A PROPOSAL FOR A DATA BASE SYSTEM FOR EXPORT COMPANIES IN TURKEY

by

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We hereby recommend that the thesis entitled "A Proposal for a Data Base System for Export Companies in Turkey" submitted by Ahmet Tanyü be accepted in partial fulfillment of the requirements for the Degree of Master of Science in Industrial Engineering in the Institute for Graduate Studies in Science and Engineering, Boğaziçi University.

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Ahmet TANYÜ

ABSTRACT

Nowadays, business activities in Turkey are performed mostly by means of manual Information Systems techniques and by the help of experienced teams and experts. The need for this kind of qualified personnel in organizations increases as a result of the increase in business activities. Today, one of the most important problems for exporters, importers and banks is the complexity of export-import procedures and the associated information flow. Therefore, there must be a well-structured Management Information System in order to process accurate information for supporting decisions and controlling the operations.

In this study, Information Systems for only export companies have been studied. First, the export companies are analyzed and their problems are studied. Then, the data model are developed for the execution stage of an export activity. Also, the files and the computer programs are developed and implemented to the computer.

ÖZET

Son yılların güncel konularından biri olan ihracatın ülkemiz açısından öneminin artışı ile birlikte, ihracatçı kuruluşlarda görülen yoğun bilgi akışı zamanla büyük boyutlara ulaşmıştır. Bu sistemlerde karşılaşılan en büyük sorunlardan biri yoğun ve hacmi büyük olan bu bilgi akışının gereken hız ve doğrulukta gerçekleştirilememesidir.

Bu araştırmaya Türkiye ihracat mevzuatı konu edilmiş ve ihracat safhalarının veri tabanı tasarımı incelenmiştir. Bu amaçla geliştirilen model ihracatın safhalarının takibini ve doğru bilgi akışını sağlamasını amaçlamaktadır. Küçük sistemlerde uygulama olanağı göz önüne alınarak geliştirilen model, Commodore 8069'da denenmiştir.

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I. INTRODUCTION

1.1. THE NEED FOR INFORMATION: AN IMMEDIATE PROBLEM OF EXPORT COMPANIES IN TURKEY

Nowadays, business activities in Turkey are performed mostly by means of manual Information Systems (ISs) techniques and by the help of experienced teams and experts.

Currently, the need for this kind of qualified personnel in organizations increases as a result of the increase in business activities. Today, one of the most important problems for exporters, importers and banks is the complexity of export-import procedures and the associated information flow. Unfortunately, the characteristics of export and import activities and economic situation, of both in Turkey and abroad, do not allow the simplification of those procedures. Therefore, there must be a well-structured IS in order to process accurate information for supporting decisions and controlling the operations.

In this study, ISs for only export companies have been studied. We focus only on export activities. These companies were selected according to their characteristics and information flow volume.

After 1980's, depending on the new regulations set by the government and tax rebate policy in exports, the

the activities of Turkish exporters began to diversify. Instead of selling some Turkish traditional goods such as textiles and foodstuff, they have entered to different markets in order to sell Turkish industrial products. As a result, export figure of Turkey increased from $ 3.5 (1979) billions to $ 6.0 billions (1983). However, parallel to this trend, accumulation of information in export companies also increased at an unexpected and unprecendented rate. Thus, serious problems arose in ISs of these companies. Therefore, the executives began to study the problem of how to satisfy the information needs of their organizations.

1.2. DIFFERENT TYPES OF EXPORT FIRMS

There are several types of export companies in Turkey which are acting in different fields. All of them have to obey export procedures set by the Government. In general, there are three categories of export companies:

i. Producer type
ii. Trading Houses
iii. Commission Agents

The producer types of exporters sell their own productions or goods. They act in two fields; both in production and marketing. These companies do not sell the goods of other producers. They are divided into two groups according to the kinds of goods they deal with. The first group consists of the producers of industrial products who manufacture the goods in their own plants. The second group comprises the merchants who buy the agricultural products such as grapes, wheat, rice, etc., directly from the growers or farmers. Thus, the common characteristic of these exporters is that they are specialized in marketing specific goods and do not prefer to deal outside their own specialties.

The second category of exporters are Trading Houses most of them belonging to individual producers, powerful finance groups, or Holding Companies. In general, they are sellers and buyers as well. But only the export departments of these organizations have been studied. Besides their own products, they export all kinds of goods of other producers. Information flow, especially in these types of organizations, is quite complex. Accumulation of information increases together with the increasing business volume. Thus, gathering, processing and storing of information manually gets difficult. Problems in developing IS are mostly observed in these types of organizations because of the large information volume. In fact, the lack of a well-structured IS is not the only problem in these organizations. There are also finance and marketing problems because of the unexpected increase in trade volumes.

The third category of exporters which is not taken into consideration in this study, consists of the commission agents. The main role of a commission agent is to serve as an intermediary between the buyer and the seller. All the tasks related to an agreement are performed by the seller and the buyer. The commission agent only gets his commission after the completion of business. So, they are not interested either in buying or selling. Developing an IS for commission agents can be another field of study.

The commission agents establish good relationships in foreign countries and act on their behalf in Turkey. They are not interested in the implementation of export activities. Therefore, different kind of information is accumulated in their files. This information is related to the buyers and sellers.

There are numerous exporters mostly producer types in

Turkey. Most of them do not have big problems in information processing because of their small trade volumes. On the other hand, Trading Houses have important problems in gathering, processing and storing of information because of their large trade volumes. In this study, only Trading Houses are taken into consideration.

1.3. DIFFERENT ORGANIZATIONAL STRUCTURES AND OPERATIONAL POLICIES OF EXPORT FIRMS

Before analyzing the information needs of Trading Houses and proposing a database system, the organization structures of these companies have to be studied.

In the first place, it is observed that most of these companies have been founded either by the well-known manufacturers or by the finance groups. Parallel to the increase in Turkey's exports, these companies have developed at an unexpected and unprecedented rate. Thus, most of them have been affected from this trend and tried to get organized so as to fit to the new environment. However, it has been observed that the manual MIS techniques are not sufficient to perform the ever increasing tasks. Then, they began to modernize their facilities in order to develop well-structured ISs so that they can accomplish the required tasks on time and in a desired format.

In general, there are two basic department groups in these companies:

i. Finance, Accounting, and Administration Departments

ii. Sales Department.

The organization of the Finance, Accounting, and Administration Departments follow the same pattern among different Trading Houses.

Only the numbers of employees differ in these departments depending on the trade volume. On the other hand, the number of employees depend on the current level of usage of computer facilities as well.

The organizational structure of Trading Houses differ mainly in the Sales Departments. The organization of the Sales Departments are based on the managing policies of the companies. Mainly, there are three types of organization approaches;

i. Based on regions,
ii. Based on goods,
iii. Hybrid.

In regional organization type, salesmen are responsible for the marketing of all kinds of goods to only a certain country. They operate as experts of certain countries rather than as experts of certain goods. There are also permanent back-up personnel who are responsible for the domestic activities such as, negotiations with the producer, preparation of the offers, etc... Salesmen and back-up personnel work cooperatively. All the personnel are specialized in regional marketing. Thus, they have to be diversified in goods. As time progresses, they begin to behave as if they are domestic merchants of their regions.

Organization based on goods is an opposite approach to the above one. In this type of organization, the personnel is specialized in marketing of a specific good such as, textiles, chemicals, foodstuff, etc.. There are also two types

of personnel; salesmen and back-up personnel. Their duties are the same as in the first type of organization except that they are not restricted with a single region. Since this time they are responsible for a specific good, they act in all regions.

The last type of organization is a hybrid of the above mentioned ones. Some of the employees are responsible for the marketing of specific goods and others are responsible for the regions. This type of organization is observed in most of the companies. Proportion of the type of specialization changes from one organization to the other.

When the existing organizations are studied, an Execution Department is found in some of the companies. In organization structure which is illustrated in Figure 1.1, there is no Execution Department. In these types of organizations, the person, who is in charge of a specific good or region, is responsible for all the executions of an export activity. In other words, from the order stage to the final tax rebate stage, all the tasks have to be carried out by the responsible person or group.

In the other approach, there is an Execution Department. The Execution Department is responsible for the execution of all tasks from the registration stage to the final tax rebate stage. In this type of organization, salesmen and back-up personnel are only responsible for marketing. Thus, they do not penetrate into the complexity of the export procedure. These types of tasks are performed by the Execution Department personnel who are specialized in these tasks. This type of organization is illustrated in Figure 1.2. This department gets the necessary instructions and information from the Sales Department. During the performance of the tasks, they always work cooperatively with the Sales, Finance,

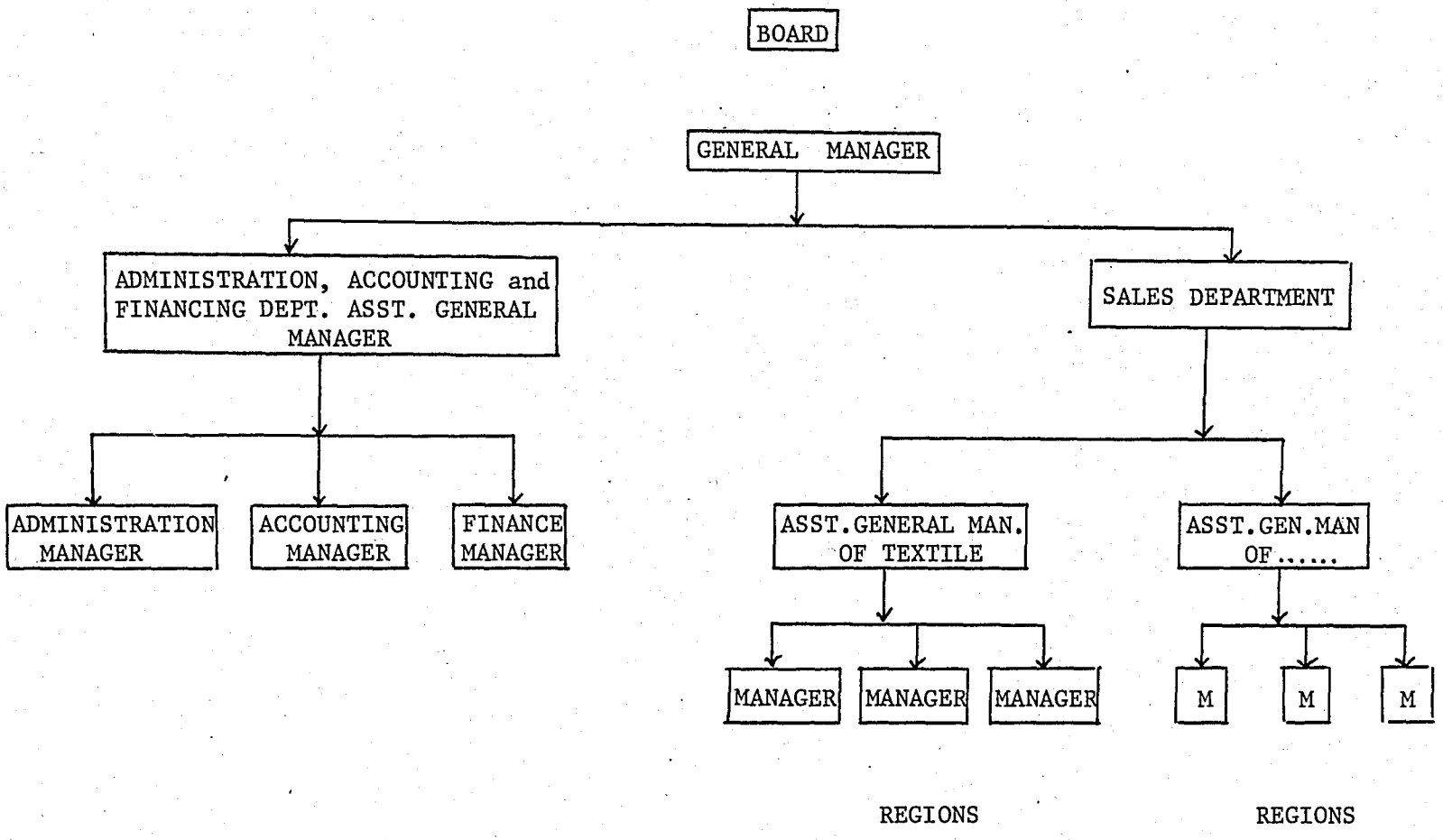


Figure 1.1. Organization Chart for Type 1.

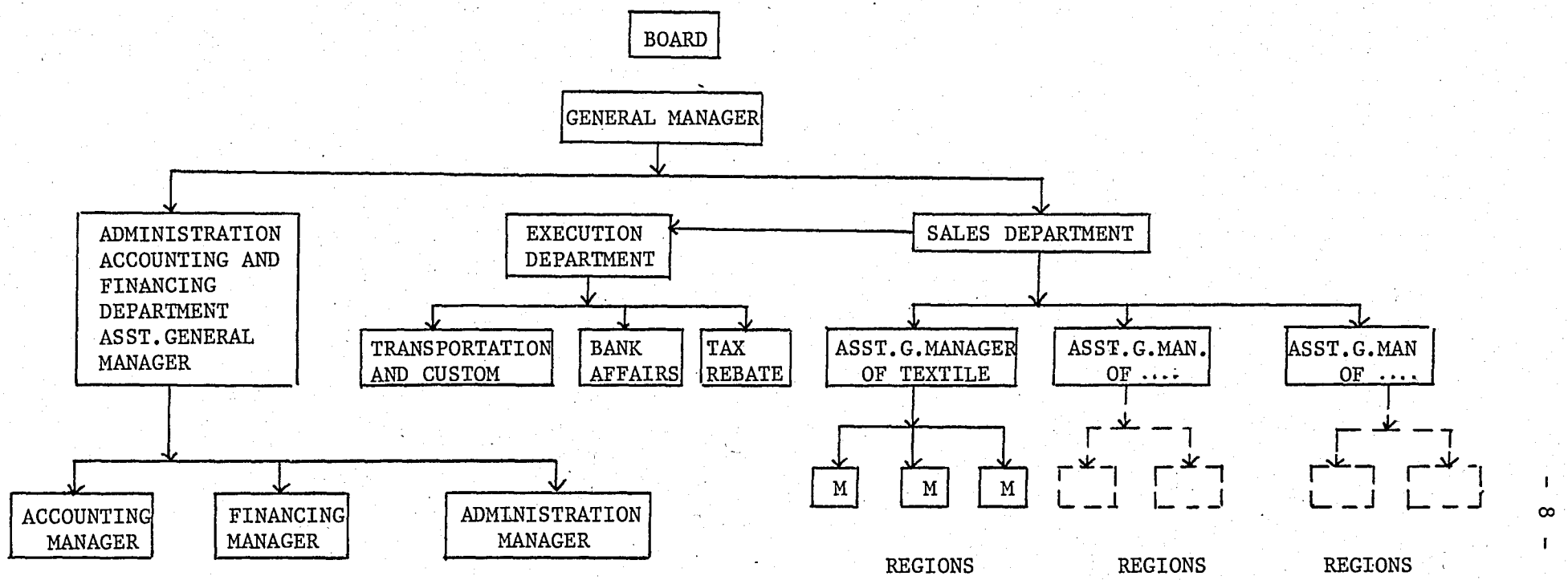


Figure 1.2. Organization Chart for Type 2

and Accounting Departments. Furthermore, this Department becomes the center for processing the information regarding registration, customs, transportation, and bank affairs. Relationships between the above mentioned departments are illustrated in Figure 1.3.

As a result, there are two types of operational policies

i. With Execution Department,
ii. Without Execution Department.

In the first type of operational policy, duties of Execution Department are carried out by the sales sections, and the position of this office does not appear in the relationship diagram (Fig.1.3).

As it is seen, there are different approaches both in organization and operational policy. But in practice, all of them have to obey the same export procedures and carry out the same tasks which are declared in Foreign Trade Laws. In practice, it is observed that every approach has different advantages and disadvantages. Most frequently executed approach is the hybrid model. In some cases, when the buying potential of a specific region or selling potential of a specific good are not at a level to allow the companies to allocate specialized salesmen and personnel for such a region and/or good, then the salesmen and personnel deal with a group of countries and/or a group of goods such as, e.g., North Africa or household appliances.

1.4. INFORMATION FLOW OF AN EXPORT ACTIVITY

Information flow of a specific export begins with the arrival of an enquiry. There are generally three channels an

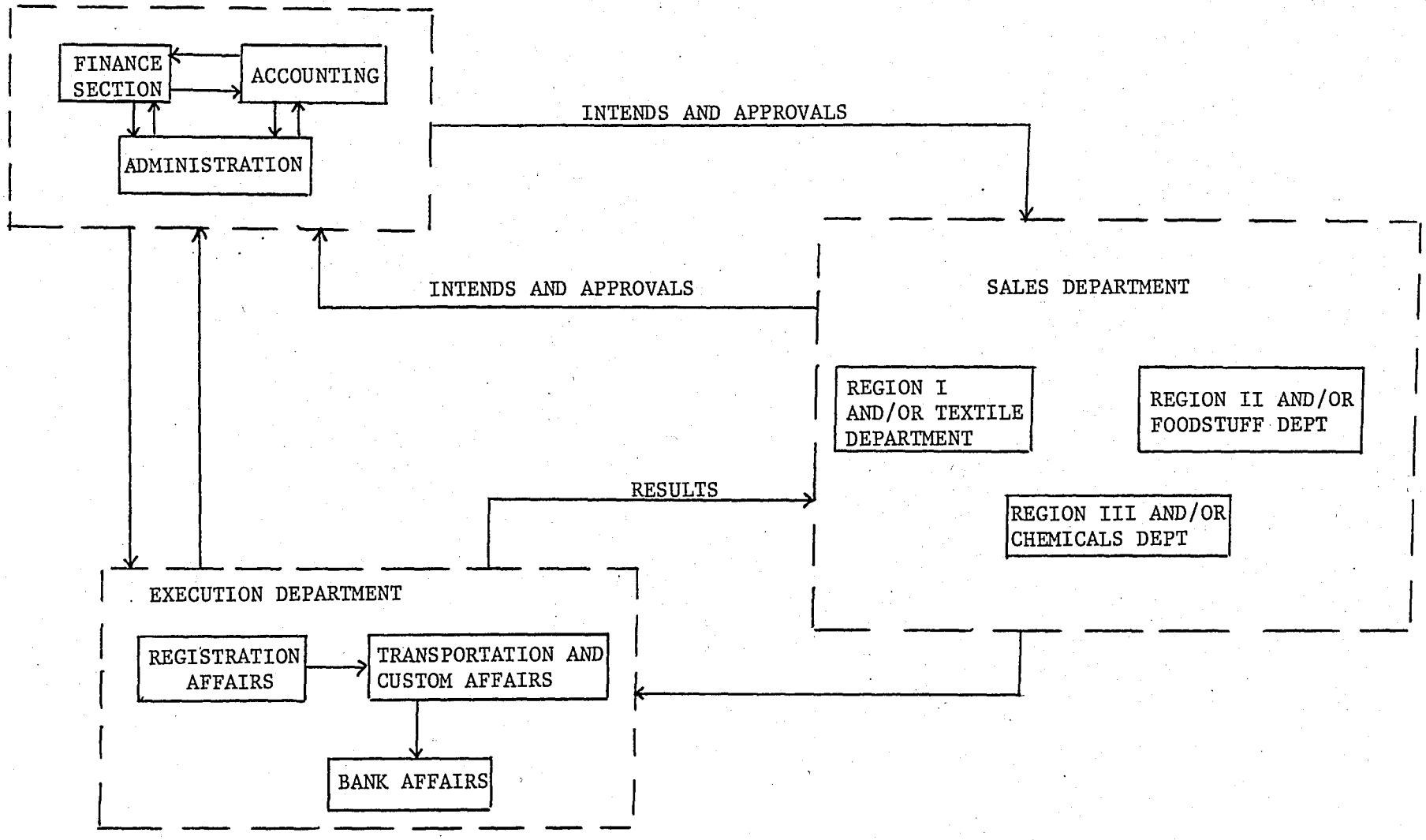


Figure 1.3. Relationships Between the Departments

enquiry is received through. The first one is a result of the application of an importer by himself. The second one is brought by the supplier or producer in Turkey. The last one is created by the salesmen. After the arrival of an enquiry, the back-up personnel begin to investigate this opportunity and carry out the negotiations with the supplier and transportation firm. If the results are positive, then they prepare an offer and send it to the salesmen. After the negotiations with the buyer, salesmen send the results for the approval. If the final situation is approved by the executives, salesmen sign the contract with the buyer. After all these tasks are performed, the necessary information and instructions are given either to the Execution Department or to the back-up personnel depending on the type of managing policy mentioned previously. According to the conditions in the contract and export procedures, the necessary registration tasks are performed. The goods are shipped and delivered after the custom formalities are carried out. Then, payment is done by the buyer according to the terms of payment. If there is any tax rebate for the exported product, the application for it is again performed by the Execution Department. This information flow is illustrated in Figure 1.4.

As it is seen from the summarized flow diagram, there are several tasks performed by the exporter from the beginning of a marketing activity to the completion of an export. Thus, this information must be processed in such a manner that will meet the formal information requirements of the company. The tasks performed offer signing the contract are the most important ones. Any mistake done in the execution of them causes serious problems. The problems arising are described in the following sections.

For this purpose, the managers are searching for effective ways in gathering, processing, and storing information techniques in order to eliminate the unexpected problems.

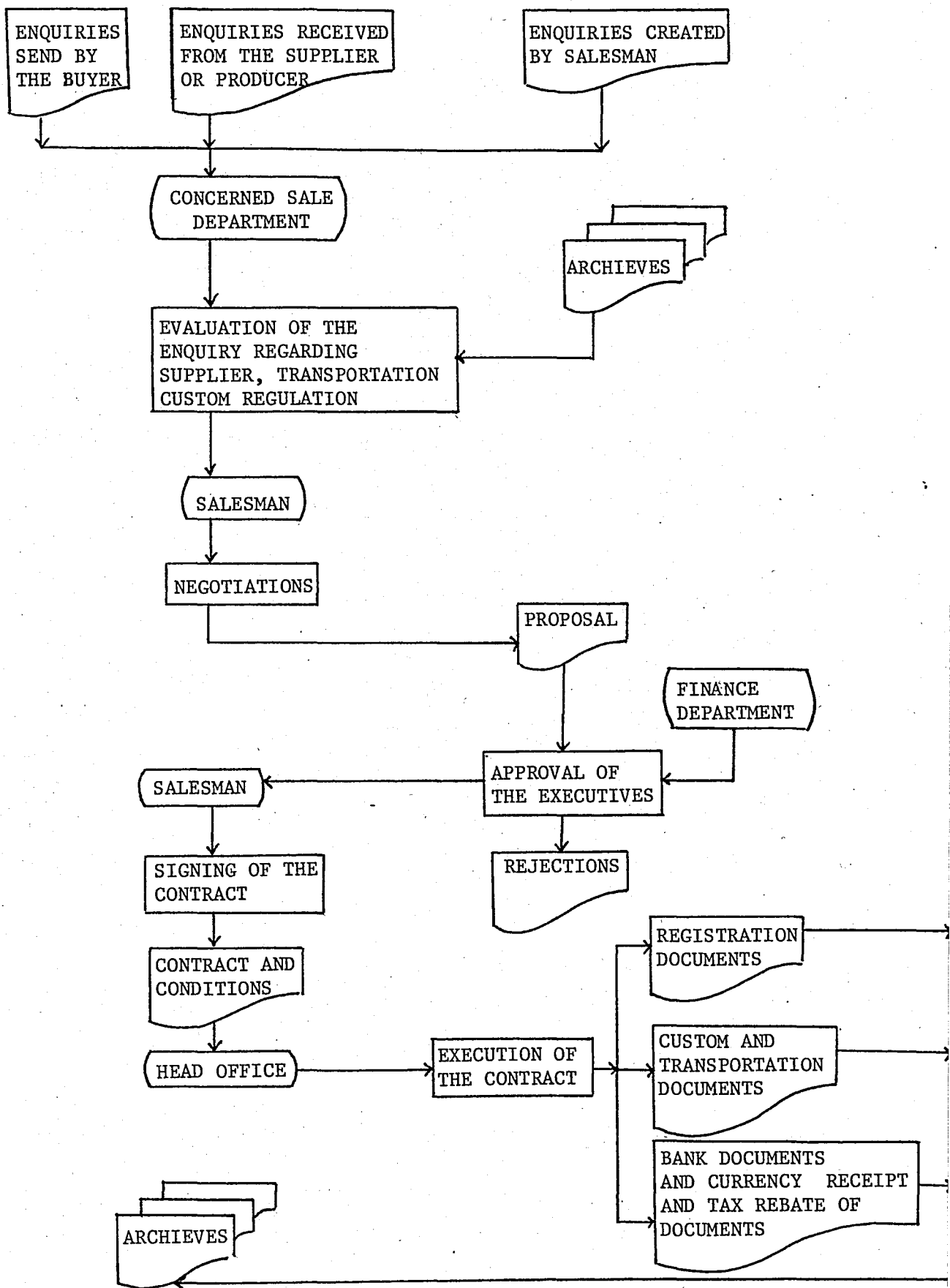


Figure 1.4- Information Flow of an Export Activity

Executing the Turkish Foreign Trade Law export procedures by an expert team is the most reasonable managing policy in export companies. For this reason, hybrid organized companies which have Execution Departments are taken into consideration in this thesis.

In literature, there are no well-defined IS design techniques which optimize the system as a whole. According to the volume of the information processed in the system, step-by-step design technique is prefered by the managers. Thus, the stages, from the arrival of an order to the tax rebate application, are studied as a module in thus study. Depending on the volume of business, the information can be processed either by the use of a computer or manually. During the interviews with the managers, it has been observed that the volume of the files are quite large for manual processing in Trading Houses. Therefore, the above mentioned portion was taken as a module and a modular IS has been developed by the use of a micro-computer in way so as to facilitate the integration of accounting, financing and marketing modules.

1.5. A SYNOPSIS FOR THE REMAINDER OF THE THESIS

In Chapter 2, MIS concept and Data Base Management approaches are introduced in order to develop a methodology for this study.

In Chapter 3, the export procedures are analyzed.

Based on the results of Section 3, information requirements of the system are studied and the information is described in Chapter 4. Since the execution of the export procedure is taken into consideration, only the

necessary information that are produced in these stages are discussed.

The design and implementation phases are presented in Chapter 5. The preferred Data Base Management approach is implemented in the design stage. This model is implemented to a micro-computer, Commodore 8096 which has been the only micro-computer available in the Industrial Engineering Department of BU at the beginning of this study.

Data Base development activities are performed under the supervision of computer specialists as well as Data Base Administrators. However, this study, which is developed for further extensions, is just the beginning of a complete Data Base Management System (DBMS) design for the above mentioned organizations.

Finally, in the conclusion chapter, results of the implementation are discussed and remarks are presented for the new extensions to include the other departments such as, finance, accounting, and administration as additional modules to the MIS.

II- MANAGEMENT INFORMATION SYSTEMS: AN OVERVIEW

2.1. THE IMPORTANCE OF INFORMATION IN TODAY'S ORGANIZATIONS

Parallel to the development of technology and business life, accumulation of data increased at all levels of management. In addition to labor, capital and land, data has become the fourth asset of an organization. The problem of the proper use of data and its introduction to the management of an organization has been looked into by management scientist as well as managers themselves. For this purpose, they have studied ways to design efficient Management Information Systems (MIS) for gathering, processing and storing of information. Different kinds of approaches were developed and implemented. Major developments in this field are summarized in this chapter.

Without information, a business simply cannot survive. Information flows are as important to the life and health of a business as the flow of blood is to the life and health of an individual. This applies to small as well as to large organizations(23). Indeed, successful information systems have enabled many small companies to more than offset the economies of scale enjoyed by their bigger competitors(22).

It is a well known fact that good decisions are based on sound and sufficient data. Information is the catalyst of

management and the ingredient that coalesces the managerial functions of planning, operating, and controlling. The manager depends on one specific tool, namely, information. Although he gets things done through people, his tool for achieving this is the spoken or written word and the language of numbers. As Norbert Wiener(28) remarks, any organism is held together by the possession of means for the acquisition, use, retention, and transmission of information.

2.2. A FRAMEWORK FOR MISs

According to Gorry and Scott Morton(8), there must be a framework for viewing Management Information Systems (MIS). This framework is essential if an organization is to plan effectively and make sensible allocations of resources to information systems tasks. The use of computers in organizations has grown tremendously, but very few of the resulting systems have had a significant impact on the way in which management makes decisions. A framework which allows to gain perspective on the present decision-making process and information flow in an organization can be a powerful means of providing focus and improving the effectiveness of the system building efforts.

Anthony(2) states that managerial activity consists of three categories:

(i) Strategic planning - the process of deciding on objectives 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.

(ii) Management control - the process by which managers

assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's

(iii) Operational control - the process of assuring that specific tooks are carried out effectively and efficiently.

It is obvious that there are several information needs in every system for efficient and effective management. Thus, the implemented MIS must supply the necessary information requirements of management. These internal information needs of a system are summarized by Murdick and Ross(20) and can be seen in Figure 2.1. On the other hand, the concerned systems grow and become more complex as time progresses; however, the basic functions and much of the basic information needs remain the same. It is apparent that change may continue to take place in management and in the operation of organizations. To handle the changes properly, the manager must learn what to do with information in order to deal with the increased complexity. In other words, the manager must be prepared to take an active part in the design and implementation of an MIS(20).

Parallel to these studies, several problems have been observed after implementation stages and several approaches have been developed in order to analyze and solve the resulting problems. One of these approaches is due to Nolan(21), namely, Managing Information Systems by committee. Nolan claims that in the majority of companies today, the large, centralized data processing department is no longer an isolated bastion of arcane knowledge. The whole structure and importance of data processing have changed over the past ten years; however, many managers are still stuck in the mold of 1970's. Though management by committee generally has a bad name, in the case of the computers the executive steering

INFORMATION NEEDS (Internal)
Accounting Control
Plans and budgets
Payroll by hourly and salaried groups
Inventories of materials, in process and finished goods
Sales by product, salesman, customer, area
Purchasing records, vendors, commitments
Distribution, transportation and warehousing
Production by product, customer, cost, over runs, backlog
Engineering-new products schedules, equipment, costs
R and D
etc... etc... etc...

Figure 2.1. Internal Information Needs of an Organization(20)

committee is the most efficient way to ensure the fit of information systems with corporate strategy.

Guyer(9) explains the reasons of using data processing in Credit Suisse with a specific example as follows:

i- Speedy, on-the-spot processing of customer requests.

ii- high-quality, error-free banking services

iii- Streamlining working procedures

iv- Constant security, updates (checks and controls, standards)

v- Information for management and executives; back-up for customer advisers.

In contrast to the last item listed by Guyer, Buss(4) claims that top executives are usually the last to know when things are going wrong in a company's data processing operation. Because they often control the department in the only way they know how-by watching the total budget. They remain unaware that serious problems are developing. The rude awakening comes when such key elements of the computer operation as sales order processing and inventory control break down completely. Buss states that such fiascoes arise from outdated applications software, and shows top managers how to read the danger signs(4). Thus, executives have to take part in every design and implementation stage of Data Processing.

Parallel to this view, McFarlan(18) states that managers, both general and IS, can avert many of these fiascoes by assessing the risks-signly and as a portfolio-in advance of an MIS implementation. Also McFarlan notes that difficult MIS projects require different management approaches. Companies can use a series of questions to asses

risk and to build a risk profile that will help them choose the best management tools for MIS projects of differing risk.

As can be seen from the critics, due to lack of analysis, several problems were observed in the implementation stage of MISs. Thus, depending on the nature of the organizations, effectiveness of an MIS is related to the chosen design and implementation approach. Most of the authors(1,7, 13,14) prefer step-by-step development approach. This approach is also called as modular procedure in three steps for every module in a system: Analysis, design, and implementation.

On the other hand, there are several common points in various descriptions of MISs(1,3,7,20):

i. It should apply to all levels of management,
ii. It should be liked with an organizational subsystem,
iii. It should function to measure, monitor and evaluate the performance of the system,
iv. It should be flexible.

In addition to , following points are taken into consideration in the choice of data processing method:

i. Volume of the data elements involved in the system,
ii. The complexity of data processing methods,
iii. Time constraints on data processing,
iv. Complexity of computational procedures.

In general, Burch et al.(3) summarize the MIS design methodology as follows:

1- Planning and programming MIS effort (Analysis)
2- Gross design (feasibility study of the project)
3- Detailed design
4- Implementation.

2.3. COMPONENTS OF AN MIS

In general, an Information System is composed of five basic components(20):

1- Administrative and Operational System
2- Management Reporting System
3- Common Data Base
4- Information Retrieval System
5- Data Management System

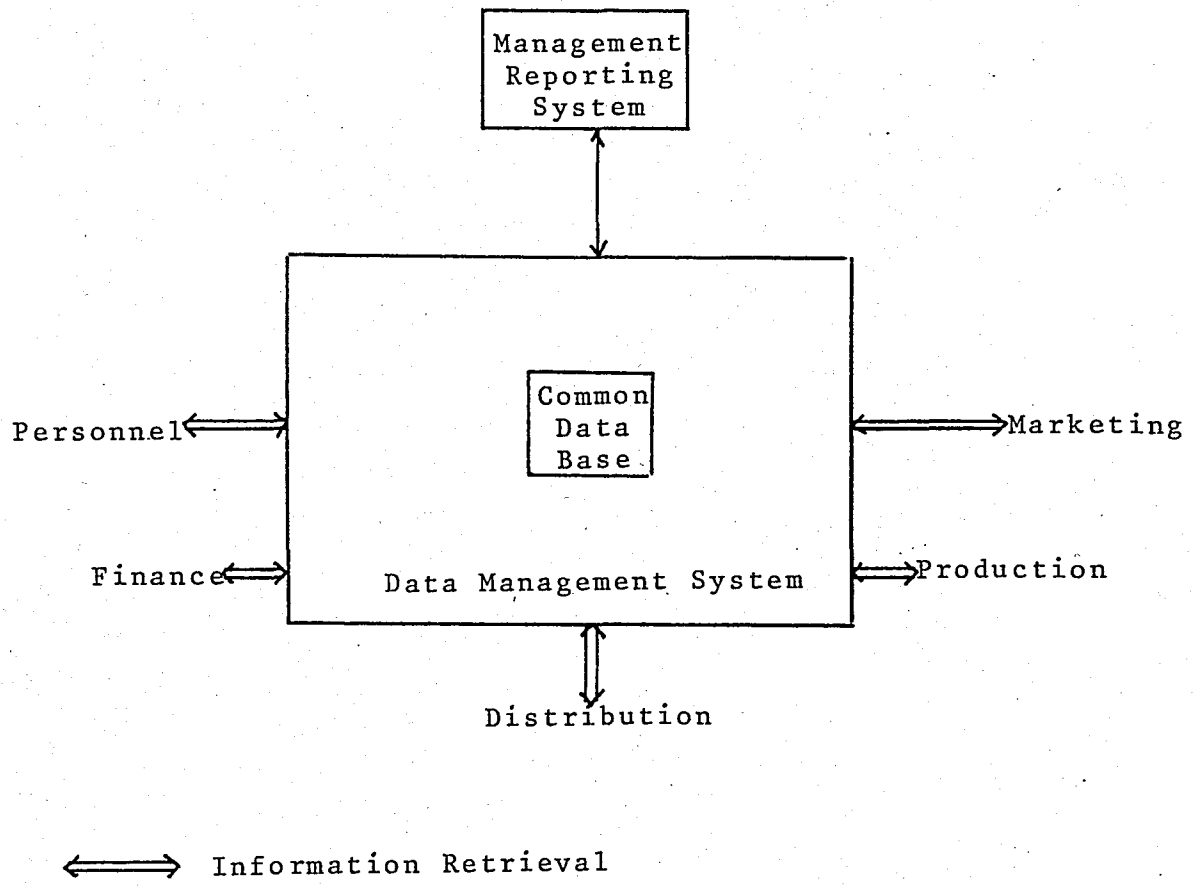


Figure 2.2. Typical Components of an MIS

2.3.1. Administrative and Operational System

In the first component, namely the Administrative and Operational System,

i. Personnel
ii. Finance
iii. Distribution
iv. Production
v. Marketing

activities are taken into consideration and included to the system analysis.

2.3.2. Management Reporting System

In the second component three basic reports:

i. Reports used for the general control,
ii. Reports on the efficiency of operations,
iii. Reports related with the achievement of the goals,

are designed and adopted to the system according to its specifications.

2.3.3. Data Base Management System

Depending on the results of these two stages, the appropriate data base and information retrieval system design methodology are chosen and implemented by a Data Base Management System team.

In general the tasks of Data Base Management System are as follows:

- Capturing and updating data for common data base and supervising these activities.
- Serving the needs of units at the periphery.
- Maintaining the system.
- Generating reports at the desired format.
- Securing the IS for the accidental damages.

According to Martin(17) Data Base is a collection of data designed to be used by different programmers. In other words, Data Base is a collection of interrelated data stored together with controlled redundancy to serve one or more applications in an optimal fashion.

Being the most advanced technology in MIS, Data Base Management Systems increase the user efficiency and consequently the acceptance of the information system(17).

The importance of users is stated by several authors(1, 3,7,13,14) that the success of an MIS may be highly improved by influence and involvement of its users. Thus, there must be a well programmed personnel training in every computerized MIS project.

The following question may arise in the managers' minds: Why Database? Date(6) answers this as follows;

i. The amount of redundancy in stored data can be reduced.
ii. Problems of inconsistency in stored data can be avoided.
iii. Stored data can be shared.
iv. Standards can be enforced.
v. Security restrictions can be applied.
vi. Data integrity can be maintained.
vii. Conflicting requirements can be balanced.

2.4. APPROACHES TO THE DATA BASE MANAGEMENT SYSTEMS

Currently, there are three approaches in Data Base Management Systems:

1. Hierarchical,
2. Network,
3. Relational.

2.4.1. Hierarchical Approach

A hierarchical data base is a collection of forests of trees called data base trees whose record occurances appear as nodes and logically organize data according to the structural relationships of hierarchical definition trees. For historical reasons this approach is very popular; it is used in many existing database systems; including, for example IBM's Information Management System(6,10,27). For expository purposes, supplier-and-part (entities) example will be used to present the models. Hierarchical model in which suppliers are superior to parts is illustrated in Figure 2.3.

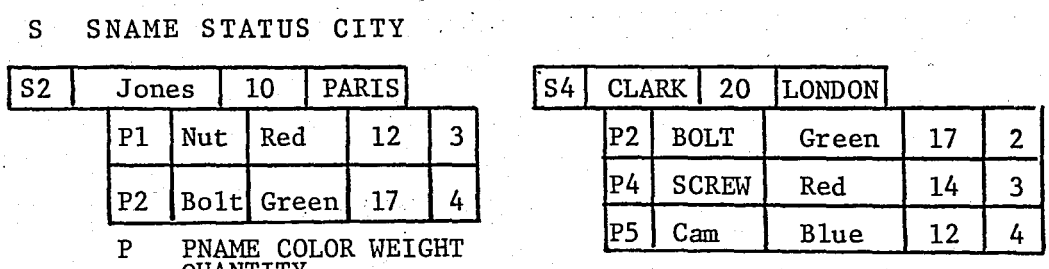


Figure 2.3. The Supplier-and-part Data Model in Hierarchical Form

2.4.2. Network Approach

Network approach has been studied and developed by the Data Base Task Group (DBTG) of CODASYL(6,25,27). It is used in many UNIVAC systems. It has a more general structure than

the hierarchical design because a given node may have any number of immediate superiors and subordinates. In this model many-to-many relationships can be expressed by using links between records(6,15,17). The same supplier-and-parts data model is illustrated in Figure 2.4. in network form.

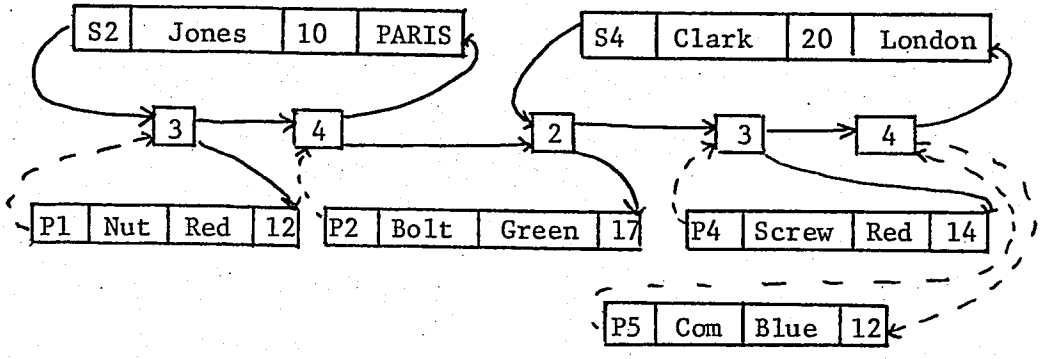


Figure 2.4. The Supplier-and-part Data Model in Network Form

2.4.3. Relational Approach

The third approach which is called as Relational, is based on mathematical theory of relations. Wederfod(26) defines this model as a table-oriented representation of data of an application world (mini world). This model is based on the third normal form of a simple relation which has been provided by Codd(6). Codd starts from a hierarchical relation and transforms this relation stepwise via first and second normal forms into the third normal form. Such that the ordering of rows and columns in a table are insignificant and no two rows are identical(6,12,19). The suppliers-and-parts datamodel in relational form is illustrated in Figure 2.5.

At the beginning of this study, there was no completed Relational Data Base System. The study of IBM Research Laboratory San Jose, California and IBM Programming Center, Endicott, which is called as Relational Data Base Management System, was introduced to the market as Data-Base package in January 1984.

S

S#	SNAME	STATUS	CITY
S2	JONES	10	PARIS
S4	CLARK	20	LONDON

SP

S#	P	QUANTITY
S2	P1	3
S2	P2	4
S4	P2	2
S4	P4	3
S4	P5	4

P

P#	PNAME	COLOR	WEIGHT
P1	NOT	Red	12
P2	BOLT	Green	17
P4	SCREW	Red	14
P5	COM	Blue	12

Figure 2.5. The Supplier-and-part Data Model in Relational Form

2.4.4. An Evaluation of the Different Approaches With Respect to the Storage Operations

As in all Data Base Models, there are three storage operations, these are:

- Adding
- Deleting
- Updating

The anomalies and advantages of the above mentioned models are summarized as follow.

The major advantage of hierarchical approach is that it obviously provides a very natural way of modeling a hierarchical structure from the real world. However, in data model of Fig.2.3, if the user wants to retrieve the following query:

Find supplier#'s for suppliers who supply part P2.

difficulties arise. The user must first position himself at the segment occurrence for S2 and then examine the part P2. The anomalies concerning other operations are noted briefly here

Adding. It is not possible, without introducing a special dummy supplier, to insert data concerning a new part until some supplier supplies it.

Deleting If the user deletes the only supplier of a particular part, data concerning that part is lost, too.

Updating If the user needs to change the description of a part, he faces with the problem of searching the entire data model to find every occurrence of this part.

The major disadvantage of the network model is simply that it is too close to a storage structure. The user has to be thoroughly aware of which chains do and do not exist.

On the other hand, the network model overcomes all the difficulties encountered with storage operations in basic hierarchical model, as noted below.

Adding It is trivial to add a new part. Initially there will be no links for the new part; its chain will consist of a single pointer from the part itself.

Deleting The user can delete a supplier without losing the part.

Updating The user can change the color of a part without search problems, because the color of the part appears at precisely one place in the model.

In relational approach, the major disadvantage is the implementation phase, no large-scale system based on this approach has yet been implemented (except the model mentioned in p.26).

According to Date(6), for the storage operations, it is sufficient to observe that, provided the correct normalized relations have been chosen for the data model, no difficulties arise. Data considers each storage operation briefly.

Adding — It is trivial to add a new part. Doing so will involve adding a new row to the P relation, initially there will be no SP rows for this part in the relation.

Deleting — The user can delete a supplier without losing the part by removing this supplier row from the S relation.

Updating — The user can change the color of a part without search problems, because the color of this part appears in precisely one row.

As it is seen, a database system must be able to represent two types of object, namely, entities and relationships. The three approaches differ in the way they permit the user to view and to manipulate relationships.

III. ANALYSIS OF EXPORT PROCEDURE

3.1. INTRODUCTION

In this chapter, export procedure of Turkish Foreign Trade Law will be summarized(16,29).

During export activities, every export company has to follow the existing export procedure. Export permissions, if they are necessary, are taken from authorized associations. Bank, Custom, Tax Rebate documents are filled in and submitted to the bank, custom and bank, respectively. All these documents are prepared according to the instructions published in the Official Gazette. In order to act without any interruption, information must be accurate and documents have to be submitted before the deadlines.

In general, all these activities can be separated into six basic stages as follows;

a. Orders
b. Registrat-on (if necessary)

c. Transportation and Custom Activities
d. Preparation of Documents for Bank.
e. Payments
f. Tax Rebates (if any)

3.2. ANALYSIS OF THE STAGES

3.2.1. Orders

There are two common properties which characterize every order.

a. Export type
b. Terms of Payment.

3.2.1.1. Export types in Turkish Foreign Trade Law

a. Free export
b. Export to the countries Turkey has barter agreements
c. Consignment export of export on clearing basis
d. Export on credit basis
e. Temporary export
f. Free of charge export
g. Export to the duty free markets
h. Export of semi-finished products
i. Advanced payment export
j. Trial export
k. Export to the construction companies which have construction business abroad
l. Transit trade and re-export
m. Border trade.

3.2.1.2. Terms of Payment

a. Advanced Payment
b. Letter of Credit (L/C)
   i. Irrevocable confirmed letter of Credit
   ii. Irrevocable letter of credit.
   iii. Revocable confirmed letter of credit
   iv. Revocable letter of credit.
c. Cash Against Documents.
d. Cash Against Goods
e. Counter Guaranteed Payment
f. Consignment Sale
g. Deffered Payment.

3.2.2. Registration and Licensed Export

Depending on the goods that are exported or the type of export, registration is compulsory. These precautions are related to the governments' policies. For the following types of exports, the exporter has to get the permission of authorized associations:

a. Export to the countries Turkey has barter agreement.
b. Consignment export or export on clearing basis.
c. Export to the duty free markets.
d. Credit export.

On the other hand, there is another type of registration depending on the kind of good, which is called export license. There are two criteria for the controlling of good. In the first step, authorized association controls whether the export of this good is allowed or not. The second step is the controlling of price according to the minimum or maximum levels.

The mentioned associations, which are authorized by the Foreign Trade and Treasury Undersecretary, perform the above tasks. The names of these associations are as follows;

a. Foreign Trade and Treasury Undersecretary
b. Chamber of Commerce
c. Chamber of Industry
d. Exporter Unions

After all these registrations, the association specifies the export period and gives the four copies of registration to the exporter for later usage.

During export period, if the exporter needs to extend the duration due to an acceptable reason the association has the right to approve this application for extension.

3.2.3. Transportation and Custom Activities

Transportation and Custom activities are performed at the same time.

In the first step, the exporter applies for Custom Manifesto and Engagement to Custom and for bill of lading (B/L) to the transporter.

According to the terms of delivery, bill of lading is prepared by the transportation agent. These delivery terms and their abbreviations are as follows:

a. Ex-works, Ex-factory, Ex-mill; Delivery in the factor,
b. FOB, FOR, FOT, FAS
   i. FOB; Free on board

ii. FOR; Free on rail.
iii. FOT; Free on truck
iv. FAS; Free alongside ship.

c. Franko Vagon (somewhere)(railway)
Franko (somewhere) (railway)

d. C and F, CIF
i. C and F; Cost + Freight
ii. CIF ; Cost + Insurance + Freight

The other step is the preparation of documents which will be given to the custom. Before the actual export, preparation and delivery to the custom of the following documents are compulsory.

a. Custom Manifesto and Engagement
b. Turkish Invoice
c. Letter of Instruction
d. Packing List
e. ATR.1 or ATR.3 Certificate of Circulation

Finally, the above list is ratified by the custom authorities.

3.2.4. Preparation of Bank Documents

In general after the actual export, the exporter has to give the following documents to his bank within ten days. In some cases, the exporter prepares some additional documents which are required in the conditional letter of credit of the client such as health certificate, quality control reports, etc.

a. Bill of Lading (ratified copy),
b. English Invoice,
c. Certificate of Origin,
d. ATR.1 or ATR.3 Certificate of Circulation.

For receiving the payment, the above and additional documents have to be prepared without any omission and mistake and have to be delivered to the bank before the deadline.

3.2.5. Payment of the Exported Goods

After the delivery of the documents to the bank the next stage is the payment. The normal duration of the payment is 3 months. But referring to an acceptable reason, additional 3 months extension can be taken. Furthermore, the exporter can apply for another extension with the same conditions.

3.2.6. Tax Rebate

The final stage of the exporting activities is the tax rebate, if the exported good is in the tax rebate list declared by the government.

For the payment of tax rebate, the exporter prepares the following documents and delivers them to his bank.

a. Ratified Custom Manifesto
b. Foreign Currency Receipt.
c. Registration documents
d. Tax rebate form and application letter.

The flow of activities is shown in Figure 3.1.

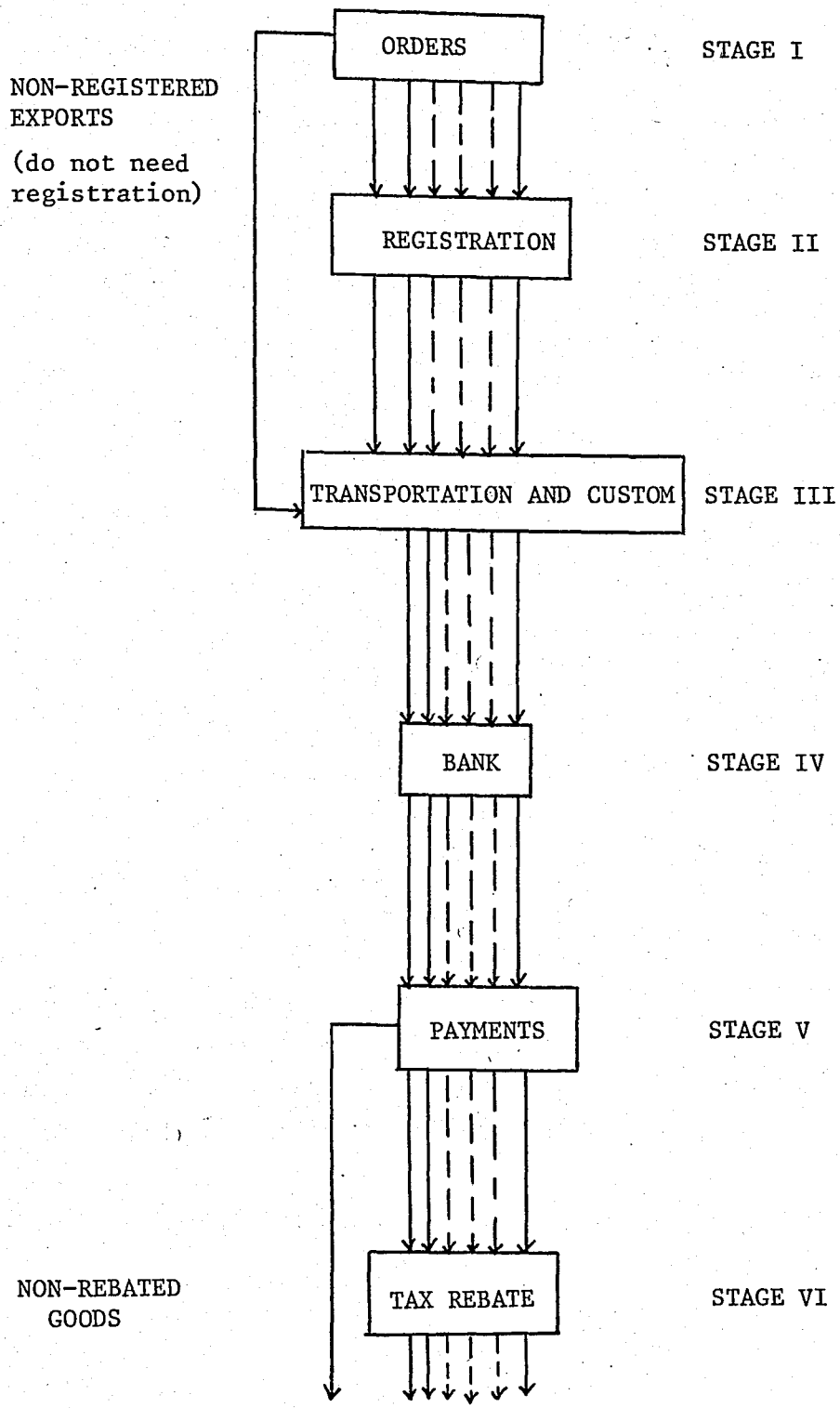


Figure 3.1. Flow of Activities in General

IV. REQUIREMENT ANALYSIS AND DESCRIPTION OF INFORMATION

In this chapter, requirement analysis of export stages will be presented in detail and the information, which is processed while performing the above mentioned tasks, will be described.

Depending on the number of files, the volume and the accumulation rate of information increase. Thus, all the information must be processed in a manner that will meet all the requirements.

Any inaccurate information or delay in gathering of information causes different kinds of mistakes. Because of these problems, the exporter couldn't carry out the engagements and contracts that have been signed. Consequently, the following problems come into focus;

a. Finance problems.
b. Legal problems.
c. Reputation of the company.

First and second one can be solved by time. The last one, however, is a big problem in minds for a long period of time. Thus, the two dimensions of information must be satisfied in order to processing efficiently. These dimensions are;

a. Accuracy of information
b. Speed of information gathering.

All the information processed in these organizations belongs to an order. An order consists of the following three basic elements;

a. Customer,
b. Supplier,
c. Product.

Execution Department gets this initial information from sales department and produces information for other sections step by step.

In the following sections information requirements are analyzed in six basic exporting stages.

4.1. ORDERS STAGE

Up to this stage marketing activities are performed by the Sales Department. After getting the concrete enquiry from the customer (buyer), the salesman signs the contract. This first step of export creates the preliminary data of this stage. These are;

a. Customer,
b. Supplier,
c. Product (Part),
d. Special conditions of the contract.

The produced information, in this stage, is not only used in successive stages but it is also a necessary information for future activities of Sales Department. When the

details of the above mentioned data are studied, the following picture comes into focus. This information process is shown in Figure 4.1.

4.1.1. Customer

i. Customer's name
ii. Customer's address
iii. Customer's telephone.

4.1.2. Supplier

i. Supplier's name
ii. Supplier's address
iii. Supplier's telephone
iv. Supplies what? (name of the product)
v. Indicative price
vi. Capacity of production.

The mentioned indicative price of the part is the supplier's list price, not the negotiated final price of the sale.

4.1.3. Part

i. Name of the product
ii. Price.

The price mentioned in this section is just an average price to be used in a preliminary study of an expected sale. There may be several manufacturers of a product. Thus, a fixed price can not be declared for a specific good.

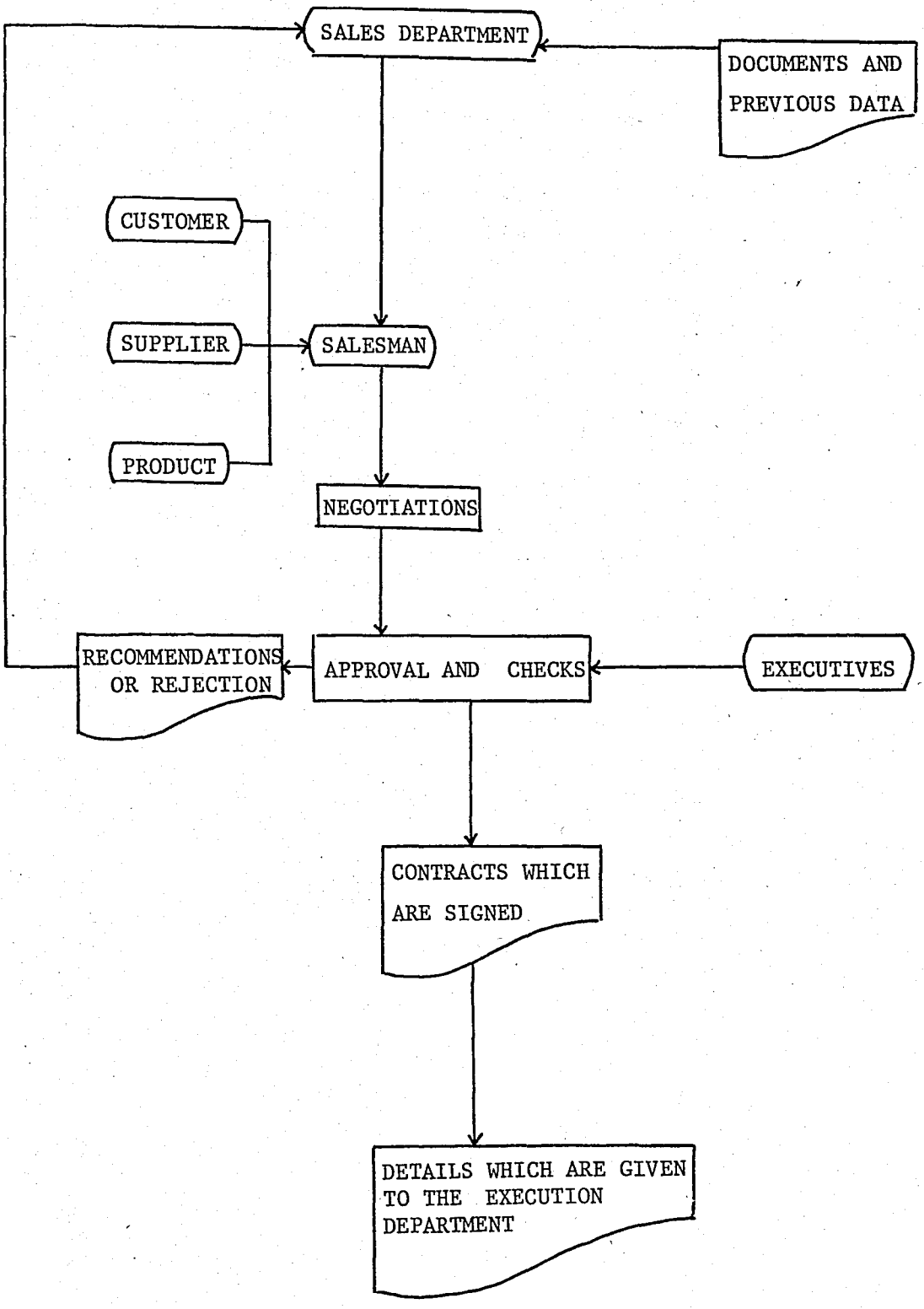


Figure 4.1. Flow Diagram of Information in Marketing Activities

4.1.4. Contents of a Contract

The contents of a contract is as follows:

i. Name of the buyer
ii. Name of the seller
iii. Their addresses
iv. Terms of payment
v. Type of the price
vi. Quantity
vii. Price
viii. Delivery schedule and terms
ix. Names of the banks
x. Product and its specifications.

The above data are gathered directly from the contract. Special conditions which differ in each contract, are included to the above information. These special conditions are Health Certificate, quality control report, certificate of origin, etc.. The additional information which must be specified for the registration step, are the type of export (eg. credited, free, re-export, etc.), good and the country of the importer.

i. Type of export
ii. Good
iii. Importer's country

All these data are the requirements of the Execution Department which are responsible for the execution of the export procedure. On the other hand, in addition to the gathered information of customers, suppliers and products, the Sales Department needs some other information concerning the following queries such as;

i. Who supplies what? (or vice versa)
ii. What are the import regulations of a certain country?

In the following section, these queries will be taken into consideration.

4.2. REGISTRATION STAGE

As it is mentioned in the previous chapter, some exports must be registred and licensed. During this step the following data is processed;

i. Name of the registry
ii. Date of the registration
iii. Reference number of the registration
iv. Number of copies
v. Export period.

In addition to these data, there are feedbacks from the following stages, regarding the usage of copies;

i. Place
ii. Date
iii. Reference number

If an additional export period is necessary, the exporter applies for an extension.

This stage is active during the whole operations of an export. The copies of registration are given to custom and bank. The last copy is filed out by the exporter. The process is shown in Figure 4.2.

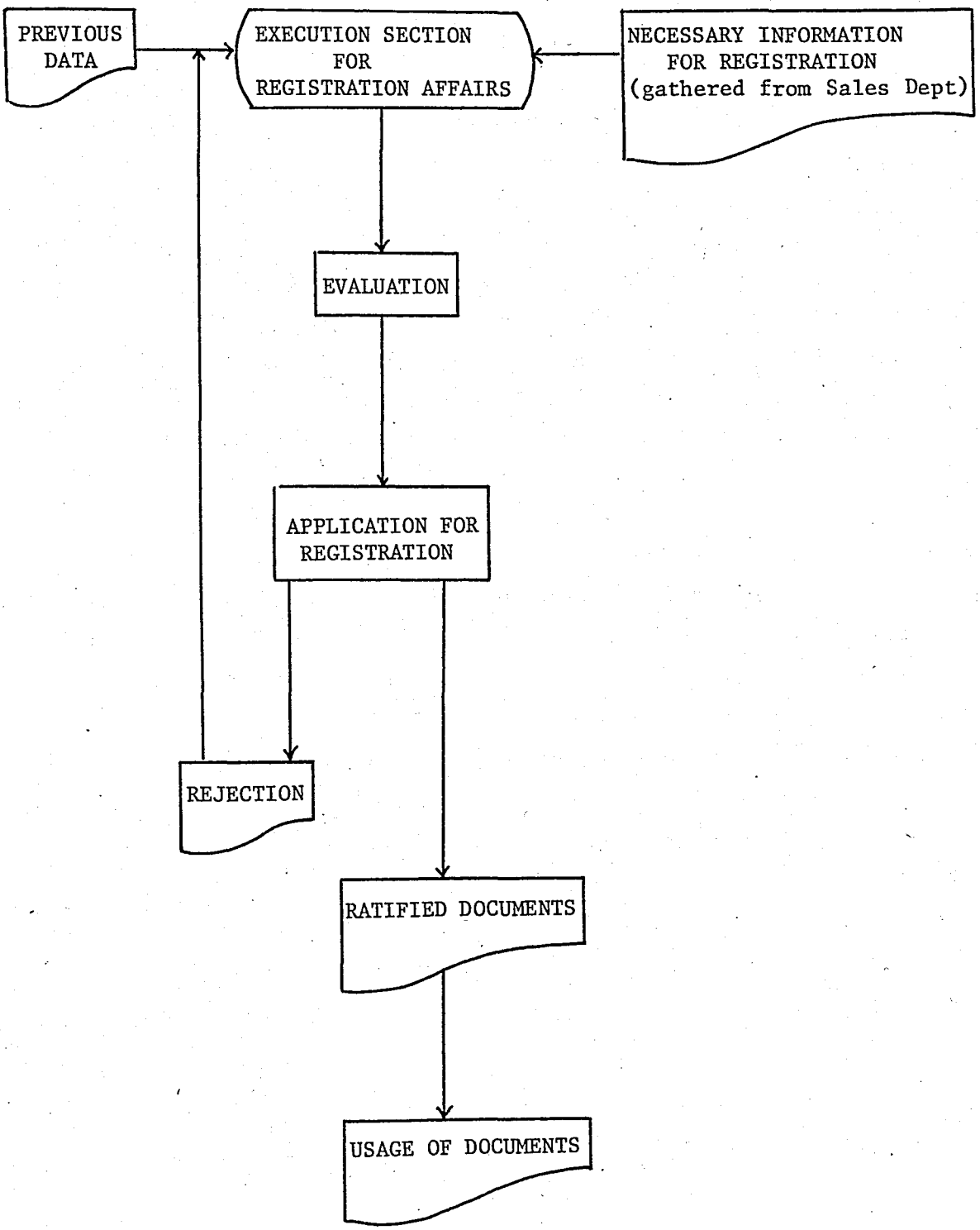


Figure 4.2. Flow Diagram of Information Processing in Registration Affairs

4.3. TRANSPORTATION AND CUSTOM ACTIVITIES

This stage is approximately the mid-point of an export activity concerning the export procedure. All the shipment and custom declarations, which are the legal documents for the future bank, payment and rebate activities, are carried out in this stage. Transportation and custom activities are performed at the same time. A custom officer inspects the goods transported at the loading place. After this inspection the concerned truck, railwagon or container is sealed according to the custom rules and Custom Manifesto is filled out and ratified.

Filled out information is the legal declaration of the customer which is used in all other applications and operations. During these executions a second kind of information is processed which is called as the data bank of exporter. These are related to custom commission agents, transportation and insurance firms. The information concerning these sectors is necessary for all future activities and accumulated for the marketing facilities of Sales Department. The above mentioned processed information can be summarized as follows;

4.3.1. Information of Transporters

i. Name of the transportation firm
ii. Address of the transportation firm
iii. Telephone of the transportation firm
iv. Field of transport.

4.3.2. Information of Insurance Firms

i. Name of the firm
ii. Address of the firm
iii. Telephone of the firm.

4.3.3. Transportation Documents

During the preparation of transportation documents which are necessary for the custom and bank, a letter of instruction is written to transporter. All the compulsory instructions, written in the letter of credit or purchase order concerning transportation conditions, are requested from the transporter. After this enquiry, transporter prepares the bill of lading and sends the copies to the necessary authorities. Additional information in a bill of lading up to this stage is the following;

i. Date of Bill of Lading (B/L)
ii. Amount of B/L
iii. Reference number of B/L
iv. Licensed name or the number of vehicle.

Preparation of insurance documents is not compulsory unless the importer asks. This task is again performed by writing a letter of instruction to an insurance firm.

All the above additional information is necessary in following up the tasks in Custom and Bank as well.

The second part of this stage is related to custom. Specialized custom commission agents are engaged in these tasks.

4.3.4. Commission Agent Information

i. Names of the commission agent
ii. Address of the commission agent
iii. Telephone of the commission agent
iv. Field of specialization.

4.3.5. Documents Given to the Custom

All documents concerning custom authorities are filled out with the information processed until this stage. Custom Manifesto and Engagement is one of the most important task in an export activity. The exporter declares all the specifications of the export activity. The exporter declares all the specifications of the export in this engagement which binds him to act accordingly in future.

The following tasks are performed and documents are prepared for Custom. Registration activities of this stage are followed up by the custom commission agent.

i. Manifesto and Engagement
ii. Custom Manifesto
iii. Turkish Invoice
iv. Packing List
v. ATR.1 or ATR.3 Certificate of Circulation (if necessary)

The necessary processed information in Custom activities for the following stages is the reference numbers and date of the documents given to the authorities.

Custom authorities get the information, related to the export, from the Custom Manifesto which is filled out by the exporter. Exporter has to be sure before filling out this manifesto that the declaration is absolutely correct. Otherwise, the exporter can not change this ratified declaration and has to behave accordingly in the remaining tasks. Thus, efficient processing and analysing of the gathered information up to this stage is the only way to avoid facing an unexpected situation.

Persons who are in charge of carrying out these steps

must study the special conditions of the contract in detail. In general, these conditions are related to transportation, delivery period and Circulation Certificates. Any mistake, concerning these conditions, causes the rejection of the goods by the importer. The flow Diagram of Information processing in this stage is shown in Figure 4.3.

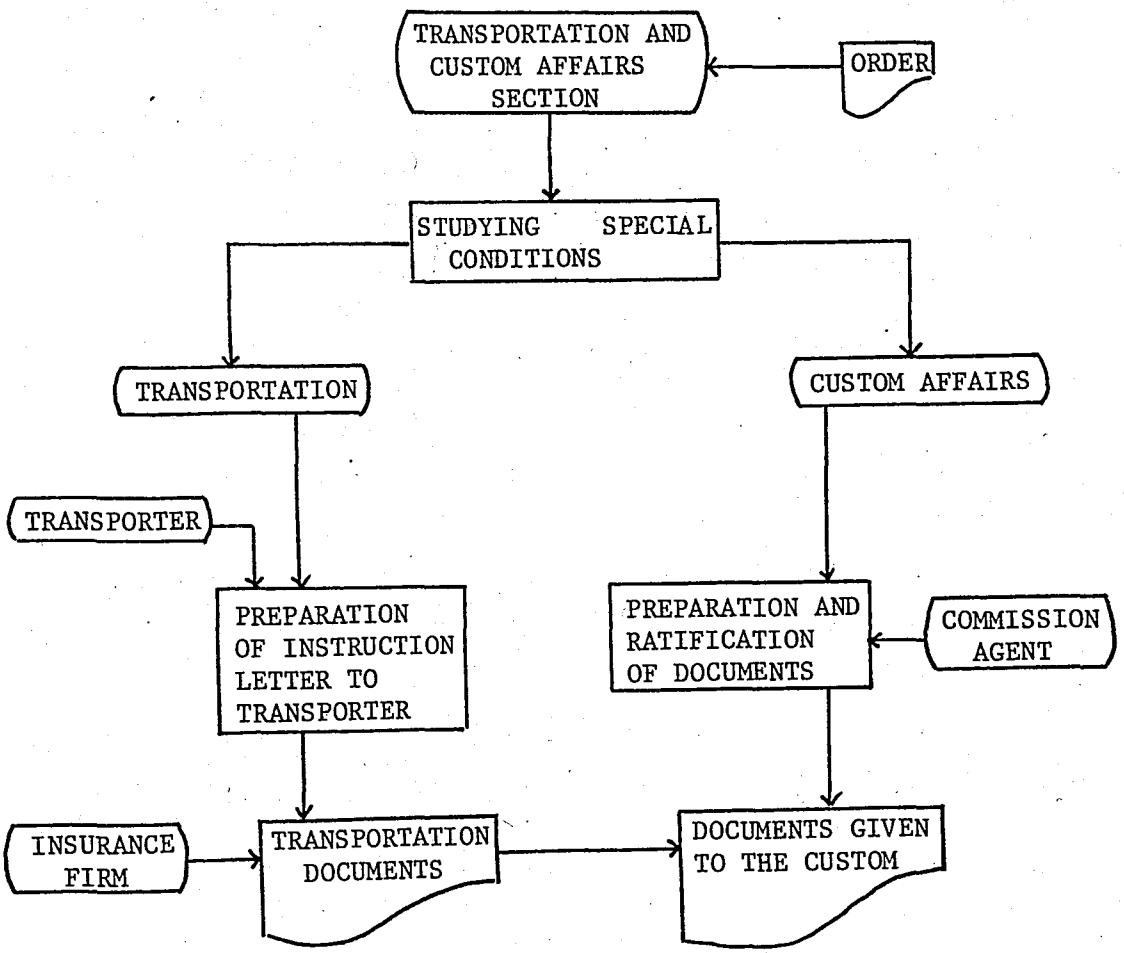


Figure 4.3. Flow Diagram of Information Processing in Custom and Transportation Affairs

4.4. BANK AFFAIRS STAGE

In completion of an export, Bank Affairs are one of the most important stages. Banks are the only international officials between buyers and sellers. Both parties prefer to communicate via Bank connection, to be on the safe side. This communication is illustrated in Figure 4.4.

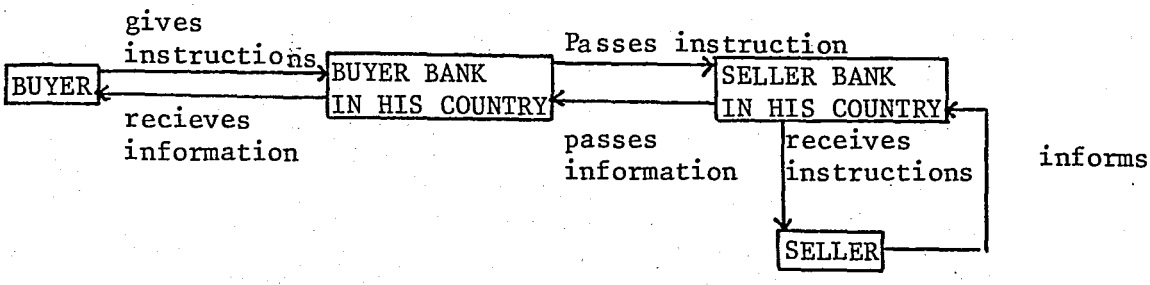


Figure 4.4.

4.4.1. Documents Given to Bank

Documents which are given to Bank are declared in export procedure. In addition to these, some optional group of documents are requested by the importer. The documents which the exporter is obliged to give to the bank are the following;

i. Custom Manifesto
ii. Delivery Documents
iii. English Invoice
iv. Certificate of Origin
v. ATR.1 or ATR.3 documents

Refering to the import regulations of the importer's country, the exporter prepares different documents. These

enquires change from one country to another. For this reason, analysis of these numerous documents is the subject of a separate study. Thus, only documents, concerning Turkish Export Procedure, have been studied in this section.

Additional information produced in this stage are as follows;

i. Name of the Bank and its agency
ii. English Invoice
    . Number
    . Date
    . Amount
iii. Certificate of Origin
    . Number
    . Date

For recieving the payment, all the above tasks must be performed within ten days after the ratification of Custom Manifesto or before the expiry date specified in the Letter of Credit or Purchase Order. Otherwise, the importer has the right to put reserve for all activities and to cancel the contract or purchase order.

As it is seen, information requirement of this stage must be processed carefully. These tasks need occurate information, which must be gathered timely and examined by the responsible persons once more. The flow diagram of this stage can be summarized as in Figure 4.5.

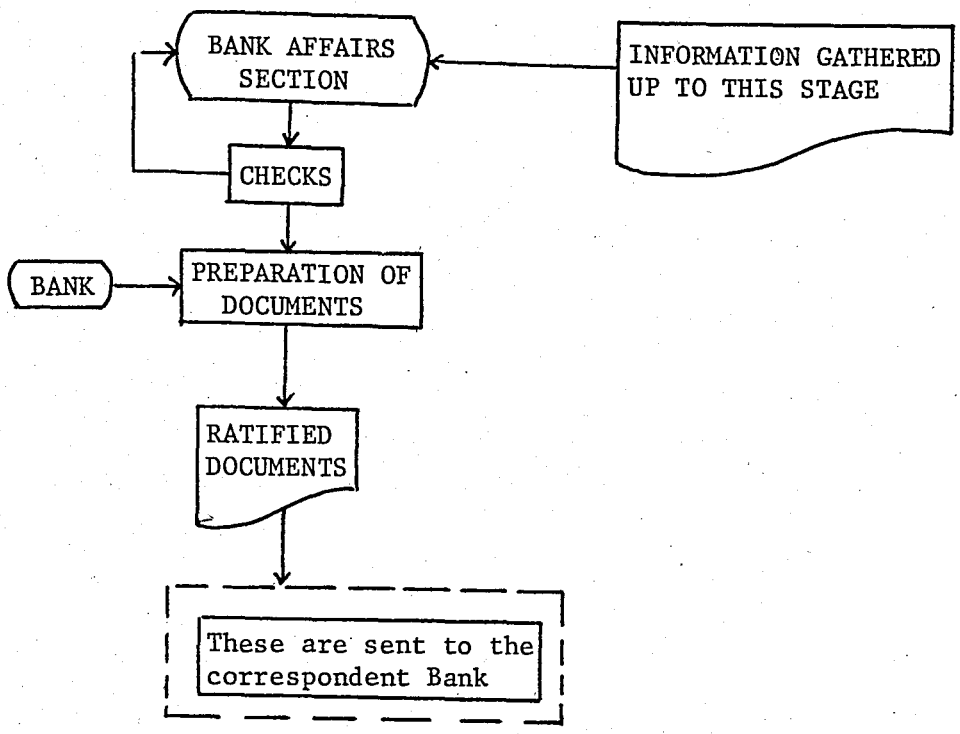


Figure 4.5. Flow Diagram of Information Processing in Bank Affairs

4.5. PAYMENTS

According to the type of payment conditions, the exporter is obliged to bring the concerned amount of foreign currency. In advanced payment the exporter obviously does not take this stage into consideration. However, in Cash Against Documents, Cash Against Goods, Letter of Credit etc., payments are made only when certain conditions are met. The money is blocked by his bank in Letter of Credit type of purchasing so it is withdrawn by the exporter's bank when the conditions of the contract or Letter of Credit are carried out.

Following up the payments, in CAG, CAD or Consignment Sales, is rather difficult and risky. There is a deadline for the payments of these kinds which is 90 days after the date

of Custom Manifesto. Depending on the laws, the exporter, by declaring an acceptable reason, has the right to extend this period at most three times.

After the payment is done, bank gives a foreign currency receipt and exchanges the money to Turkish Lira at the same time.

Information requirements of this stage are generated by the previous tasks. The following information is the input of this stage;

i. Name of the bank and agency
ii. Terms of payment
iii. Amount of the payment
iv. Deadline of the payment

Name of the Bank and Agency are gathered from the Bank stage that it is used for further following tasks, such as; currency receipt and extensions. Terms of payment is also important for the same following up purposes. On the other hand, English Invoice specifies the amount that will be paid.

Finally, the deadline of the payment is gathered either from registration stage if it is an registered export or from the agreement between two parties.

Using these data, the payments are performed in order to complete the engaged export activities. Otherwise, according to the Foreign Trade Law, an export activity can not be completed without payment. After the payment is done by the buyer, the bank prepares the foreign currency receipt for the exporter. During this operation following information is processed;

i. Name of the currency and exchange date.
ii. Currency Receipts number and date.

This step is one of the most important task, that has to be performed, in this stage. In some cases, payments can not be done by the importer before the specified deadline Refering to an acceptable reason, another additional three months permission is taken from the authorities. Therefore; exporter must observe this period carefully to get the mentioned extension. Thus, if such a kind of situation exists another additional information is processed;

i. Deadline of the extension

There is another group of information which must be stored, namely the daily foreign currency parities. This is useful for this stage and even in marketing activities for price negotiations. The flow diagram of Information Processing in this stage is shown in Figure 4.6.

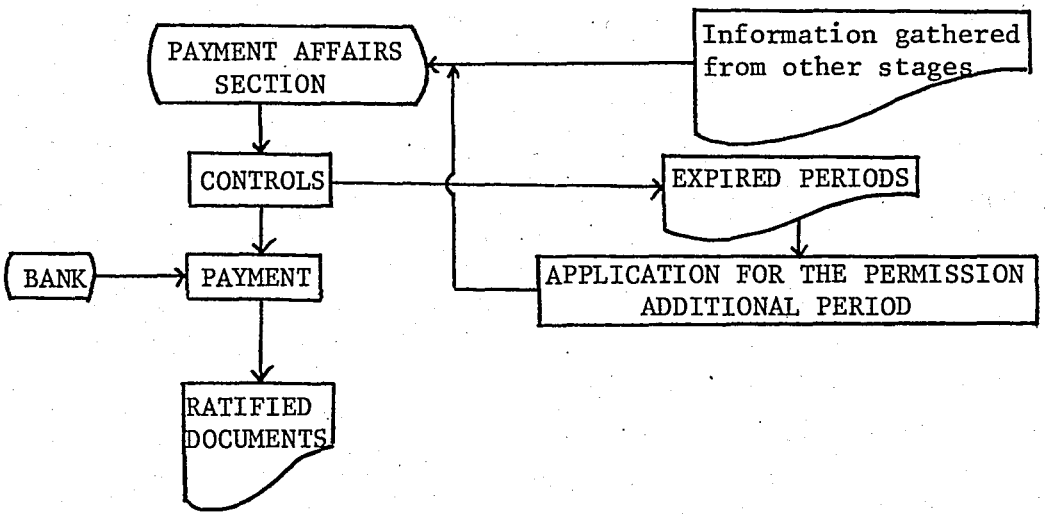


Figure 4.6. Flow Diagram of Information Processing in Payments Affairs

4.6. TAX REBATES

There are several incentives for exporters, one of them is the tax rebate for certain goods. If the exported good is in the tax rebate list published by the government, exporter has the right to get the certain percentage of the amount as a tax rebate from the Central Bank of Turkey. Tax rebate percentage changes according to the kind of the exported product.

After the currency receipt is given by the bank, exporter applies to the bank to get the tax rebate. First of all, necessary documents are prepared refering to the kind of product, paid amount, and the parity in Custom Manifesto and then send to the bank. Again, in this stage two kinds of information are processed. The first one is filed for further tasks, these are:

i. Letter of Instruction, number and date.
ii. Amount, number and date of tax rebate receipt.
iii. Date of Custom Manifesto (for currency, parity)

The above documents are the last part of an export, if there is any tax rebate. Thus, for the future controls and/or analysis this information must be kept in the archieves of the company.

The second type of information, which is updated over time, is related to the tax rebate lists. Percentage of tax rebates are sometimes varied and regulated by the government. Therefore, these changes must be observed and updated immediately for the sake of tax rebate applications and marketing purposes as well. There are several lists where the goods are classified according to the tax rebate percentage. Maximum good tax rebate is 20 % for certain group of

products which is called as List 1. This ratio decreases in increments of 2.5%. Necessary information regarding tax rebates are as follows:

i. Product Name
ii. List Number
iii. Percentage

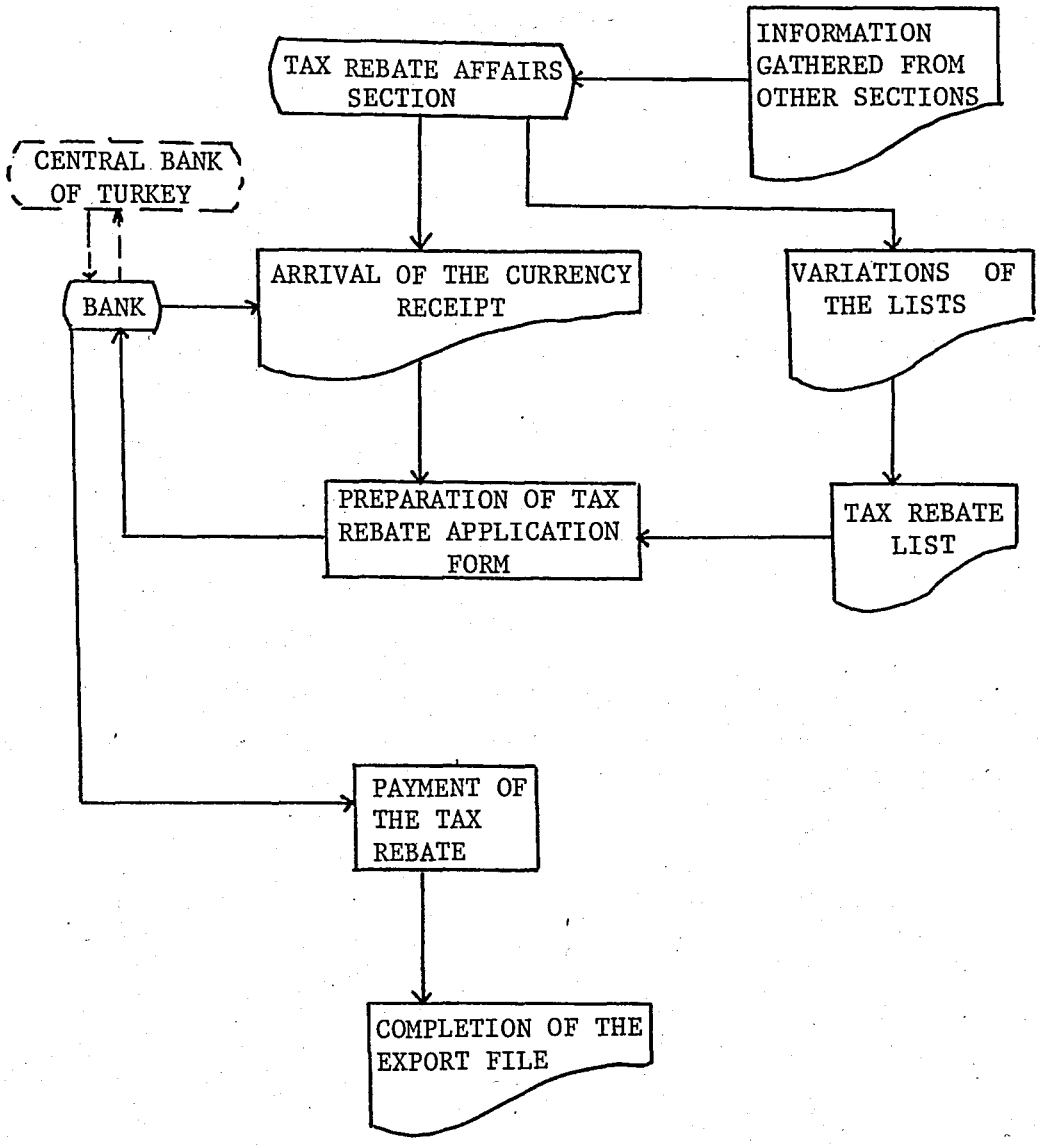
The Flow Diagram of Information Processing when rebate tasks are performed is shown in Figure 4.7.

4.7. CONCLUSION

The Requirement Analysis and Information Description shows that most of the tasks can not be performed independently. Any inaccurate information processed in previous task affects the successive one. On the other hand, processing time is another constraint which is as important as the first one.

In general, there are two types of information. Information processed for routine operational needs is the first one. The second one is processed for decision making needs in marketing activities. Consequently, Information Processing mechanism must support these needs with accurate information and timing.

If the number of files are taken into consideration, the above mentioned efficient Information Processing mechanism can only be redesigned by the use of a computer in order to satisfy the above needs. In the following Chapter, a new model is designed and implemented to the computer.



-------- This stage is not the exporter's task.

Figure 4.7. Flow Diagram of Information Processing When Rebate Tasks are Performed

V. DESIGN AND IMPLEMENTATION OF A NEW SYSTEM FOR EXPORT ACTIVITIES

5.1. INTRODUCTION

In this chapter, by the use of relational approach mentioned in Chapter 2, necessary Conceptual Data Structure in a MIS and Relational Schema are developed. Then, files and computer programs for the new system are developed and implemented to the computer.

As concluded in the previous sections, only the execution stage of the export procedure will be developed as one of the modules of the whole system and processed by the computer.

In the following sections, first the Conceptual Data Structure of the tasks explained in Chapter 3 and 4 are developed and described. In the second step, Relational Schema is developed as it is mentioned in Chapter 2 and the attributes of the schema are described.

Based on the results of the schema the files are designed by using the facilities of Commodore 8096 and then together with the computer programs which have been written in Basic Language, are implemented to the computer.

Finally, the facilities and user interface of the main program are explained.

5.2. CONCEPTUAL DATA STRUCTURE

5.2.1. Orders Stage

As described in previous Chapters, the beginning information resource of an export activity is this stage. According to the conditions in the agreement signed by the exporter, the contract must be executed by the exporter. Thus, the clauses of the mentioned contract is the framework of a specific export.

In this stage, two kinds of information are processed. The first one is the information processed for further tasks regarding the specific export. The second one is processed for marketing purposes. On the other hand, some of them are used for both purposes.

Based on the clauses of the contract and additional information for further tasks, the following information must be stored.

Data structure of a customer and supplier are illustrated in Figure 5.1. Name, Address and Telephone of a customer are necessary for further tasks and the salesmen in marketing. In the supplier case, in addition to the above information the name of the product (part), which is supplied by the supplier and capacity of the supplier must be specified.

In the third component of an order, which is called o.s. part, price indication must be taken into consideration in order to give an indicative price idea to the salesmen. The structure of a part is given in Figure 5.2.

CUSTOMER		
NAME	ADDRESS	PHONE

SUPPLIER					
NAME	ADDRESS	PHONE	PART NAME	CAPACITY	PRICE

Figure 5.1. Customer and Supplier Data Structure

PART		
NAME	INDICATIVE PRICE	SUPPLIER NAME

Figure 5.2. Part Data Structure

When a supplier, a customer, and a part come together, an order exists.In order to process the necessary information for further tasks, the contract and its special conditions must be studied in detail and the following illustrative data in Figure 5.3. as the structure of an order, must be stored.

ORDER				
CUSTOMER	SUPPLIER	PART	EXPORT TYPE	REGION

TERMS OF PAYMENT	PRICE TYPE	SHIPPING DATE	QUANTITY SHIPPED

PRICE

Figure 5.3. Order Data Structure

The above defined information is necessary as the input of registration, transportation, custom and bank activities. On the other hand, for marketing purposes, the sales groups

need different kinds of information. In order to satisfy the fundamental information needs of these sections, the following information must be stored in this stage.

i. Who is the supplier of product "A"?
ii. What are the import regulations of country "B"?

For the first step of marketing activity, the above queries must be answered. Thus, the name of the supplier and its price and production capacity must be stored as in Figure 5.4. together with the name of the part produced by this supplier. In order to answer the second query, the import regulations must be stored for different countries. In fact, there is no limitation in gathering and storing of such a kind of information. However, in practice, keeping the fundamental points of the regulations is sufficient. For further detailed knowledge, the documents about this subject have to be separately studied.

SUPPLIER VS. PART			
SUPPLIER NAME	PART NAME	CAPACITY	PRICE

IMPORT REGULATIONS	
COUNTRY NAME	REGULATIONS

Figure 5.4. Supplier-Part and Import Regulations Data Structure

5.2.2. Registration Stage

Depending on the country or the good the exporter has to take the export permission from the authorized associations. Exporter doesn't execute the export, unless the permission is granted. As it is mentioned in Chapter III, depending on the

kind of export, several associations are responsible for the approval of the permission. Thus, after the approval, four copies of the permission are given to the exporter. These copies are used in different places such as, custom, bank, etc.. According to the type of export, the exporter has to realize it within a specific period of time which is called as export period. If it can not be realized in this period, an extension permission is taken from the same associations. Consequently, three major points of a registration have to be stored and then controlled. These are;

i. Export periods
ii. Extension (if any)
iii. Usage of the registration copies.

For further tasks and controls, the above information must be stored as illustrated in Figure 5.5.

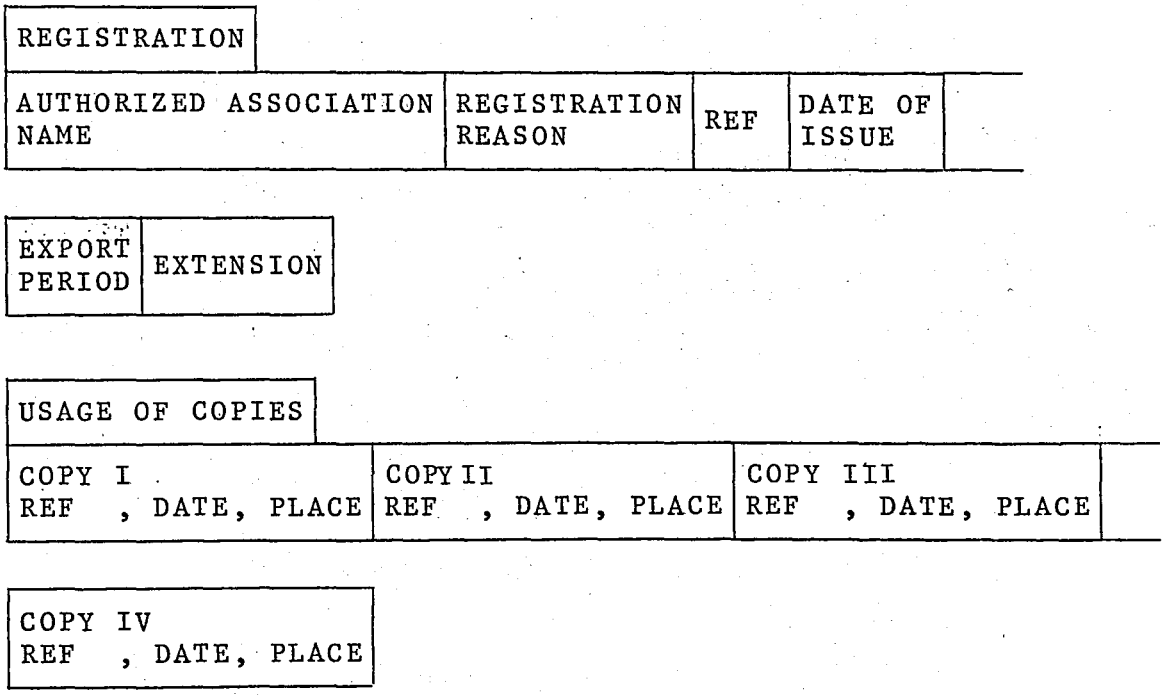


Figure 5.5. Registration Documents and Copies Data Structure

5.2.3. Transportation and Custom Stage

Before performing the tasks of custom and transportation, exporter finds and signs contracts with transportation insurance firms, and custom commission agent according to the conditions of the main contract. For further inspections, the information concerning these firms must be stored at the very first step. The form of the information is illustrated in Figure 5.6.

TRANSPORTATION FIRM		
FIRM NAME	ADDRESS	TELEPHONE

INSURANCE FIRM		
FIRM NAME	ADDRESS	TELEPHONE

COMMISSION AGENT		
NAME	ADDRESS	PHONE

Figure 5.6. Transportation, Insurance, and Commission Agent Data Structure

There are several tasks, as mentioned in previous Chapters, which are performed for custom activities. These are the preparation of Manifesto and Engagement of Bank, Custom Manifesto, Turkish Invoice, Packing list, Letter of instruction to Transporter, if necessary, and ATR.I or ATR.III Certificate of Circulation. After all these forms are prepared, transportation and custom activities must be separated from each other and stored in different files in order to simplfy and make inspections easy for following tasks. Grouping of this information is shown in Figure 5.7.

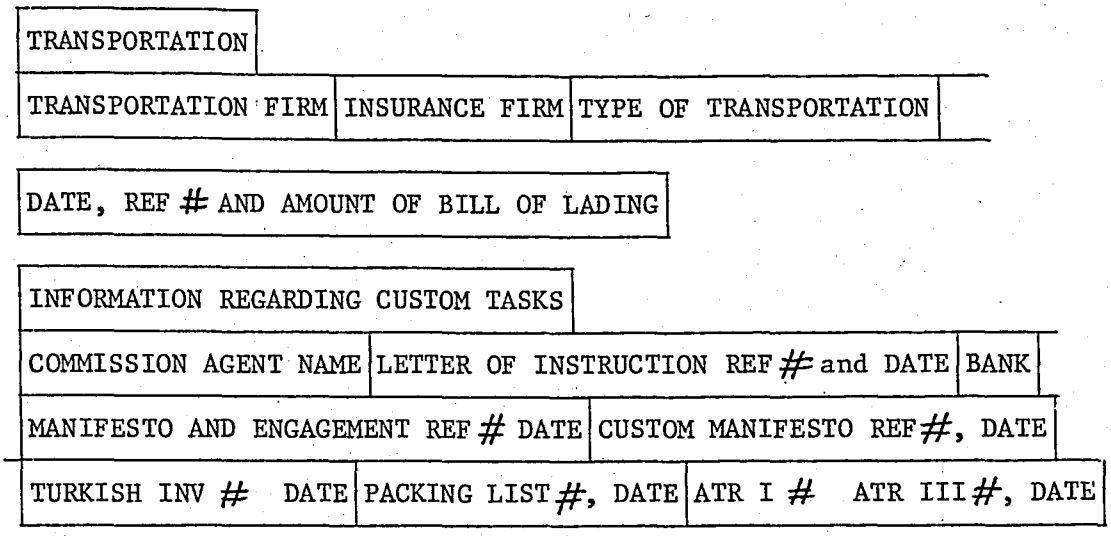


Figure 5.7. Transportation and Custom Documents Data Structure

To control the previous tasks, reference numbers and date of issue must be known, especially in custom activities, since, in all government office, the files are classified and processed by their reference numbers. Thus, the exporter must have this information in order to follow up his tasks.

5.2.4. Bank Affairs Stage

After the completion of shipment and custom affairs, the exporter begins to prepare the bank documents. Being a correspondant between the exporter and the importer, banks have a great role in foreign trade. Therefore, the tasks regarding bank activities must be performed carefully, controllers of the conditions, which have been stated and signed in the agreement or letter of credit by both parties, are the banks. In addition to the documents required by the importer, exporter must sign an engagement and give it together with a copy of the Custom Manifesto to the bank. As it is mentioned in Chapter 3, for recieving the payment, specific documents are given to the bank. Depending on these

documents, illustrated information in Figure 5.8 must be stored for further inspections, especially in payment affairs.

BANK DOCUMENTS		
BANK AND BRANCH NAME	C.MANIFESTO GIVEN DATE, REF#	
DELIVERY DOCUMENTS GIVEN DATE, REF#	ENGLISH INVOICE DATE, REF#	
CERTIFICATE OF ORIGIN DATE, REF#	ATR 1 and ATR 3 DOCUMENTS	

Figure 5.8. Bank Documents Data Structure

Date and reference number stored in this stage are not the issued date and number of the mentioned documents. This information is related to the given date of the documents to the bank. Thus, the tasks regarding the bank can be controlled by this method and delivered before the deadline.

5.2.5. Payment

After the above activities are completed, the payment follows as the last activity in an export. Depending on the terms of payment, the exporter is obliged to make the payment of the exported goods. The conditions and the rules of payment are described in Chapter III. According to these conditions, the payment is done and the bank issues this with a foreign currency receipt. During the performance of this task, amount of payment, exchange parity against the Turkish Lira, and the number and date of the currency receipt must be stored. In the second step, if the payment could not be done before the expiry date is over, an extension is requested from the authorities and is usually granted at most three times. Regarding this step, the expiry date and the extension, if any, must be stored in order to follow up the deadlines. The necessary information which is stored in this stage is illustrated in Figure 5.9.

PAYMENT				
BANK AND BRANCH NAME	TERMS OF PAYMENT	AMOUNT	TYPE OF	
CURRENCY AND DATE	EXPIRY DATE	EXTENSION CURRENCY		
RECEIPT DATE AND NUMBER				

Figure 5.9. Payment Documents Data Structure

On the other hand, daily exchange rates of most frequently used foreign currencies should be stored in order to make necessary projections for marketing, finance, and bank purposes. The form of this data is shown in Figure 5.10.

EXCHANGE RATES						
DATE	US $	DM	FS	FF	UK £	HF

Figure 5.10. Currency Rates Data Structure

5.2.6. Tax Rebate

Being an incentive given by the government, tax rebate is an important source of income of an exporter. There are several tax rebate lists which have been prepared according to the type of goods. Information regarding this subject is used by Salesmen and Execution Department, in price calculation and tax rebate application forms, respectively, Therefore, these lists must be stored in order to satisfy the mentioned needs. In Figure 5.11, the form of tax rebate list is shown.

TAX REBATE LIST		
PRODUCT NAME	LIST NUMBER	REBATE PERCENTAGE

Figure 5.11. Tax Rebate List Data Structure

During the tax rebate application, several tasks are performed. In order to control and follow up the execution in Central Bank of Turkey, the information illustrated in Figure 5.12, must be stored. Otherwise, this task could not be carried out because of the delays in Central Bank of Turkey.

TAX REBATE APPLICATION		
PERCENTAGE	REGISTRATION DOCUMENTS REF#	APPLICATION
LETTER DATE, REF#	AMOUNT DATE and RECEIPT REF#	

Figure 5.12. Tax Rebate Documents Data Structure

5.3. RELATIONAL SCHEMA

Being a table-oriented representation of the data of an application world, Relational Schema are developed in this section. Based on the results of Data Structure Study in the previous section, Schema is designed stage by stage. In order to establish the relations between the stages, the serial number given to a specific export is used as a relation key. This number is given after the arrival of a purchase order or Letter of Credit. All these serial numbers must be different. The necessary information is retrieved by specifying the values for some or all of these keys.

5.3.1. Relational Schema of Orders Stage

Relation	Attribute	Comment
Customer	Cust#	Customer serial no (key)
	Name	Customer name
	Address	Customer address
	Phone	Customer telephone

Relation	Attribute	Comment
Part	Part#	Part serial no (key)
	Name	Part name
	Price	Indicative Price
Supplier	Supp#	Supplier serial no (key)
	Name	Supplier Name
	Address	Supplier Address
	Phone	Supplier Phone
Orders	Order#	Order serial no (key)
	Cust#	Customer serial no (key)
	Part#	Part serial no (key)
	Supp#	Supplier serial no (key)
	Export type	Export type
	Region	Region (country)
	T/P	Terms of payment
	Price/type	Type of price
	Shipdate	Shipping Date
	Qshipped	Quantity shipped
	Price	Realized price
Who supplies what?	Part#	Part serial no (key)
	Supp#	Supplier serial no (key)
	Capacity	Capacity of the supplier
	Price	Price of the part

Figure 5.13. Relational Schema of Orders Stage

As it is seen in Figure 5.13, a serial number is given for every specific item of an export. These are customer, supplier, part and order. In order to avoid duplication of the information these serial numbers appear only in orders and who supplies what relations. They are called as "key" in the figures. On the other hand, production capacity and price

attributes of a supplier data structure are omitted not to cause any duplication of information. This information appears in who supplies what relation. For instance, assume that a user wants to have a bolt supplier's name or the whole information regarding capacity, price, supplier name, address, and phone. First of all, by using the "Who supplies what" relation, he retrieves the supp# , capacity and price. Then, the name, address and phone number of the supplier is retrieved from the "supplier" relation by using the retrieved "supp# ". Since the relations between these items are established with these keys, duplication of the information is not necessary in every occurrence. Thus, the storage requirement is minimized by this method.

5.3.2. Relational Schema of Registration Stage

Relation	Attribute	Comment
Registration	Order#	Order serial no (key)
	Foundation	Name of the authorized association
	Type	Type of the registred export
	Ref	Reference no of the registration
	Date	Issued date
	Export Period	Export Period
	Extension	Expiry date of the extension
Usage/ Documents	Order#	Order serial no (key)
	Copy I	Date, Ref and place
	Copy II	Date, Ref and place
	Copy III	Date, Ref and place
	Copy IV	Date, Ref and place

Figure 5.14. Relational Schema of Registration Stage

As it is seen from the above schema (Fig. 5.14), and additional information is added to data structure of registration affairs. This addition is the order serial number. The logic of this application is to establish the relations between a registration and a specific export. Thus, all the information is retrieved or added by refering to an order serial number.

5.3.3. Relational Schema of Transportation and Custom Stage

By using the same method as in the orders stage, schema regarding the information of transportation and custom affairs are developed. Different serial numbers are given for every specific transportation firm, insurance firm, and commission agent. The same order serial numbers are used for building linkage with other stages. Thus, based on the data structure of this stage, the following relational schema is developed (Fig.5.15).

Relation	Attribute	Comment
Transportation Firm	Tfirm#	Transportation firm serial no (key)
	Name	Firm name
	Address	Address
	Phone	Phone number
Insurance Firm	Ifirm#	Insurance firm serial no (key)
	Name	Firm name
	Address	Address
	Phone	Phone number
Transportation	Order#	Order serial no (key)
	Tfirm#	Transportation firm serial no (key)
	Ifirm#	Insurance firm serial no (key)
	Type/shipt.	Type of shipment
	Date.Am B/L	Date, amount and number of Bill of Loding

Relation	Attribute	Comment
Commission Agent	Comm#	Commission Agent serial no (key)
	Name	Commissioner name
	Address	Address
	Phone	Telephone
Custom Documents	Order#	Order serial no (key)
	Comm	Commissioner serial no
	L/I , DATE	Number and date of Letter of Instruction
	Man & Eng.# Date	Number and date of Manifesto and Engagement
	Cust.Man.Date#	Number and date of Custom Manifesto
	T.invoice Date#	Number and Date of Turkish Invoice
	P.List.Date.	Number and Date of Packing List.
	Atr.1 and Atr.3 Date,	Number and Date of ATR.1 and ATR.3

Figure 5.15. Relational Schema of Transportation and Custom Stage

In transportation relation, order# , Tfirm# , and Ifirm# come together and set up a relation which contains Type of Shipment and information regarding Bill of Lading. Finally, order# and comm# set up the relation of Custom tasks.

5.3.4. Relational Schema of Bank and Payment Stages

The same logic is applied in the development of these two stages. All the group of data, concerning the bank and payment affairs, is related to a specific export. Therefore, they are stored and retrieved related to a specific order . This means that in every relation there is only one key. The structure of this schema is illustrated in Figure 5.16.

Relation	Attribute	Comment
Bank Documents	Order#	Order serial no (key)
	Bank	Bank and Branch name
	C.Man	Given date and number of Custom Manifesto copy
	Del-Doc	Given date and number of Delivery Documents
	E.Inv.	Number and Date of English Invoice
	C/O	Number and Date of Certificate of Origin
	Atr.1 and Atr.3	Given date and number of Atr.1 and Atr.3 Documents.
Payments	Order#	Order serial no (key)
	Bank	Bank and branch name
	T/P	Terms of Payment
	Amount	Amount of Payment
	Curr & Date	Type of currency and date
	Exp.Date	Expiry date of payment
	Extension	Extension of payment (if any)
	Receipt	Foreign currency receipt date and ref
Currency	Date	Date (key)
	US$	US Dollar exchange rate
	DM	W.German Mark exchange rate
	FS	Swiss Franc exchange rate
	FF	French Franc exchange rate
	UK.£	UK.Pounds exchange rate
	HF	Holland Florin exchange rate

Figure 5.16. Relational Schema of Bank and Payment Stages

5.3.5. Relational Schema of Tax Rebate Stage

In order to provide answers to the queries of Salesmen and Execution Department, there exists a key in every relation of tax rebate stage. As it is described in data structure of

this stage, there are two groups of information. The key of the first group is the name of the product. By using this key the user can retrieve either the percentage of rebate or list number or both. In the second group of information concerning the tax rebate activities and applications, order# is the key as in other relations. The relational schema of this stage are shown in Figure 5.17.

Relation	Attribute	Comment
Tax Rebate List	P.Name	Product name (key)
	List	List number
	%	Percentage of rebate
Tax rebate	Order#	Order serial no (key)
	%	Percentage of rebate
	Reg/Doc.	Given date and number of the registration copy
	L/I,Date#	Application Letter number and date
	Amount,Date,#	Amount, Date and no. of Rebate Receipt.

Figure 5.17. Relational Schema of Tax Rebate Stage

5.4. FILES AND PROGRAMS

In this section, thirtysix files are designed in order to process information by a computer. The designs are completely based on the facilities of Commodore 8096 System and Basic Language. After designing the files and writing the programs, all programs are implemented by a sample data to the system.

All the relations described in Relational Schema section are generated as a single file. Two types of files can be created in this computer. The first one is sequential type

file. The second one is relative type file. The files created in this section are relative types. This type of file is chosen mainly for two reasons. One reason is that the relative type files allow to access any record on the disk relative to the beginning of these files. The second reason is to reduce the amount of time required to access a specific record stored on disk.

Again by using the facilities of Basic Language, retrieval, update, add, and delete programs are separately written and then these programs are linked together in a main program. The second step in the program is to establish the user interface between the program and the user.

5.4.1. Files

As concluded in previous chapters, two types of information must be stored in these files. The first type is for further tasks regarding export procedure. The second type is for marketing purposes which are necessary for sales Department. The files and the programs are designed in such a manner that any extension related to files or programs can be easily adopted to the system. In general, there are two types of files, the first type of files is used for retrieving, updating, deletion, and addition purposes. The second type of files which are called as department files, contain the attributes names of the related files. In fact, there are eighteen operation files and eighteen permanent files. The files are explained by sample data in the following subsections.

5.4.1.1. Orders Stage Files

There are six files concerning this stage;

i. Customer File

ii. Part File

iii. Supplier File
iv. Orders File
v. Who Supplies What File
vi. Import Regulations File

The structure of the files are in the same form as in Relational Schema. These files also contain the same information described in Relations. Their structure, attributes and memory requirements (record and field lengths) are shown in the following figures, respectively. Every row is a single record in the file.

ATTRIBUTES

CUST#	NAME	ADDRESS	PHONE
111	SMITH	LONDON	1234567
112	HASAN	TAHRAN	222222

(4 bytes) (15 bytes) (25 bytes) (14 bytes)

Total Length of a record = 58 bytes

Figure 5.18. Customer File.

ATTRIBUTES

PART#	NAME	PRICE
101	CRANK	155 $/P
102	M/C TOOL	6600 $/P

(4 bytes) (15 bytes) (16 bytes)

Total Length of a record = 35 bytes

Figure 5.19. Part File.

ATTRIBUTES

SUPP#	NAME	ADDRESS	PHONE
101	AHMET	1.LEVENT	1642407
102	TUNÇEL	USA REP	1659219

(4 bytes) (15 bytes) (25 bytes) (14 bytes)

Total length of a record = 58 bytes

Figure 5.20. Supplier File.

ATTRIBUTES

ORDER#	CUST#	PART#	SUPP#	EXPORT TYPE
101	111	108	101	CREDIT
102	111	108	105	CREDIT

(4 bytes) (4 bytes) (4 bytes) (4 bytes) (10 bytes)

TERMS OF PAYMENT	PRICE TYPE	SHIPPING DATE	QUANTITY SHIPPED	PRICE
L/C	FOB	02.02.1984	200 TONS	0.61 $/kg
CAG	C+F	10.12.1984	150 TONS	0.6 $/kg

(4 bytes) (10 bytes) (10 bytes) (15 bytes) IG bytes

Total length of a record = 81 bytes

Figure 5.20(a). Orders File

ATTRIBUTE

PART#	SUPP#	CAPACITY	PRICE
101	104	200 P/year	150 $/P
102	103	1000 P/year	6000 $/P

(4 (4 (16 bytes) (16 bytes)

Total length of a record = 40 bytes

Figure 5.21. Who Supplies What File

COUNTRY	IMPORT REGULATIONS
ENGLAND	ALL KINDS OF IMPORTS ARE FREE FOR FOOD: SAN.CERT IS REQUIRED PLUS ATR.1 ATR.3
IRAN	FOR ALL PRODUCTS, IMPORTER NEEDS IMPORT LICENCE. C/O IS REQUIRED

(15 bytes) (250 bytes)

Total length of a record = 265 bytes

Figure 5.22. Import Regulations File.

5.4.1.2. Registration Stage Files

In this stage, there are two files concerning the tasks in registration affairs;

i. Registration File
ii. Usage of Documents File

Their structures, attributes and memory requirements are illustrated in Figure 5.23.

ATTRIBUTES	ORDER#	FOUNDATION	TYPE	REF #	DATE	EXPORT PERIOD	EXTENSION
	101	İHRACATÇI BİRLİKLERİ	CREDIT	23145	01.01.1984	3 MONTHS	
	102	İHRACATÇI BİRLİKLERİ	CREDIT	11121	10.9.1983	3 MONTHS	
	(4 bytes)	(20 bytes)	(10 bytes	(10 (bytes)	(10 bytes)	(2 bytes)	(10 bytes)

Total length of a record = 66 bytes

ATTRIBUTES	ORDER#	COPY I	COPY II	COPY III	COPY IV
	101	02.02.1984/314 CUSTOM	12.0.1984/516 BANK		
	102	10.12.1984/ 4177 CUSTOM			
	(4 bytes)	(30 bytes)	(30 bytes)	(30 bytes)	(30 bytes)

Total length of a record = 124 bytes

Figure 5.23. Registration and Usage of Documents Files

5.4.1.3. Transportation and Custom Files

There are five files in this stage concerning the transportation and Custom affairs.

i. Transportation Firms File
ii. Insurance Firms File
iii. Transportation Documents File
iv. Commission Agent File
v. Custom Documents File

Based on the results of Relational Schema, these files are designed in the same form as in Relations. Structure, attributes and memory requirements of these files are shown in Figure 5.24.

ATTRIBUTES	TFIRM#	NAME	ADDRESS	PHONE
	101	ULAK NAKLİYAT	ISTANBUL	146 46 46
	102	ABC SHIPPING LINE	LONDON	7654321
	(4 bytes)	(15 bytes)	(25 bytes)	(14 bytes)

Total length of a record = 53 bytes.

Figure 5.24. Transportation Firms File

ATTRIBUTES

IFIRM#	NAME	ADDRESS	PHONE
101	AKSİGORTA	FINDIKLI	776633
102	BAŞAK SİGORTA	HARBİYE	112233

(4 bytes) (15 bytes) (25 bytes) (14 bytes)

Total length of a record = 58 bytes

Figure 5.25. Insurance Firms File

ATTRIBUTES

ORDER#	TFIRM#	IFIRM#	TYPE OF SHIPMENT	DATE/AMOUNT/# of B/L
101	101	-	TRUCK	02.02.1984/315.000/744
102	101	-	TRUCK	10.12.1983/200.000/710

(4 bytes) (4 bytes) (4 bytes) (7 bytes) (30 bytes)

Total length of a record = 49 bytes

Figure 5.26. Transportation Documents File

ATTRIBUTES

COMM#	NAME	ADDRESS	PHONE
101	BAŞARAN	ISTANBUL	666666
102	UŞARLAR	ISTANBUL	777777

(4 bytes) (15 bytes) (25 bytes) (9 bytes)

Total length of a record = 53 bytes

Figure 5.27. Commission Agent File

ATTRIBUTES

ORDER#	COMM#	L/I(#,DATE)	MAN.AND.ENGAGEMENT(#,DATE)
101	102	214/01.02.1984	41417/02.02.1984
102	101	215/09.12.1983	314/10.12.1983
(4 bytes)	(4 bytes)	(20 bytes)	(20 bytes)

CUS.MAN(#,DATE)	TURKISH INVOICE	PACKING LIST	ATR.1# ATR.3#
51617/01.02.1984	5312/01.02.1984	-	561/30.01.1984
51718/09.12.1983	746/09.12.1983	-	371/09.12.1984
(20 bytes)	(20 bytes)	(20 bytes)	(20 bytes)

Total length of a record = 128 bytes

Figure 5.28. Custom Documents File.

5.4.1.4. Bank Stage File

In this stage there is only one file which is Bank File. This file contains the information concerning the documents delivered to the Bank and the name of the Bank and the branch. This file is also in the same form as in Relational Schema. The structure, attributes, and memory requirement of this file is illustrated in Figure 5.29.

ATTRIBUTES

ORDER#	BANK	CUSTOM MANIFESTO DELIVERED OR NOT	DELIVERY DOCUMENTS #,DATE
101	İŞ/BEYOĞLU	OK (Delivered)	51763/12.02.1984
102	İŞ/BEYOĞLU	OK (Delivered)	1371/08.12.1984
(4 bytes)	(20 bytes)	(2 bytes) bytes	(20 bytes)

ENGLISH INVOICE(#,DATE)	CERTIFICATE OF ORIGIN(#,DATE)	ATR.1# ATR.3 (Delivered or not)
5167/08.02.1984	NR(not required)	OK
14341/08.12.1983	NR	OK

(20 bytes) (20 bytes) (2 bytes)

Total length of a record = 70 bytes.

Figure 5.29 Bank File

5.4.1.5. Payment Stage File

As described in Relational Schema Section, there are two relations regarding payment affairs. Therefore, there are two files in this stage. The first file is for the control of payment affairs. The second file is designed for both implementation and Sales Department. Their structure, attributes, and memory requirement are shown in Figure 5.30.

ATTRIBUTES

ORDER#	BANK	TERMS OF PAYMENT	AMOUNT	CURRENCY / DATE
101	İŞ/BEYOĞLU	L/C	$122.000	$/01.02.1984
102	İŞ/BEYOĞLU	CAG	$ 90.000	$/10.12.1984

(4 bytes) (20 bytes) (4 bytes) (10 bytes) (15 bytes)

	EXPIRY DATE	EXTENSION	RECEIPT OF THE CURRENCY #, DATE
	-	-	4331/07.02.1984
	10.02.1984	-	-

(10 bytes) (10 bytes) (20 bytes)

Total length of a record = 93 bytes

ATTRIBUTES

DATE	US $	DM	FS	FF	UK £	HF
01.01.1984	325.65	101.46	122.24	39.64	423.76	
02.01.1984	325.69	102.01	122.75	39.65	423.94	

(10 bytes) (6 bytes) (6 bytes) (6 bytes) (6 bytes) (6 bytes) (6 bytes)

Total length of a record = 46 bytes

Figure 5.30. Payment Documents and Exchange Rates Files

5.4.1.6. Tax Rebate Stage Files

There are two files in this stage. These files contain all the information described in previous sections and will be used in order to follow the tax rebate affairs. The structure, attributes and memory requirements of these files are shown in Figure 5.40.

ATTRIBUTES

PART NAME	LIST	%
CRANK	1	20
M/C TOOL	1	20

(15 bytes) (1 byte) (4 bytes)

Total length of a record = 20 bytes

ATTRIBUTES

ORDER#	%	#AND GIVEN DATE OF REGISTRATION DOCUMENTS	#AND DATE OF APPLICATION LETTER	REBATE RECEIPT AMOUNT,DATE,
101	20	716/10.3.1984	264/10.3.1984	76716/25.3. 1984/478
102	17.5	1121/10.4.1984	312/10.4.1984	-

(4 bytes) (4 bytes) (20 bytes) (20 bytes) (40 bytes)

Total length of a record = 88 bytes.

Figure 5.40. Tax Rebate List and Tax Rebate Documents Files

5.4.2. Program

Based on the results of the previous sections, several programs are written in order to process the information. The program is composed of three phases. The first phase is the user phase which gathers and analyzes the user's query. The second phase is the access phase which positions to the right record of the right file. The third phase is the manipulation phase which handles the retrieving, updating, addition, and deletion operations.

There are four usage modes: Retrieval, add, update, and delete modes. Depending on these modes, the above mentioned phases are composed of optional subprograms. Thus, adding new data, retrieving and modifying existing data in the files are done by means of these programs. The summarized flowchart of the main program is shown in Figure 5.41.

In user phase, first of all usage mode is entered by the user. There are four types of operations:

i. Retrieval,
ii. Add,
iii. Update,
iv. Delete.

In the second step, the user enters the name of the stage to which he wants to proceed. These stages are called as departments in the program. As described in previous chapters, there are six stages (departments):

i. Orders,
ii. Registration,
iii. Transportation and Custom,
iv. Bank,

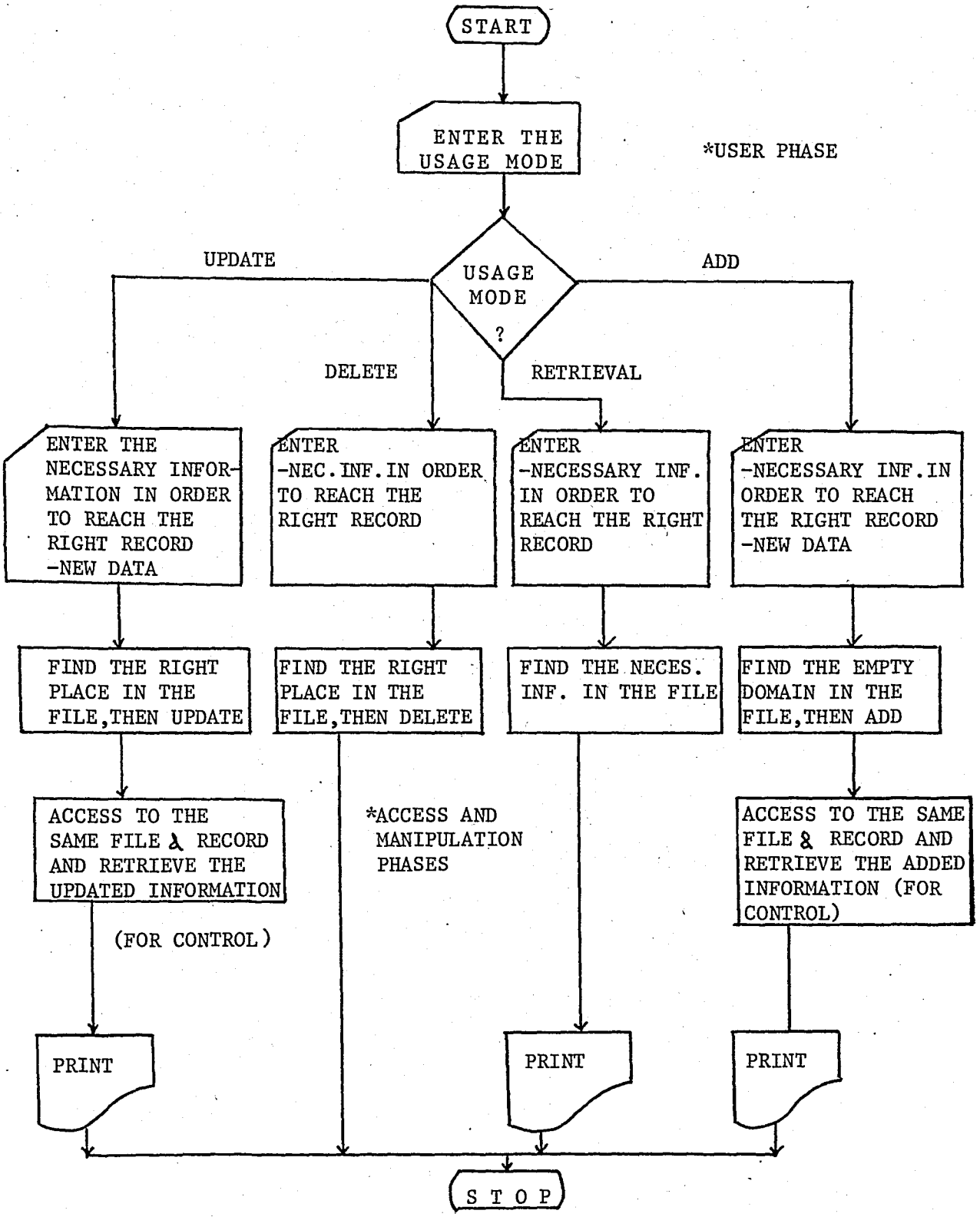


Figure 5.41. Summarized Flowchart of The Program

v. Payment,
vi. Tax Rebate.

After this procedure, the user specifies. the name of the file to be used in operation. The names of the related files which were designed previously are as followS.

i. Customer,
ii. Part,
iii. Supplier,
iv. Orders,
v. Who o.s. what,
vi. Importreg,
vii. Regist file,
viii. Usage/Doc.,
ix. Trans.firm,
x. Ins.firm,
xi. Trans/Doc.
xii. Commission Agent,
xiii. Custom.doc.,
xiv. Payment,
xv. Payment,
xvi. Exch.rate,
xvii. T-rebate.list,
xviii. T.rebate.doc.

If the user types the names of the files as in above written formats, he reaches the related file.

Then in the fourth step, the user enters the following data to the system, unless he adds a new occurence. Otherwise, he enters the attributes of new event.

In retrieval mode, the user has two alternatives. He can retrieve either the wholelist or a single entry of a specific occurence. If he wants to retrieve a single entry he must type the attribute name of that entry (i.e. if he only wants to retrieve the address of a customer, he must type "Address".) Otherwise, he types "wholelist" which provides the entire information (ie. cust#, name, address, phone; the entire row).

In update and delete modes, the user types the name of the attribute which will be updated or deleted. The entire list (record) can not be deleted or updated at once. In order to provide the data security, these operations are done entry by entry.

After entering the above information in retrieval, update and delete modes, he must complete his query by specifying the related occurence or occurences in order to get the answer of the query.

For expository purposes, all the possible queries and their input structure related to the above procedure are explained in the following paragraphs.

The sample queries are as follows:

1. Retrieve Order#'s for all orders shipped on 31 July 1984.

2. Retrieve the wholelists (supp#, part#, capacity price) of suppliers who supply part :314.

3. Update the telephone number of Insurance Firm: IFirm :516, by phone number:242424.

4. Delete the import regulations of country "B".

5. Add the details of a new part.

6. Retrieve the supp# for all suppliers who supplied the part:part#:112 to the region:Algeria in terms of payment:Cash Against Documents.

In order to simplfy the input structure of a query, the questions are asked to the user by the computer. The format of these questions are shown in Table 5.1.

Q.1. Which type of operation do you want to do?
?User types the usage mode (Retrieval, update, add or delete)

Q.2. To Which Department do you want to proceed?
?User types the department name (Due of the six stages)

Q.3. Which Record do you want to reach (use)?
?User types the name of the file he wants to use.

Q.4. Which Information do you want to reach?
(Valid only for retrieval, delete and update modes)
?User types either "wholelist" or the name of single attribute

Q.5. Of which special domain & special-attribute?
(Valid only for retrieval, delete and update modes)
?User types the related domain and attribute names.

TABLE 5.1. Questionnaire Form of the User Phase.

The above mentioned queries can be adopted to the related questionnaire by the user as follows:

Query 1. Q.1
?Retrieval
Q.2
?Orders
Q.3
?Orders
Q.4
?Order
Q.5
?Shipdate, 31.07.1984

Query 2. Q.1
?Retrieval
Q.2
?Orders
Q.3
?Who.vs.what
Q.4
?Wholelist
Q.5
?Part#, 314

Query 3. Q.1
?Update
Q.2
?Cust & Trans.
Q.3
?Insurance Firm
Q.4
?Phone
Q.5
?I Firm#, 516
Q.5.1 (valid for update mode, user types the new phone) ?242424

Query 4. Q.1
?Delete
Q.2
?Orders
Q.3
?Importreg
Q.4
?Regulations
Q.5
?Country, B

Query 5. Q.1
?Add
Q.2
?Orders
Q.3
?Part (After this step user begins to enter the new data)
Part#, 126
Name, Screw
Price, 0-16 $/P

Query 6. Q.1
?Retrieval
Q.2
?Orders
Q.3
?Orders
Q.4
?Supp#
Q.5 *
?Part#, 112
?region, Algeria
?T/P, CAD
?0,0

*(If there are more than one criterion as in this query, the user types one after the other and finally types 0,0 in order to specify the end of constraints. Thus, the program begins to search the occurences which satisfy these constraints).

As described, the user enters the query in a certain format by means of the questions asked by the computer. During this process, if the user makes a mistake or types an undefined word, the system warns the user. After this warning, the user either corrects the mistake and retypes the right one or gives up.

In general, the purpose of the user phase is to analyze the user's query and to meet the requirements of access and manipulation phases are directed by means of the outputs of this stage.

Based on the results of the user phase, the access phase reaches the necessary file and brings the required part of it to the main program. After this process, manipulation phase makes the comparison on that data according to the constraints entered by the user. If all the constraints are satisfied, then the required operation is done. Depending on the type of usage mode, the program traces different sub-routines. In general, there are four sub. programs;

i. Retrieval Subprogram,
ii. Addition Subprogram,
iii. Relation Subprogram,
iv. Updating Subprogram.

If the usage mode is one of these delete, add or update, the new events regarding these operations written to the files by means of access phase. Thus, all the contacts between the

files and program are linked by the access phase.

All the facilities of the above mentioned program has been tested by a sample data stored in the files and their display on the screen can be seen in the Appendix Section.

The above mentioned programs and files were saved in a 5 1/4 diskette. Two copies of this diskette have been left in Industrial Engineering Dept. at BU. The program can be executed as follows:

i. Insert the diskette in Drive 0.
ii. Type "dload " btanyü" ".
iii. Type "run".

VI. SUMMARY AND CONCLUSIONS

In this study, an Information System was designed for a specific part of an export company. Then, the developed system was implemented to Commodore-8096 system in accordance with the facilities of this computer. Since, Commodore-8096 has been the only computer available in the Industrial Engineering Department of BU at the beginning of this study, this computer was used in the implementation stage.

As concluded in Introduction chapter, this study covers only one of the modules of an IS in an export company. All the modules should be designed separately and linked together in a Common Data Base. Furthermore, the documents, which are prepared for Custom, Bank, etc..., can be filled out by using the printer of the computer. According to the standard forms of the documents, the format design should be developed and implemented to the system.

Relational Data Base design technique was selected in order to design the files and to implement the related IS to the computer. In fact, the implemented program is not a complete DBMS, however, it is a quide and a framework for further additions and extensions to achieve a sophisticated DBMS. By using the same Data Base, several report programs can be developed for finance, accounting and statistical purposes. The inputs of these programs will be retrieved from Data Base.

For example, for statistical purposes, the sales figures, profit-loss analysis of certain countries can be reported by means of additional report programs. Several warning programs, which follow up the deadlines of several tasks, (eg. export period, expiry date of payment) can be developed.

Introducing a computer as an information processing mechanism does not only bring efficient information flow, but also decreases the manpower requirement. For example, the preparation of the documents is a time-consuming task. In general, in an export company, a group of team is in charge of these tasks. However, if the mentioned programs, which fill out the documents, are developed, then the manpower requirement will decrease at least in the performance of these tasks.

This computerized information system increases the speed of the information flow between departments as well as accurately processes information for these departments. However, implementation of such a system has also same disadvantages several problems may arise. These are mainly resistance of individuals and adaptation problems. These problems can be classified as follows:

i. Since the new system decreases the manpower requirement and changes the roles of the individuals in the organization, there may be resistance to the new system.

ii. In general, the individuals do not know how to use a computer. Therefore, their adaptation to the new system creates a serious problem.

iii. Before enforcing the new system, the new and the present systems should be run in parallel resulting in additional load.

Adaptation problem can be solved by preparing manuals and by training the personnel. In order to solve the problems related to the new arrangements, the new posts must be carefully explained to the individuals. Besides, for further additions and extensions the contribution of the individuals to a computerized information system must be taken into account.

As it is seen, besides its advantages a computerized system may create several problems during its implementation. The most important problem, which may arise in future, is the effects of the changes in the execution of export procedure. Depending on the government policy, regulations and procedures may change. For example; during the study, the government has changed a regulation in tax rebate tasks. According to the new regulation, the tax rebate application forms and documents are delivered to the related bank instead of delivering them to Central Bank of Turkey. In this case, nothing has changed in the model,since the information, which is stored in the files, did not change. However, the format of the application form has changed. Thus, only the format designs of the programs, which fill out the application form, are affected.

Until the organization gets acquainted with the new model, a team of specialists must be responsible in order to solve the above mentioned problems and to manage the new MIS.

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APPENDIX

```
PLS. ENTER THE TYPE OF OPERATION
?RETRIEVAL
TO WHICH DEPT. DO YOU WANT TO PROCEED?
?ORDERS
WHICH PECORD DO YOU WANT TO REACH?
?WHO.US.WHAT
WHICH INF DO YOU WANT TO REACH?
?WHOLELIST
ENTER YOURS KEY ATTRIBUTES & SP. ATTRIBUTES
?PART,M/C
?0,0
PART THERE IS NO SUCH ATTRIBUTE SORRY
IF YOU WANT TO CORRECT TYPE 'Y? OTHERWISE 'N'
?Y
ENTER YOUR S.KEY ATTRIBUTES & SP. ATTRIBUTES
?SUPP#  , 111
?0,0
PART#     111       112
SUPP#     111       111
CAPACITY 5000 TONS/YEAR 2000 TONS/YEAR
PRICE 0.12 DM/PIECE 0.25 DM/PIECE
QUERY: LIST THE PART# , CAPACITY, AND PRICE, OF THE PRODUCTS
       PRODUCED BY SUPPLIER "111"?
```

```
PLS.ENTER THE TYPE OF OPERATION
?RETRIEVAL
TO WHICH DEPT. DO YOU WANT TO PROCEED?
?ORDERS
WHICH RECORD DO YOU WANT TO REACH?
?PART
WHICH INF. DO YOU WANT TO REACH?
?WHOLELIST
OF WHICH S.KEY ATTRIBUTE & SP. ATTRIBUTE
?PART# , 111
PART            NAME            PRICE
111             BOLT            0.12 DM/PIECE

QUERY: LIST THE DETAILS (NAME, PRICE) OF PART "111"?
```

PLS. ENTER THE TYPE OF OPERATION

?RETRIEVAL

TO WHICH DEPT. DO YOU WANT TO PROCEED?

?ORDERS

WHICH RECORD DO YOU WANT TO REACH?

?ORDERS

ENTER YOUR S.KEY ATTRIBUTES & SP.ATTRIBUTES

?SUPP# ,	111		
ORDER#	111	222	555
CUST#	111	112	222
PART#	111	222	111
SUPP#	111	111	111
EXP.TYPE	SERBEST	FREE	CREDIT
REGION	IRAN	IRAN	W.GERMANY
TERMS/PY	L/C	CAD	CAD
PRICETYPE	C F	CIF	C F
SHIPDATE	01/02/1984	12/08/1984	23/08/1984
QSHIPPED	212 TONS	50 TONS	100 TONS
PRICE	23 $/kg	85 $/ton	112 $/ton

QUERY: LIST THE ORDER DETAILS OF SUPPLIER "111".

PLS.ENTER THE TYPE OF OPERATION

?RETRIEVAL

TO WHICH DEPT. DO YOU WANT TO PROCEED?

?ORDERS

WHICH RECORD DO YOU WANT TO REACH

?ORDERS

WHICH INF. DO YOU WANT TO REACH?

?WHOLELIST

ENTER YOUR S.KEY ATTRIBUTES & SP.ATTRIBUTES

?SUPP#,	111
?CUST#,	111
?O,O	
ORDER#	111
CUST#	111
PART#	111
SUPP#	111
EXP. TYPE	SERBEST
REGION	IRAN
TERMS/PY	L/C
PRICETYPE	C F
SHIPDATE	01/02/1984
QSHIPPED	212 TONS
PRICE	23 $/KG

QUERY: LIST THE DETAILS OF THE ORDERS SUPPLIED BY SUPPLIER "111" AND PURCHASED BY CUSTOMER "111".

PLS. ENTER THE TYPE OF OPERATION

?RETRIEVAL

TO WHICH DEPT. DO YOU WANT TO PROCEED?

?ORDERS

WHICH RECORD DO YOU WANT TO REACH

?ORDERS

WHICH INF. DO YOU WANT TO REACH

?WHOLELIST

ENTER YOUR S.KEY ATTRIBUTES & SP.ATTRIBUTES

?SUPP# , 111

?REGION, IRAN

?TERMS/PY, L/C

?0,0

ORDER#	111
CUST#	111
PART#	111
SUPP#	111
EXP. TYPE	SERBEST
REGION	IRAN
TERMS/PY	L/C
PRICETYPE	C F
SHIPDATE	01/02/1984
QSHIPPED	212 TONS
PRICE	23 $/KG

QUERY: LIST THE DETAILS OF THE ORDERS, SUPPLIED BY SUPPLIER "111", EXPORTED TO IRAN, AND IN TERMS OF PAYMENT "L/C".

```
PLS. ENTER THE TYPE OF OPERATION
?RETRIEVAL
TO WHICH DEPT. DO YOU WANT TO PROCEED?
?ORDERS
WHICH RECORD DO YOU WANT TO REACH?
?ORDERS
WHICH INF. DO YOU WANT TO REACH?
?QSHIPPED
ENTER YOUR S.KEY ATTRIBUTES & SP. ATTRIBUTES
?PART# , 111
?REGION, IRAN
?0,0
QSHIPPED 212 TONS
```

QUERY: LIST THE QUANTITY OF PART "111" EXPORTED TO IRAN.

```
PLS. ENTER THE TYPE OF OPERATION
?RETRIEVAL
TO WHICH DEPT. DO YOU WANT TO PROCEED?
?ORDERS
WHICH RECORD DO YOU WANT TO REACH?
?ORDERS
WHICH INF. DO YOU WANT TO REACH?
?WHOLELIST
ENTER YOUR SKEY ATTRIBUTES & SP.ATTRIBUTES
?SUPP#, 999
?CUST#, 333
?0,0
THERE IS NO SUCH OCCURENCE
```

QUERY: LIST THE DETAILS OF THE ORDERS SUPPLIED BY SUPPLIER "999" AND PURCHASED BY CUSTOMER "333".

PLS. ENTER THE TYPE OF OPERATION

?RETRIEVAL

TO WHICH DEPT. DO YOU WANT TO PROCEED?

?ORDERS

WHICH RECORD DO YOU WANT TO REACH?

?CUSTOMER

WHICH INF. DO YOU WANT TO REACH?

?PHONE

OF WHICH S.KEY ATTRIBUTE & SP.ATTRIBUTE?

?CUST#, 111

THERE IS NO SUCH INF. IN THE DESIRED FILE.

QUERY: LIST THE PHONE NUMBER OF CUSTOMER "111".

PLS. ENTER THE TYPE OF OPERATION

?DELETE

ARE YOU SURE? IF YES TYPE !Y? OTHERWISE !N'

?Y

TO WHICH DEPT. DO YOU WANT TO PROCEED?

?ORDERS

WHICH RECORD DO YOU WANT TO REACH?

?SUPPLIER

WHICH INF DO YOU WANT TO REACH?

?PHONE

OF WHICH S.KEY ATTRIBUTE & SP. ATTRIBUTE?

?SUPP#, 199

ARE YOU SURE? IF YES TYPE !Y! OTHERWISE 'N'

?Y

DELETE OPERATION

PLS. ENTER THE TYPE OF OPERATION

?UPDATE

TO WHICH DEPT. DO YOU WANT TO PROCEED?

?ORDERS

WHICH RECORD DO YOU WANT TO REACH?

?SUPPLIER

WHICH INF. DO YOU WANT TO REACH?

?PHONE

OF WHICH S.KEY ATTRIBUTE & SP.ATTRIBUTE?

?SUPP#, 199

ENTER YOUR NEW PHONE

232323

UPDATE OPERATION

```
PLS. ENTER THE TYPE OF OPERATION
?ADD
TO WHICH DEPT. DO YOU WANT TO PROCEED?
?ORDERS
WHICH RECORD DO YOU WANT TO REACH?
?CUSTOMER
ENTER YOUR NEW CUST#
?888
ENTER YOUR NEW NAME
?KUTLUTAŞ
ENTER YOUR NEW ADDRESS
?JEDDAH
ENTER YOUR NEW PHONE
?565656

ADD OPERATION
```

A DECISION-SUPPORT SYSTEM FOR DISTRIBUTION SYSTEM DESIGN

The developed model can have two or three effectiveness criteria, according to the manager's choice :

(a) the total distribution cost and ;

(b) the realised sales level ;

or ;

(a) the total distribution cost ;

(b) the realised sales level and ;

(c) the delivery times .

The model provides six devices to the manager who wants to improve the current distribution system :

(a) to improve without changing the current system - i.e the present warehouse and vehicle numbers and capacities remain unchanged-.

(b) to change the current warehouse capacities, rearranging them

(c) to decide on additional warehouses as well as rearranging the current ones ;

(d) to buy or hire new vehicles ;

(e) to use the vehicle policy together with the rearrangement of the current warehouse capacities ;

(f) to choose additional warehouses and decide on vehicle policy

The manager who chooses one of those alternatives must give the data about the current situation and the alternative he mentioned. Besides he must determine an investigation period (week/month/year).

After the data step, first, the manager will be given a report according to averages, in order to make him able to take appropriate decisions. In this report are mentioned the total distribution cost of the current system - warehouse investment and operating cost, transportation investment and operating cost, inventory holding and shortage cost-, the distribution cost per sale and, if the manager is interested the delivery times composed of loading, unloading, waiting times and time spent in road. The manager may analyse the components of the total distribution costs separately.

The next step of the model is the analysis of chosen alternative. This analysis is composed of three parts. First, with the Vogel approach, the appropriate transportation cost from factory and warehouses to consumers is fulfilled. Next, the simulation may be executed. The simulation illustrates the influences of the demand and production fluctuation on shortage , inventory level and lost sales, by building a dynamic relationship between the periods. In the third and last part, a repor similar to that of the current situation is prepared and the manager is asked if his last trial is the best analysed till then. In this step, the

manager must decide not only paying attention to the reported costs but also to the results of the simulation and besides, to the delivery times, if chosen as an effectiveness criteria. When the manager gives an affirmative answer, this trial is kept as " best ".

Continuing by this way, the manager may improve the current system, in the direction he wants, by trying the same alternative with different data or applying different alternatives.