Government of the State of Bahrain. Factors to be taken into consideration should include:-

* Compatability of the operating systems.
* The possible processing time that can be made available to the PFC.
* The ease of loading up all applications onto the "back-up" machine.

Formal arrangement should be entered into with a list of alternative back-up sites so that processing facilities could be made available with minimum distruptions to daily processing. On a periodic basis the arrangements should be tested to ensure staff can manage the procedures satisfactorily, and that no changes have been made to the back-up sites which would cause problems in running the systems.

4.8.2 Back-up of EDP resources

Observation

It is important that EDP resources (e.g. data files, programmes, system software and documentation) are periodically copied and stored at a remote location. This ensures that the backups would not be destroyed by a localised disaster.

It is noticed that although daily backups of data files and programmes which are not stored in a remote location, instead,

they are stored in the Computer Services' fire proof Safe.

Recommendation

It is proposed that consideration be given to removing the safe (and the backups) to a remote location, perhaps a remote office of a Ministry of the Government of the State of Bahrain.

4.8.3 Computer operators' procedures manual

Observation

Clearly that there is no computer operators' procedures manual. Such a manual is important in providing a set of standard procedures required to be carried out in the normal day-to-day operations as well as in exceptional circumstances, e.g. a system failure, power failure, etc. It provides documentation of operating procedures unique to the PFC and is a useful for future on-the-job staff training.

Recommendation

It is suggested that management should initiate the compilation of a computer operators' procedures manual. It should define the duties and responsibilities of each staff member of the computer operations section. Standard procedures to be carried out for the efficient running of daily computer operations should be detailed, such as:-

i) When and how back-up of the system should be carried out.

ii) Procedures to be followed in exceptional circumstnaces.

iii) Recovery procedure in cases of data corruption and,

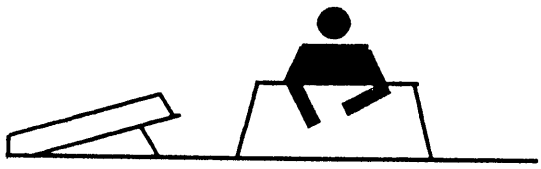
iv) Who to contact in cases of total system failure.

MIS summary

The non data processing executive should now understand how to initiate the planning process of an MIS. The basic steps that he should follow to develop a management information system, along with the various examples, have been presented throughout the different Section of this report. The steps are fundamental enough that they can be adapted to almost any business environment or type of industry.

Top management may wish to engage a professional systems consultant or add such a person to the staff since no one is currently qualified. The executive in charge of developing the MIS will find, however, that the information contained in this report will allow him to understand better the concepts described by the professionals.

CONCLUSION



CONCLUSION

In this project an attempt was undertaken to outline a strategy for MIS development and implementation into the Pension Fund Commission in Bahrain. The strategy uses the most important findings of research and studies relevant to MIS development and implementation.

Specifically, the two major approaches to MIS implementation, the factor approach and the process approach, were outlined and studies relevant to them were disucssed. I have tried to draw upon the findings of these studies.

A number of problems and limitations were faced throughout the course of preparation and writing of this project. One of the major problems has been the nonexistence of information on ~~the~~ the pension and social insurance in Bahrain. Had this information been available, it would have changed the course of events.

Other limitations are related to shortage of research and studies in areas pertinent to MIS building and implementation. This may suggest the direction for future research to ivestigate these areas thoroughly. The first area is problem-finding processes and techniques. It has been so many years since Pounds published his article in 1969 on problem finding process. It is amazing that his article has not stimulated other researchers to

explore the topic further, although it is important. In fact, it is the first and most important step by which managers or managment scientists can determine what went wrong in a particular organization. What is certain is that further research to cover this topic is needed.

The second area is dyfunctional consequences of performance measurements. Although it is an acknowledged fact that the introduction of a management control system into an organization may generate some disruptive behaviors, there exist only a few studies dealing with these side effects. What is needed is further research to investigate this area and provide some useful and helpful strategies to manage these negative consequences and alleviate their effects.

The final area is productivity measurement in the Public Sector. Although there is some research dealing with this subject, it has not been covered sufficiently. By contrast, a large amounts of research and a great number of studies on productivity in the private sector has been undertaken. The focus of these studies needs to be shifted, in part as least, to provide new insights in measuring productivity in the public sector.

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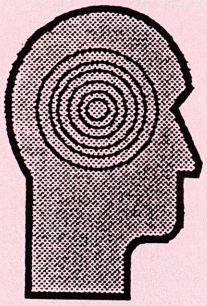
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APPENDICES



Appendix No. 1

7.1 IMPLICATION OF AN MIS FOR THE PFC

Social Insurance is one of the necessities of modern working life. Workers are constantly subject to accidents that can result in disability which prevent them from performing part or all of their jobs.

The provision of such insurance is a vital component in the administration of social justice.

The objectives of Social Insurance can be stated briefly as follows:-

1- To ensure that the social needs of the individual are met.

2- To maintain a system which reflects the nature and the standard of the national economy as well as the distribu tion of manpower.

To achieve these objectives, planners usually take into consideration those basic factors which indentify them as well as the financial capablility involved based on the following:-

1- The economic and financial resources of the country.

2- The number of employees and workers and the average standard level of their income.

3- The nature and the scope of a feasible investment.

4- The administrative efforts required by the system and the coordination that should exist between it and the overall organizational structure of the country and it.

5- The social insurance systems which were previously in operation.

Since there are different sections at the Pension Fund Commission that need to exchange information with each other, an MIS is a necessity for the organization. It is believed that an MIS could play a vital role in providing managers within the PFC with the latest, most accurate information when it was most needed. Such information would be an important input for them in reaching decisions, since the accuracy of these usually depends on the type of information provided.

If we take, for example, the relationship between the General Manager and the Investment Section, we can see clearly the importance of an ideal level of data exchange between the two. (See Table No.4 that shows PFC's revenues, expenses, and investments during the period from 1980 through 1989). Several important points can be observed:-

7.1.1 Investment: **Studies indicate that a huge financial surplus would be available to the Pension Fund Commission during the first two decades of its life. Thus, it has to maintain the actual value of its assets and to develop them by investing this surplus in promotion economic and social projects within the**

TABLE NO. 4

PFC'S REVENUE, EXPENSES AND INVESTMENTS
FOR THE PERIOD 1980 THRU 1989

YEAR	1 EMPLOYEE CONTRIBUTIONS	2 INVESTMENT	3 ROI	4 % OF ROI (3/2)	5 TOTAL REVENUE (1 + 3)	6 ADMIN. EXPENSES	7 INSURANCE DISBURSEMENT	8 TOTAL PAYABLES (6 + 7)	9 SURPLUS (5 - 8)	10 INVESTABLE NEXT YEAR (2 + 9)	11 UNINVESTED AMOUNTS (10 - 2)
1980	10,754,339	31,725,000	2,753,471	8.681	13,507,810	210,708	1,770,617	1,981,325	11,526,485	43,251,485	1,458,485
1981	13,646,825	41,793,000	4,034,771	9.651	17,681,596	236,134	2,079,805	2,315,939	15,365,657	57,158,657	(1,007,324)
1982	17,245,674	50,245,981	5,425,728	9.321	22,671,402	249,443	2,567,681	2,817,126	19,854,278	70,100,259	6,516,278
1983	18,793,525	71,583,981	5,284,589	7.381	24,078,114	276,975	2,972,308	3,249,283	20,828,831	92,412,812	5,841,332
1984	22,275,776	86,571,480	7,189,486	8.301	29,465,262	323,605	2,891,301	3,214,906	26,250,356	112,821,836	9,507,507
1985	23,917,511	103,314,329	8,535,278	8.261	32,452,789	410,800	3,107,334	3,518,134	28,934,655	132,248,984	15,424,585
1986	23,775,296	116,826,399	8,327,409	7.131	32,102,705	447,423	2,835,229	3,282,652	28,820,053	145,646,452	16,507,038
1987	20,361,243	129,137,414	7,052,862	5.461	27,414,105	561,130	3,210,466	3,779,596	23,634,509	152,771,923	6,779,711
1988	22,285,264	145,992,212	8,257,076	5.661	30,542,340	691,667	5,009,297	5,700,964	24,841,376	170,833,588	4,123,997
1989	27,500,321	166,709,591	12,584,828	7.551	40,085,149	733,862	4,814,641	5,548,503	34,536,646	201,246,237	
1990					0			0	0	0	0
TOTAL	200,555,774		69,445,498	7.741	270,001,272	4,141,747	31,266,679	35,408,426			65,871,609

Table No. 5

Linear regression for INVE/STMENT						
Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	+31725					
2	+41793	+21657	+10068			
3	+58246	+17400	+13261		+51861	-6385
4	+71584	+16830	+13603		+70442	-1142
5	+86575	+16137	+13949		+84845	-1731
6	103314	+14977	+14447		+99832	-3482
7	116824	+14770	+14524		116102	-721.625
8	129137	+15227	+14372		130961	+1824
9	145992	+14911	+14466		144573	-1419
10	166710	+13484	+14856		159576	-7135
11					176896	
12					191751	
13					206607	
14					221463	
MAD= +2980 MSE=+142E+05 Bias= -2524 A= +13484 B= +14856						

Fig No. 7

PENSION FUND COMMISSION

Forecasting for INVESTMENT

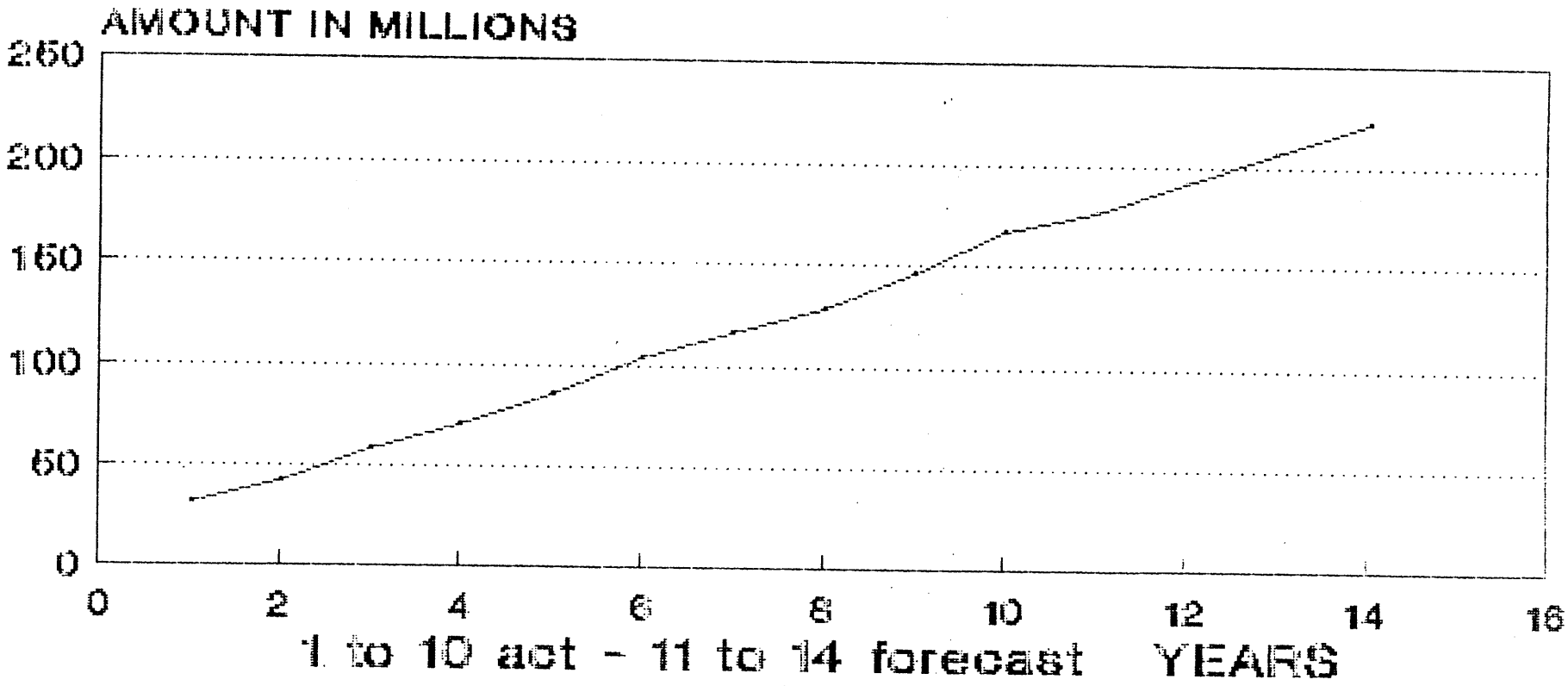


Table No. 6

Linear regression for ROI						Page: 1
Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	2753471					
2	4034771	1472168	1281300			
3	5425728	1399066	1336128		5316072	-109656
4	5284589	2128564	898430		6743576	1458987
5	7189486	1901058	1012185		6620716	-568770
6	8535278	1714018	1092343		7974164	-561114
7	8327409	2009164	981664		9360424	1033015
8	7052862	2711566	747529		9862476	2809614
9	8257076	2974290	668713		9439332	1182256
10	+126E+05	2389606	828171		9661416	-2923414
11					+115E+05	
12					+123E+05	
13					+132E+05	
14					+140E+05	
MAD= 1330853 MSE=+271E+10 Bias= 290115 A= 2389606 B= 828171						

PENSION FUND COMMISSION

Forecasting for ROI

Fig No. 8

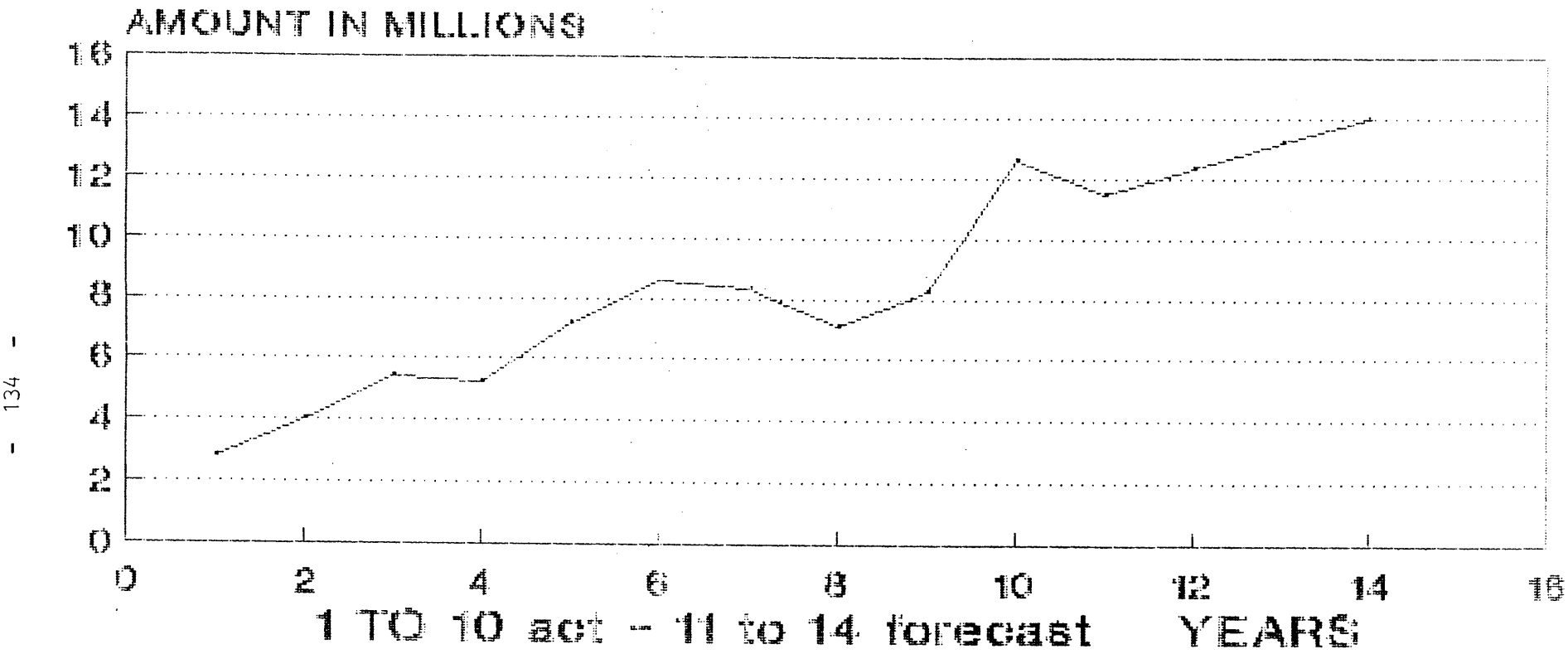


Table No. 7

Linear regression for % OF ROI						Page: 1
Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	+8.68000					
2	+9.6500	+7.71000	0.970001			
3	+9.3200	+8.57667	0.320000		+10.6200	+1.30000
4	+7.38000	+9.8150	-.423000		+9.8567	+2.47667
5	+8.30000	+9.5750	-.303000		+7.70000	-.599996
6	+8.26000	+9.4073	-.231142		+7.75700	-.502996
7	+7.13000	+9.5957	-.301785		+7.78934	0.659337
8	+5.46000	+10.0261	-.445237		+7.18143	+1.72143
9	+5.66000	+10.1058	-.469166		+6.01894	0.358936
10	+7.55000	+9.6787	-.352666		+5.41417	-2.13583
11					+5.79934	
12					+5.44667	
13					+5.09401	
14					+4.74134	
MAD=+1.21940 MSE=+2.06569 Bias=0.409694 A= +9.6787 B=-.352666						

Fig No. 9

PENSION FUND COMMISSION

Forecasting for % OF ROI

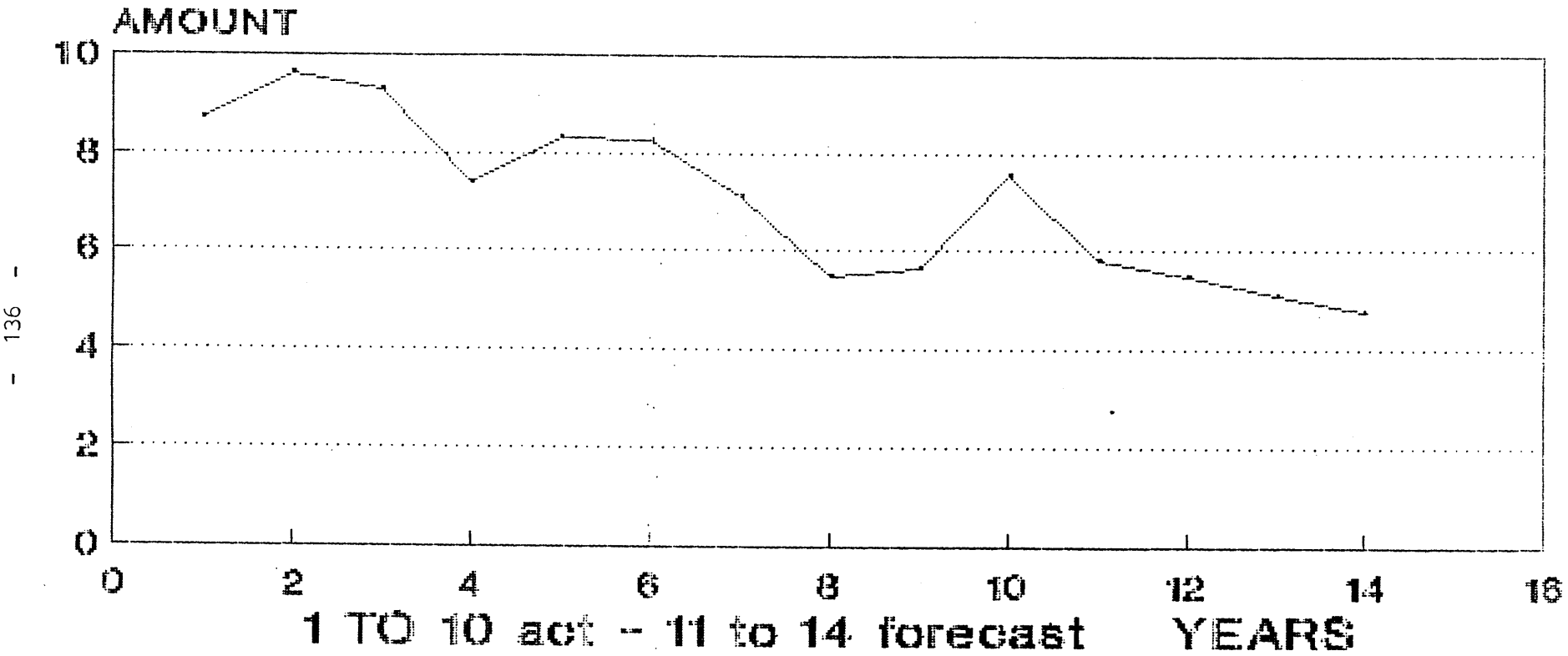


Table No. 7

Linear regression for FUND SURPLUS						Page: 1
Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	+115E+05					
2	+154E+05	7652984	3873504			
3	+199E+05	7235320	4186752		+193E+05	-626512
4	+208E+05	8826480	3232056		+240E+05	3182336
5	+263E+05	8301184	3494702		+250E+05	-1313248
6	+289E+05	8424328	3441930		+293E+05	369408
7	+288E+05	9486576	3043588		+325E+05	3717856
8	+236E+05	+120E+05	2190648		+338E+05	+102E+05
9	+248E+05	+136E+05	1726566		+318E+05	6961216
10	+345E+05	+129E+05	1925222		+309E+05	-3642000
11					+340E+05	
12					+360E+05	
13					+379E+05	
14					+398E+05	
MAD= 3755982 MSE=+241E+11 Bias= 2360542 A=+129E+05 B= 1925222						

Fig No. 10

PENSION FUND COMMISSION

Forecasting for FUND SURPLUS

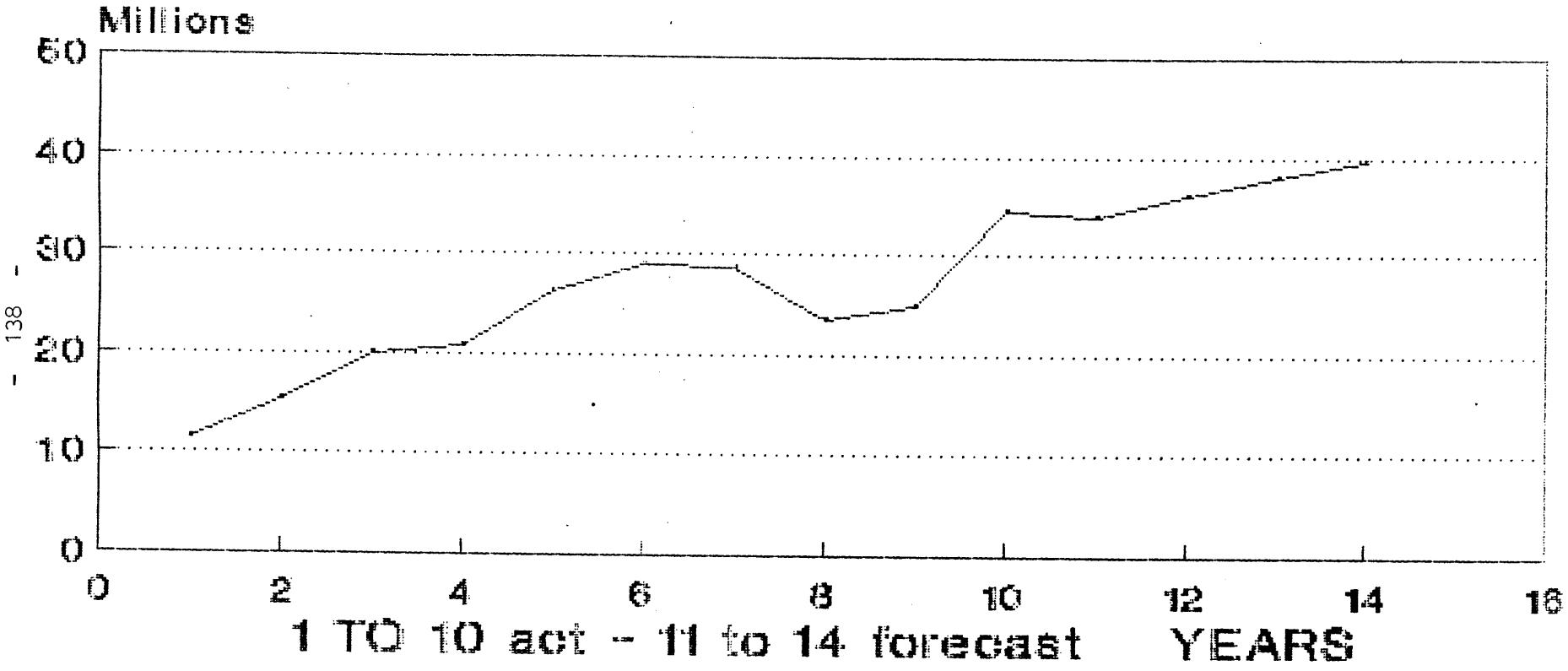


Table No. 8

Linear regression for INVE STABLE NEXT YEAR Page: 1

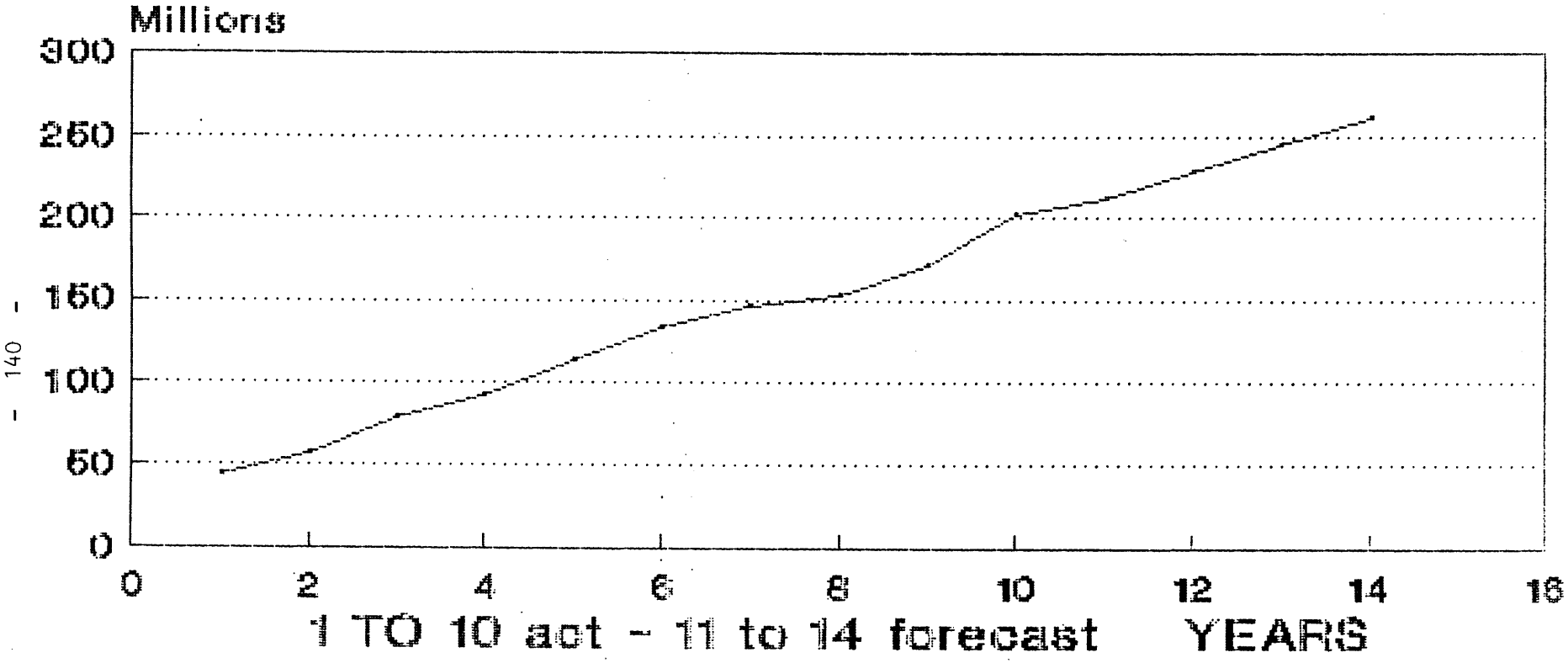
Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	+43252					
2	+57159	+29345	+13907			
3	+78100	+24656	+17424		+71066	-7034
4	+92413	+25625	+16842		+94352	+1939
5	112822	+24431	+17439		109837	-2985
6	132249	+23370	+17894		129067	-3182
7	145645	+24223	+17574		148628	+2983
8	152772	+27234	+16571		164817	+12045
9	170834	+28464	+16202		176369	+5535
10	201246	+26311	+16789		190480	-10766
11					210988	
12					227776	
13					244565	
14					261354	

MAD= +5809 MSE=+466E+05 Bias=-183.164 A= +26311 B= +16789

Fig No. 11

PENSION FUND COMMISSION

Forecasting for INVESTABLE NEXT YEAR



framework of an investment policy which takes into account the following:

1- The PFC is committed to meeting its insurance responsibility, so that such a fund surplus has to be invested in order to maintain the actual value of its wealth and to avoid erosion of it as a result of a growing rate of inflation.

2- Increasing the ROI to facilitate meeting insurance expenses and/or adding extra pension benefits to insured employees.

3- Since such a fund surplus establishes the PFC as an important financial institution, it is obligated to participate in developing the Bahraini economy by financing projects which are financially viable in terms of profit.

Thus, an MIS would be the most effective tool for the PFC in demonstrate the size of its internal and/or external investment, it would also establish the growth rate of such investment to enabling decision to be made See Table Nos. 5 through 8 and Fig. Nos. 7 through 11. The Linear regresion model has been used as an aid to forecast for the next four years, that is, to show the size of the PFC's investment in 1994, and the surplus amount that would be ready for investment.:-

1- The ROI on internal investment vs. external envestment.

2- The growth rate of ROI on internal investment vs. exter

Table No. 9

Linear regression for EMPLOYEE CONTRIBUTIONS Page: 1

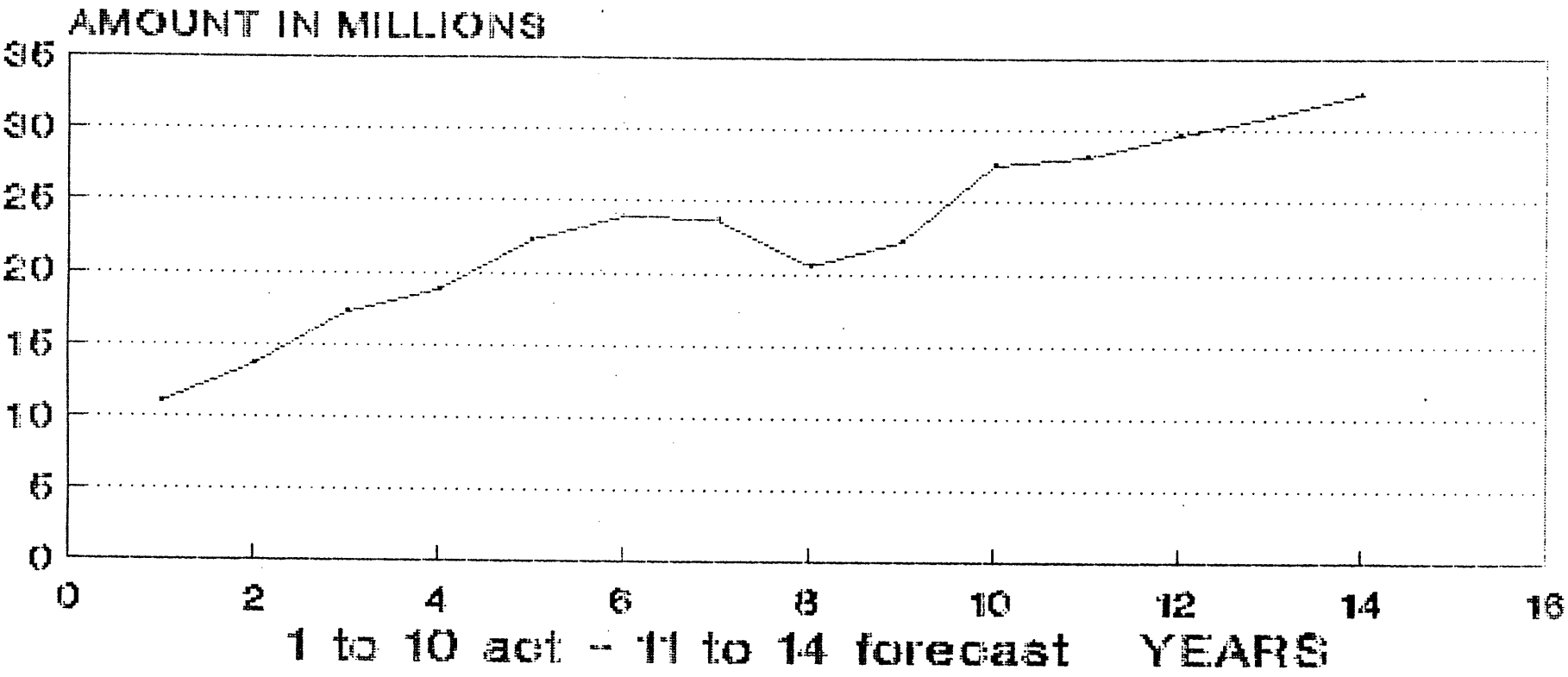
Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	+108E+05					
2	+136E+05	8000000	2800000			
3	+172E+05	7466664	3200000		+164E+05	-800000
4	+188E+05	8200000	2760000		+203E+05	1466656
5	+223E+05	8080000	2820000		+220E+05	-300000
6	+239E+05	8446664	2662856		+250E+05	1100000
7	+238E+05	9385704	2310716		+271E+05	3286656
8	+204E+05	+113E+05	1688096		+279E+05	7471424
9	+223E+05	+122E+05	1411667		+264E+05	4146424
10	+275E+05	+119E+05	1477576		+263E+05	-1208328
11					+282E+05	
12					+297E+05	
13					+311E+05	
14					+326E+05	

MAD= 2472436 MSE=+112E+11 Bias= 1895354 A=+119E+05 B= 1477576

Fig. No. 12

PENSION FUND COMMISSION

Forecasting for EMPLOYEE CONTRIBUTIONS



nal investment, (See Table No. 6, 7 and fig. No. 8, 9 that show the movement of the PFC's ROI.

3- The risk degree on external investment vs. internal investment).

4- the liquiditability of external investment vs. internal investment.

5- The risk provision for internal vs. external investment.

6- Diversification in investing the PFC's funds, in order to maintain the liquidity level.

7- Defining a ceiling for financial investment as a part of the total PFC investment.

7.1.2 EMPLOYEE CONTRIBUTIONS

Employee contributions are considered to be the most important and the most secure source of income for the PFC. See Table No. 9 and Fig. No. 12 which show the steady increase in the employee contributions and in the number of government employees). These figures indicate that such a source is reliable. Government employee salaries have been increasing accordingly.

MIS can play a vital role in enlightening management about such phenomena. Thus assisting long-term planning.

Delay in receiving a part of the due contribution would lead to visible risk to the PFC because of the opportunity cost principle.

Each and every name has to be checked by an ideal MIS to make sure that contributions are paid on time. MIS would be utilized to discover any delay in payment, so that a decision could be made as how to pursue collection.

7.1.3 INSURANCE EXPENSES

The major cash outflow involving a heavy financial commitment by the PFC is the monthly pension paid to both male and female pensioners. Management needs to know the size of the pension that is being paid to both sexes so a prediction can be made to cope with any unexpected event. It is a fact that females form about 12.5% of those receiving pensions). Management should not be misled by this low percentage. Since males started working for the Government many years before females. Thus the female workforce is still young and has plenty of time before they reach the age of 60.

An efficient MIS would provide accurate data that could be utilized to predict the possibility of balancing male with female pensioners.

7.1.4 TOTAL REVENUE VS. TOTAL PAYABLES

Contributions and ROI form the total monthly revenue for the PFC. On the another hand, administrative expenses and insurance disbursement increase the total monthly payables.

An MIS would provide a comprehensive follow-up to the rela-

tionship between total revenue and total payables and would clearly define the growth rate in both side. (See Table No. 8 and 9 and Fig. 10 and 11).

In this way, the PFC would be in a position to know where it would stand, for example, four years from now. Utilizing the QSB computer application could help a lot in the forecasting process.

This type of prediction would provide PFC's management with a clear idea as to whether it would be self-financer some years ahead. If it would, then more pension benefits could be added. If it would not, then more fund sources would be needed to avoid insolvency, and/or elemination of pensioners/insured persons' benefits.

Usually, the last resort for any social insurance ogranization is to seek help from the Government, a situation which the PFC must strive to avoid.

Table No. 10

Linear regression for INSURANCE DISBURSEMENT Page: 1

Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	1770617					
2	2079805	1461430	309188			
3	2567681	1342303	398532		2388990	-178691
4	2972308	1324364	409295		2936432	-35876
5	2891301	1516181	313387		3370842	479541
6	3107334	1612571	272077		3396504	289170
7	2835229	1807394	199019		3517112	681883
8	3218466	1852664	183929		3399540	181074
9	5009297	1519047	284014		3508022	-1501275
10	4814641	1427955	308857		4359184	-455457
11					4825380	
12					5134237	
13					5443093	
14					5751950	

MAD= 475371 MSE=+413E+09 Bias= -67454 A= 1427955 B= 308857

Fig. No. 13

PENSION FUND COMMISSION

Forecasting for INSURANCE DISBURSEMENT

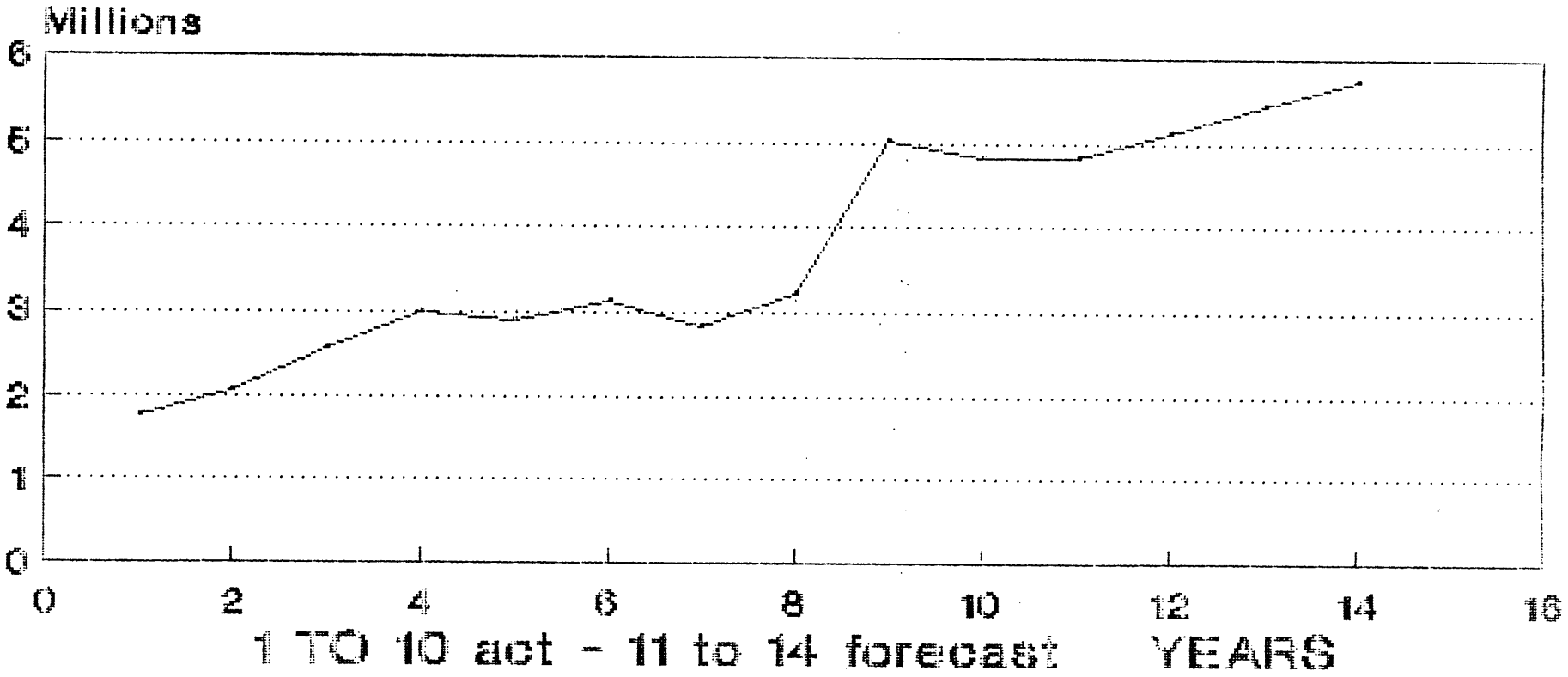


Table No. 11

Linear regression for TOTAL PAYABLES						Page: 1
Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	1981325					
2	2315939	1646712	334614			
3	2817124	1535663	417900		2650552	-166572
4	3249283	1514652	430506		3207262	-42021
5	3214906	1695563	340051		3667184	452278
6	3518134	1768143	308946		3735868	217734
7	3282652	1953317	239506		3930762	648110
8	3779596	1975758	232025		3869360	+89764
9	5700964	1611984	341157		4063984	-1636980
10	5548503	1506995	369791		5023554	-524949
11					5574690	
12					5944481	
13					6314272	
14					6684063	
MAD= 472301 MSE=+458E+09 Bias= -120330 A= 1506995 B= 369791						

Fig. No. 14

PENSION FUND COMMISSION

Forecasting for TOTAL PAYABLES

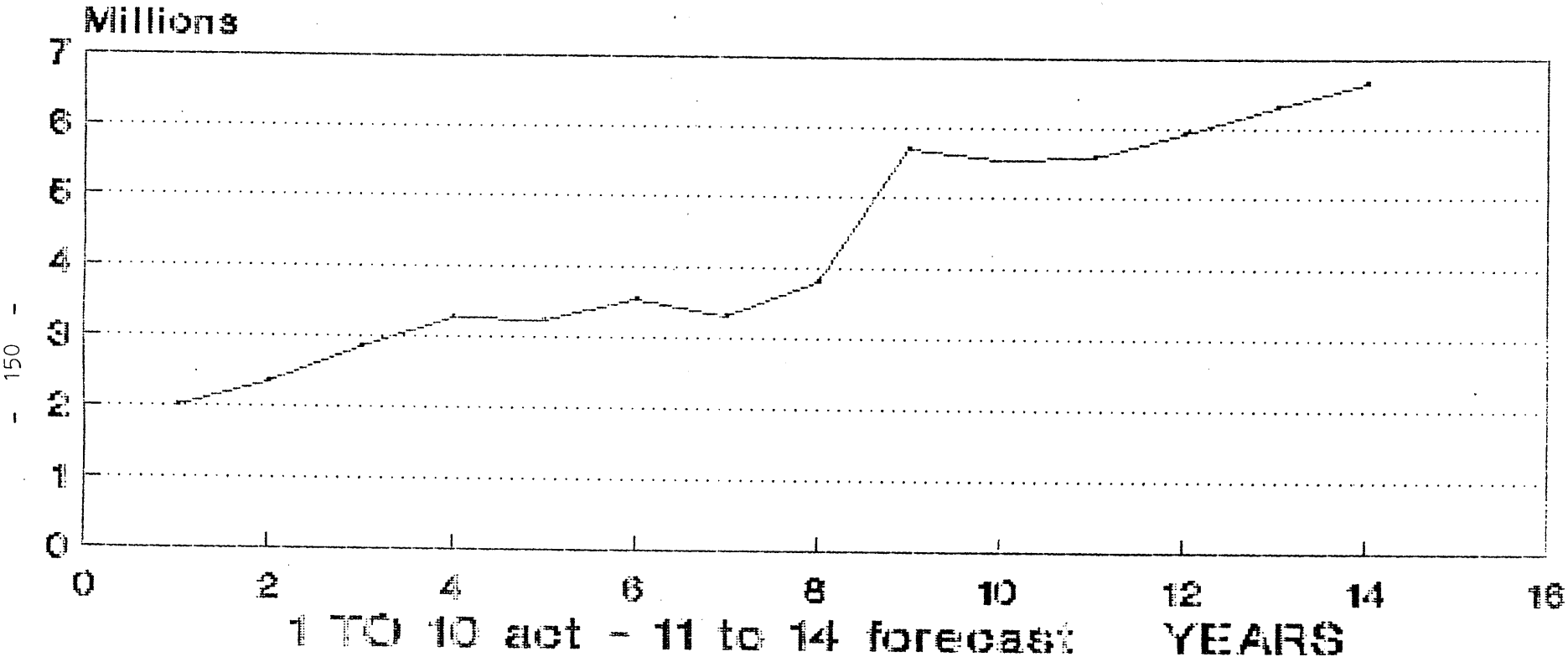


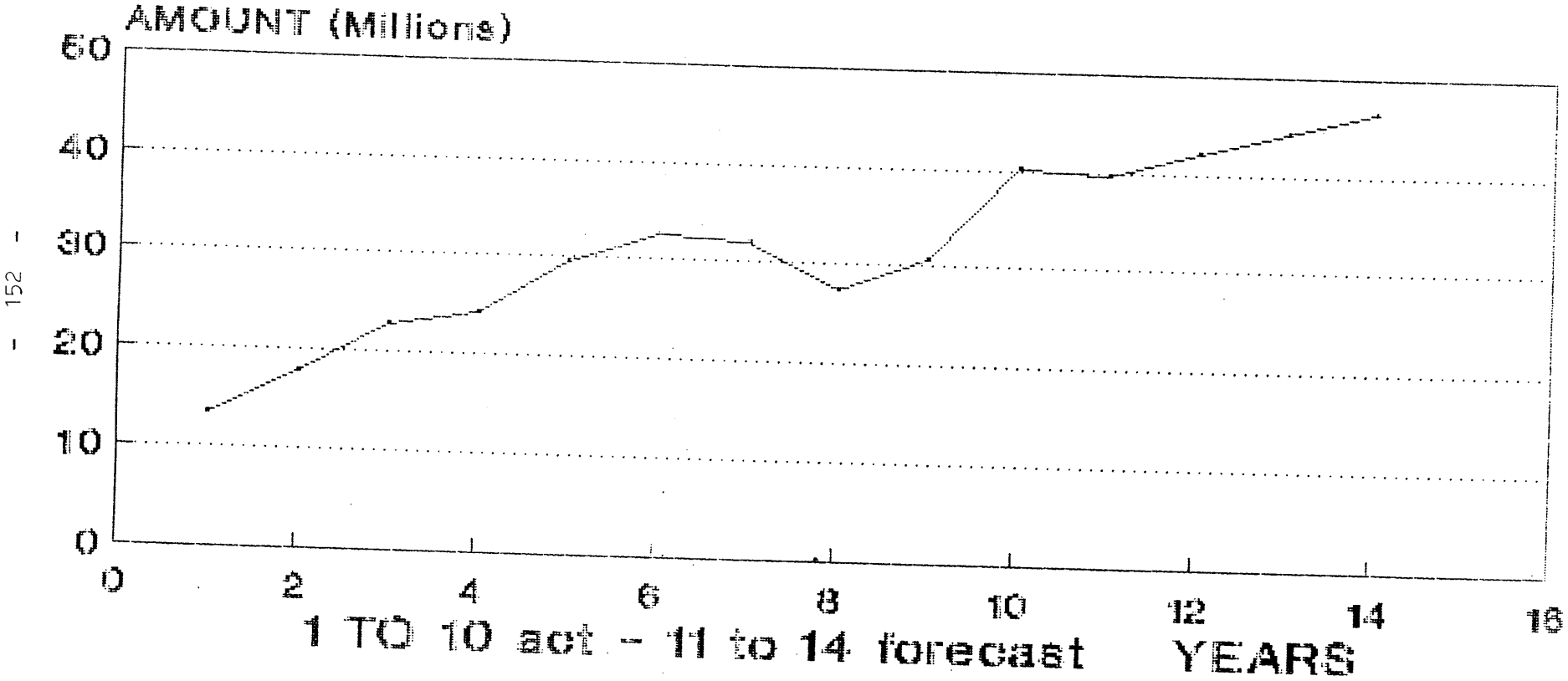
Table No. 12

Linear regression for TOTAL REVENUE						Page: 1
Period	Act. Demand	F(t)	T(t)/W(t)	I(t)	Forecast	Error
1	+135E+05					
2	+177E+05	9334032	4173784			
3	+227E+05	8790008	4581796		+219E+05	-816040
4	+241E+05	+103E+05	3670072		+271E+05	3039074
5	+295E+05	9987416	3831146		+287E+05	-805356
6	+325E+05	+102E+05	3756648		+330E+05	521466
7	+321E+05	+114E+05	3290036		+365E+05	4355060
8	+274E+05	+140E+05	2430726		+377E+05	+103E+05
9	+305E+05	+152E+05	2076218		+359E+05	5317628
10	+401E+05	+143E+05	2303008		+359E+05	-4157824
11					+397E+05	
12					+420E+05	
13					+443E+05	
14					+466E+05	
MAD= 3665520 MSE=+227E+11 Bias= 2220715 A=+143E+05 B= 2303008						

Fig. No. 15

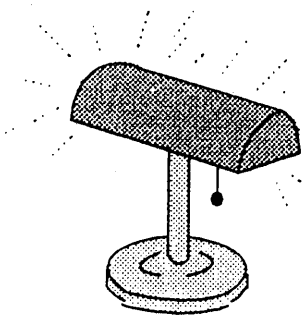
PENSION FUND COMMISSION

Forecasting for TOTAL REVENUE



APPENDIX 2

APPENDIX I I



Appendix No. 2

7.2 ACCOUNTING INFORMATION SYSTEM

7.2.1 General Ledger System

The major functions of the proposed general accounting system are:

1- To capture and maintain the financial and statistical data required by the other four systems to report on income and performance.

2- To produce reports that evaluate the financial position and income of the PFC and its subsidiaries, directorates.

3- To assign upon input those income and expenses items that can be directly associated with income or projects.

The budget and planning system would assist the management of the PFC in formulating and maintaining budgets. In addition, the module produces summary budget reports.

The reponsibility reporting system uses the data base maintained by the general ledger accounting system and the budget and planning module to produce needed reports comparing such things as actual income, expense, assets, and liabilities with budgeted amounts, noting any variances. The amount reported by this system do not include indirect or allocated amounts. These reports can be produced for any level of management, a process often referred to as the pyramiding of reports or responsibility accounting.

7.2.2 General Ledger Accounting System

Input

It suggested the the PFC has to develop its general ledger accounting system that could collect financial and statistical input for the entire general ledger system and maintains the reporting and allocation logic used by the entire general ledger system. Input to general ledger can consist of manual entries such as closing entries or automated entries from various other systems such as accounts payable (unpaid pensions or indemnities), and payroll. Four types of data can be entered into the system: (1) convertible, (2) financial, (3) statistical, and (4) maintenance.

Convertible entries generate multiple transactions from a single entry, allocate the dinars associated with the transaction, produce automatic reversals of accruals, and so on. For example, a multiple transaction is generated from a single entry when the user enters one side of a transaction, either a debit or credit, and the system generates the offsetting entry automatically. On automatic reversals of accrual entries, the appropriate reversing entry is generated automatically and held in a pending record at the time the accrual is entered. The system releases all the beginning of the next period to reverse the accrued entries.

Example of financial transactions include that could take place in the PFC:

1- The entry of normal journal voucher entries. These can be manual entries or automated entries from other system.

2- Entry of standard or recurring journal entries. These include any entries that must be made at regular intervals and that involve the same payment or charge, such as rents, insurance premiums, or depreciation entries. They can be generated automatically. For example, a debit depreciation expense and a credit to accumulated depreciation can be generated every month. On the date the recurring entry is due, a journal entry is created for the appropriate amount, released to the system, and posted to the general ledger.

3- Entries in advance of posting date. Entries can be input before the date they are to be posted to the ledger. They are suspended automatically until they are due to be posted.

4- Entries effective prior to posting date. Entries can affect balances as of a prior time period. This is helpful if entries have to be adjusted or corrected after a posting date has passed.

4- Statistical nondinar entries are used to update the statistical data and the volume counts that the system maintains for reporting purposes or to update the various factors or statistics used for cost allocation purposes. The system can define and maintain as many statistical [dinars] accounts as desired. These statistical data, such as hours worked on a particular project, are entered during the accounting period along with

financial transactions and are available for reporting throughout the period in the manner the user has specified. Statistics used for cost allocation purposes can differ widely. For example, the hours of computer services provided to each directorate within the PFC can be the basis for allocating computer cost. The hours would be input through a statistical entry.

The fourth and final type of entry is the maintenance entry, which is used to define and maintain the data base linkages that define custom reporting relationships, report characteristics, cost allocation procedures, an so on.

7.2.3 Online Data Entry

It is recommended also that transactions can be entered through an online entry module. The module displays an input mask on the CRT screen. This facilitates the input of transactions because entries can be edited and validated immediately. When a batch has been entered, the system automatically balances the input to control totals and highlights imbalances on the screen. The user can review the entries and make any necessary corrections.

7.2.4 FILES

One more benefit of the proposed improvement on the general ledger accounting system is to captures and maintains data from automated systems and from manual entries in a single data base. After the data are captured, the data base provides the single source of data for financial reporting, budget and

planning reporting, responsibility reporting, cost allocation. A typical computer-based general ledger will receive automated journal entries from accounts payable (e.g. unpaid pensions or indemnities), inventory, fixed assets, payroll, and accounts receivable (e.g. uncollected contributions)

It is believed that the data base contains five different logical files -the general ledger file, the report characteristics file, the relationship linkages file, the reporting hierarchies, and the allocation schedules file.

Several different versions of budgeted amounts can be contained in the file. They could include the current year's original budget, various revisions to the current year's budget, the current year's operating budget, and proposed budgets for future years.

The system can handle multiple charts of accounts. There should be a separate chart of accounts for each directorate and section. Therefore, the data contained in the general ledger files become pertain to a general ledger account within the PFC.

The remaining four files are used to generate the various reports from the data base. The allocations schedule file contains the various factors and methods used to allocate amounts from one general ledger account to another.

The relationship linkage file contains report pointers that

link the data contained in a specific general ledger account to specific reports. In addition, it contains an allication criteria segment that links specific accounts to the allocation schedules contained in the allocation schedule file.

The report characteristics file in the general ledger data base contains the characteristics of individual reports including such information as spacing instructions, totaling instructions, and definition of calculations. In addition, this file contains report titles, the names of report recipients, and descriptions for general ledger accounts and physical locations, such as a plant or store.

It should be noted that a very important difference between MSA's basic approach and traditional general ledger systems. Traditionally the functions which are performed by the report characteristics, relationship linkage, and allocation schedule files were performed through program coding. If any of them changed, the program code had to be changed -a time-consuming, error-prone, and costly proposition. MSA's data base approach allows changes to be made through simple changes in these four files. These changes are much faster and can usually be made by users rather than data processing professionals. This user-oriented approach is definitely the trend in information systems. So the most recommended for the PFC because it is flexible enough to allow the user to define custom reports without going through

categories of posting ledgers, journal ledgers, general journals, and trial balances. Unlike the control reports, the user could have a considerable flexibility in requesting the information to appear on general reports. Specific examples of such reports are general ledger or transaction journals, individual account analyses, trial balances, expenses recaps, budget worksheets or spread sheets, and budget cross-references.

Custom Reports Custom reports would provide complete flexibility in summarizing data and allow the PFC Management to emphasize the information it deems necessary. Designing a custom report would require the user at the PFC to specify the general characteristics of the report, which can be summarized as follow:

1- Format definitions indicate what the report looks like.

2- Processing logic definitions specify selection definitions and calculation definitions. Selection definitions identify the data in each column on a report such as current month actuals and year-to-year actuals. The specific data that appear in certain columns of a report may not exit in the general ledger data base. Therefore, they are often calculated from other data items. Calculation definitions define these calculations and specify in which colmn of the report the resulting calculation will appear.

3- Structure definitions assign the sequence and grouping of individual general ledger accounts to the various lines of the report. One or many general ledger account numbers can be summarized into a line on the report. In addition, the structure

definitions identify the organizational levels within the reporting hierarchies for which the report is to be produced.

7.2.6 Budget System

The proposed budget system could perform six basic functions:-

1- It would provide the historic information that a manager needs to formulate a new budget.

2- It would provide several short-cut methods for inputing the budget.

These would include:

a) The input of an annual amount to be automatically prorated over twelve months.

b) The input of a quarterly amount to be automatically prorated over the appropreate three months.

c) A percentage increase or decrease over the current year's actual cost.

d) A repeat of the prior year's plan.

e) The direct calculation of one account's budget from another's.

3- The system would allow both direct [controllable] and indirect [noncontrollable or allocated] items to be budgeted.

4- It would captures budget data and produces summary budget reports.

5- It would permit revisions to be made in the plan as often as required.

6- It would permit the use of either fixed or variable budgets. Variances that are attributable to volume changes, changes in standard rates, and changes in efficiencty can be calculated.

The budget system can also maintain multiple budgets. For example, might want to maintain last year's budget as well as the current year's original budget and several revisions to it. In addition, the PFC may wish to maintain the proposed or preliminary operating budget for future years.

7.2.7 Responsibility Reporting System

This proposed system would report the actual values of those revenues, expenses, statistics, assets, liabilities, and equities for which the managers at the PFC are reponsible and compares them with the budgeted amounts. The system would allow data to be summarized or selected for reporting to all levels of the management (See Fig. Nos. 28 through 31).

One of the basic problems in designing an information system is deciding the amount of detail to provide in reports. So the recommended responsibility reporting system allows the individual managers at the PFC to specify the amount of detail they want, including the ability to report by exception. On the another side an exception report would print only those budget variations that exceed certain exception parameters established by the management.

7.2.8 Online Capabilities

In addition to inputing and validating transaction from a CRT, the proposed general ledger system would display on the CRT many reports that are normally printed on hardcopy.

Although they may be display on a CRT, few of the reports from the general ledger system could be realtime reports sinece little of the underlying data is realtime. It is clear that most reports would be a periodic reports. Financial statements for internal management could be generated monthly, and more detailed production budget performance reports could also be generated weekly. Realtime general ledger files are normally not practical or cost-effective. Therefore, the reports displayed on the CRT in this proposed system would be reports from previous period endings.