9.1 Introduction

There is no standard formula for success of a computerised information system as the organisation served by the information systems are all different and the environment in which the systems operate are constantly changing. To remain vital and viable, an information system must have a dynamic set of tools, techniques, strategies and tactics that support the ever-changing environment.

It is necessary to identify the role of the information system in organisation's overall strategic plan: whether its support is peripheral or central to the organisation. Once the position of the information system is decided then it becomes necessary to decide how to implement the system - to select suitable hardware and software according to the needs of the business. (2)

If large corporate databases need to be accessed by different groups, then a mainframe computer will be suitable. While selecting the hardware, the frequency of data transfer must also be taken into account. Heavy reporting also needs to justify the procurement of a main-frame. Frequent analysis and number crunching usually dictate the use of a main-frame. Substantial communications requirements call for a departmental or main-frame based electronic mail capability. A large
number of users also suggests for a departmental or a mainframe system. If the need is to do smaller individualised tasks like producing short reports or doing limited spreadsheets, statistical or graphical analysis, then micro-based computers will be suitable. The softwares (either developed or off the shelf purchased) must perform the tasks to support the objectives of the information system. The softwares must fulfill not only the present needs but also accommodate the future capabilities and expansions. It should have capability of exchanging data with other software products. (52)

9.2 Characteristics of Computerised Information System for International Tendering

The objectives of initiating the development of a computerised information system for international tendering (with special emphasis on Indian machine tools) are to provide timely decision information, improve services to users and greater utilisation of models for more man/machine interaction thus to provide facility of selecting relevant information according to users' choice.

The proposed computerised information system for international tendering is expected to have the following characteristics.

(i) The system is expected to have both forward and backward looping control. It should be able to maintain data files on-line and they should be available to the central processing
unit when needed. The data are expected to be updated as events occur and could be integrated from remote I/O terminals. Company personnel would be able to receive response from the system in time to satisfy their own real-time environmental requirements. The system should be integrated with other computerised systems such that it will access the systems of other departments as and when the needs arise. For example, the computerised on-line daily production schedule data from production planning department of a manufacturing unit can be accessed when need arises. Similarly, it will be possible to know, at any point of time, the order position by accessing the orders booked file of the sales execution department. The system will also be capable of providing historical information according to the requirement of its users.

(ii) Importance should be given to input data design for this system. Although input of operational transactional data should be emphasised, a full range of queries and expectation inputs should also be included in the system. The managers will be able to access status and transactional information via terminals at their offices. A manager or a group of managers res-
ponsible to take decision on acceptance of a tender will be able to enquire on-line the political or business environment of a buyer's country and the list of possible competitors who will be interested to quote for a particular tender. The system will provide facility to access all the master data items for amendment. A certain amount of cross-checking during the data entry will be adopted before inputting/updating the master data file.

(iii) The system will be capable of presenting output on CRT display terminals or on hard copy printer according to users' choice. The internal data of the company will be summarised increasingly as the level of management rises in the hierarchical structure with top management receiving the most summarised report and the lower management more detailed reports. In case of external information the summarisation will be increased as the position of the receiver decreases in the managerial hierarchy.

(iv) Other than the standard reports or on-demand reports, the system will be able to provide exception reports when need arises. From the existing data files or database, records of tender floated, bid submitted and bid awarded for the past several years can be extracted as
and when required. Comparison of actual awarded bid against expected figure and analysis of influencing factors which lead to the control or out-of-control conditions so that when an out-of-control condition occur, it can be reported to the management either by visual display or by print-out form.

(v) The system will be capable of communicating with a number of input/output devices that are located in the organisation or other organisations. The system will be able to provide necessary communication link with existing electronic typewriters, word-processors or any other visual devices in the organisation, if need arises. Even if the input/output devices are many miles away from one another, they will be united through a data communication network for producing forward or backward looking information. Thus, it will be possible for a person involved in the preparation of quotation to contact the concerned agent or field office and transact information without wasting time. Similarly, it will be possible to access various commercially available databases.

(vi) Basically, the system should be designed to focus the total corporate need. Information
will be processed according to the functional needs rather than the departmental structure. Thus, data acquired from one source will be used by many subsystems to reduce duplication. The conceptual structure of the proposed system is shown in Figure 15.

This model illustrates the integration at three levels considering on-site and remote terminals which allow two-way communication with the computer. In the first level, data is fed into the central computer from I/O device and routed back to the same subsystem (e.g. international tendering). At the second level, data flows into the central computer from one subsystem to another (tendering to manufacturing). At the third level, external data enters into central computer facility for use by all subsystems. Thus I/O devices are positioned at the various levels of data generation to bring together information which can be used by all subsystems in integrating company's activities.

(vii) As mentioned earlier the company's database/data banks should be data oriented rather than department oriented. Thus a particular database will be a common storage medium which can be accessed by different categories of users.
Figure 15: Conceptual structure of proposed computerised information system for international tendering
The database structuring will follow both horizontal and vertical approach such that it will help in providing decision-oriented data at all levels. It should be used to identify potential market demands, potential tender, to indicate improvement in pricing of a product and to show profit profile of alternative pricing policies. Thus, before structuring databases, the following questions should be answered.

(a) What database elements are required
(b) Whether data elements are fully identified
(c) Where are they located
(d) How they are located
(e) How large they are
(f) What are their specific contents
(g) What are the relationship among the database elements

The databases would be designed on the basis of a Data Base Management System which encourages and facilitates the integration and standardization of data definition. Thus, data will be monitored and processed by the DBMS and not by the individual programs as far as possible.

A conversional or interactive processing mode will be adopted to update files on-line and to
provide management with immediate response to inquiries. Proper control will be administrated over the access of databases such that each user will be having different access rights or privileges. Some will be allowed to simply make inquiries about some aspects of the databases, some will be permitted to access the entire databases and some will be allowed to update them. The system will also ensure the accessibility of various system functions for simultaneous use. Thus, several operators will be able to use the same computer programs simultaneously at different VDUs without each being aware of other's work.

It should be noted that all environmental data will not be stored on-line always. Some of the data will be obtained on-line when they are needed to perform a particular type of analysis. For example, trade data and other descriptive information like past failure history of a particular tender will be stored on magnetic tape and will be called online when an assessment is required about the potentiality of a bid to get awarded.

(viii) Modular or building block approach should be followed at system design and programming level. By this method not only the data elements will
be updated but the modules will also be expanded and contracted to meet the ever-changing system requirements. The system modules of data capture and information dissemination will be flexible enough to accommodate new external and internal environmental factors. A standard cost module which is an integral part of the accounting subsystem is concerned with past and current operating data, the existence of on-line cost data elements will provide the opportunity to develop other subsystems for the projection or simulation of future events. Thus, the cost-effect analysis according to the changes in product specifications or profit forecasts with comparison to actual variance factors could be formulated.

(ix) The system will be built on various operations, research models such as Game Theory for analysis of competitions, Decision Trees to help in decision-making process, Pricing Models for optimisation, Input/Output Analysis for search process, Simulation technique for determining the influence of production schedule on the delivery of a product, or effect of product specifications on the price structure of a product. Spread Sheet technique will be used in the preparation of quotation. (14, 38, 59, 67, 70)
9.3 Description of Various Databases and Computer Based Information Processing

The proposed information system will be designed to achieve maximum efficiency in international tendering operation. One of the important objectives as mentioned earlier will be to reduce manual effort by reducing duplication in work and to help the users of the system in accessing accurate up-to-date information for decision-making. Thus, care would be taken to reduce frequency and magnitude of arithmetic errors and thereby improve the quality of the quotation for bidding in international market.

While developing various databases, one important feature will be taken into consideration i.e. when a commonality is found in certain type of databases, a standardised data description, file structure and retrieval procedures will be followed.

It is assumed here that the proposed information system for international tendering will be converted from a manual to a computerised form. Various databases of other departments or units (such as production schedule of a manufacturing unit, order-sales position of order execution department) will already be available in computerised form and will be available to the international tendering personnels.
9.3.1 Competitors' Register

9.3.1.1 Input Coverage and Design

Understanding competitors is a challenging and a vital factor in increasing competitiveness in international tendering. The following checklist helps to define the scope of the information collection on one's competitors.

(i) Who are the competitors
(ii) What does a company need to know about them
(iii) What type of competitor intelligence system is appropriate to the international tendering with reference to export operation (43)

In international tendering context, competitors are a mixture of companies from home country as well as from overseas. The main objective of this file will be to cover up-to-date information about the activities of the competitors with an indicative information about the products. It will also cover information like marketing strategies generally followed, anticipated potential activities with special emphasis on the pricing strategies of their products. The detailed information on the competitors' products will be stored in a separate database and facility will be provided to link these two databases through database management system, when required. Some of the important data elements of this database will be: (49,50)

Company's name
Address
Postal address
Telephone Number
Telex Number
Cable
Year of Establishment
Type of Company (manufacturer/manufacturer & exporter/trader/ etc.)
Size of Company (No. of employees)
  In Manufacturing
  In Domestic Sales
  In Export operation
  Total
Marketing Data
  Manufacturing capacity
  Total sales (productwise)
  Export sales (productwise)
Area of Exports
  Existing
  Desired
Export Channel
  Agents
  Other representatives
Products
  Already exported
  Potential
Brand Name
Financial Data
  Paid-up capital
Loan/credit (from World Bank/other development banks)
Price strategy/currency used
Major customers
Membership (in trade associations, chambers of commerce, etc.)
Tender Opportunity
   Special strategy
   Bids submitted
   Bids got awarded
Other Information (like special export strategy, name and designation of significant persons, etc.)
Database creation date
Database updating date (latest)

9.3.1.2 Data Collection

Collection of data on competitor is very difficult in practical situations. No single source can provide all information about a competitor. The information will be collected by analysing various sources. No source will be taken as completely perfect. Thus, information will always be verified and cross-checked. However, certain sources will be considered as primary sources and others will be used for verification. Some of the main sources are: (65)

(i) Records of trade transactions available with government ministries and agencies; various trade promotional organisations, trade associations; various banks
(ii) Custom records
(iii) Export licenses
(iv) Press advertisements
(v) Articles in various technical periodicals, newspapers
(vi) Trade literature
(vii) Printed sales material, Audio-visual sales aids
(viii) Exhibitions
(ix) Seminars and product demonstrations
(x) Annual reports
(xi) Existing exporters' directory
(xii) Direct contact with customers or potential customers
(xiii) Marketing intelligence/industrial espionage
(xiv) Commercially available databases

A worksheet is designed to record data from various sources for compilation of competitors' register in computer readable form. The worksheet is designed in such a way that it will be easy to compile and the data from the worksheet can be easily transferred into computer readable form. Accordingly, data coding will be done on the same sheet.
### Worksheet to Record Competitors' Information: A Specimen

Worksheet completing date: ---

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9. Products already exported

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Products that have potential for export

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10. Brand Name

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11. Financial Data

Paid-up capital

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Loan/credit

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Financial Institutions

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Price Strategy

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12. Major Customers

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13. Membership

Name: ------------------------ Code ---------
Address ---------------------------------

Name: ------------------------ Code ---------
Address ---------------------------------

14. Tender Opportunity

Special strategy (for bids) ------------------------
Bids submitted ------------------ Year ---------
Bids got awarded ------------------ Year ---------
(no., name of the buyer, product, year)

15. Other Information

Special export strategy

Counter trade

Country ------------------------

Consortium

Organisation: Name Code Number

Address ---------------------------------
9.3.1.3 Processing and Output Design

The data will be processed to get answer for specific enquiries such as, list of most probable competitors for a particular product to be exported to an organisation for a project funded by the World Bank. The data of this database will also be processed to obtain various reports according to needs. Format of one of such reports is:

**Bid Performance Report of the Competitor**

<table>
<thead>
<tr>
<th>Name of Bid Submitter</th>
<th>Year Export</th>
<th>Products FOB</th>
<th>Status</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>the committed competitor to</td>
<td>strategy</td>
<td>Quoted Price of the (unit) Bid</td>
<td>Award/Non-Award</td>
<td></td>
</tr>
<tr>
<td>Followed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
It will be possible to obtain output data on visual display unit or/and on printer depending on the requirement.

9.3.2 Suppliers' Register

When an export organisation is involved in exporting products of other manufacturers, it submits bids for products of other manufacturers. Thus suppliers' performance evaluation is an important aspect which should be stressed. The efficiency of an export organisation depends on the supplier's capability to supply the products at the right time, with the right quality and at a right price.

9.3.2.1 Input Coverage and Design

The suppliers company profile will contain information on its manufacturing capacity, plant and production equipment facility, inspection and test facilities, customers, products available for export, etc. Some of the significant data elements which are expected to be included in this database are:

Supplier's name
Address
Postal address
Telephone number
Telex number
Cable
Year of establishment
Type of Company (manufacturer/manufacturer & exporter/trader, etc.)
Size of Company (No. of employees)

In Manufacturing
In Domestic Sales
In Exporting
Total Number

Different unit information (if any)

Branch name
Address

Marketing Data

Manufacturing capacity
Total sales (productwise)
Export sales (productwise)

Export Channels

Agents
Other representatives

Products

Products manufactured (unitwise)
Brand name
Product Performance
Domestic market
Export market
Products available for export
Products exported

Production schedule (productwise)

Inspection facility

Standards followed

Capability in supplying customerised products.
Financial Data

Financial Resource

Loan/credit received

Delivery performance (Good/Satisfactory/Bad)

Delivery condition (supply to the exporter place/
supply directly to the port, etc.)

Packaging Facility

Labour Condition

Guarantee Condition

Price Negotiation

Discount Facility

Agent's percentage (productwise if necessary)

Incentives Claim Condition

Claim by exporter

Claim passed on by exporter

Disclaim

Customers

Membership

Tender Performance

Special Features

Tenders submitted

Tenders got awarded

Contact Person

Name

Position

Other Information

Database Creation Date

Database Update Date (latest)
9.3.2.2 Data Collection

The main sources of input data are supplier's annual reports and direct contact with the suppliers. A worksheet is designed on similar lines as illustrated in Sec. 9.3.1.2.

9.3.2.3 Processing and Output

The data will be processed to get response for specific enquiry like, whether the production schedule for a particular product of a supplier matches with the delivery schedule specified in tender document.

9.3.3 Country Profile

9.3.3.1 Input Coverage and Design

The input coverage mainly concentrates on the political, economic condition, trade data and various business opportunities. Some of the significant data elements which are identified for creation of this database are:

Country's name
Area
Climate
Population
Capital City
Other important Cities
Political Condition
- Current form of government
- Political stability of the government
- Political relation with other countries
- Head of the country
Contact persons in the government
Contact persons in the embassy

Economic Condition
Gross national product/year
Current state of infrastructural development
Current state of industrial development
Current balance of payment
Foreign debt
Inflation rate
Stability of the economy
Unemployment situation

Financial regulation
Credit terms
Credit incentives
Credit insurance
Taxation
Currency
Conversion rate
  In dollars (US)
  In pound sterlings
  In Rupees

Native Language
Business Language
Level of Literacy

Infrastructural Facilities
Percentage of the country electrified
Voltage
Phases
Transport

Freight rates

Status of Engineering Infrastructure/Supporting Facilities

Foundry
Forge
Heat Treatment
Plating
Fabrication/General engineering
Tool Room
Vocational training centres
National standards for machine tool industry

Trade Requirements
Import (productwise/Quantity/Value)
Export (productwise/Quantity/Value)
Production (productwise/Quantity/Value)

Business and Industry
Number of Companies in
Manufacturing
Importing
Exporting

Business Relation with other Countries
Number of Business offered by International aid agencies
Main Sector in which services/products are purchased from abroad
Joint Venture Partnership with Foreign Firms
Incentives offered to Exporter by Government
Credit offered to Foreign Importer by Government

Insurance Charges

Contact Persons in Business

Bank Facilities
- Bank Name
- Address
- Credit Facility
  - For import
  - For export
- Guarantee
- Certificate
- Contact Persons

Trade Organisation/Financial Organisation
- Name
- Address
- Main Facility
- Contact Persons

9.3.3.2 Data Collection

The fact that a country profile covers a wide range of topics indicates the variety of sources one has to refer to collect necessary data for its creation. Some of the important sources are (75, 80)

(i) Various organisations in the US system and their related bodies - directly contacting them or by analysing their various publications.
(ii) Bank's country reports, e.g. reports issued by Grindlays Bank, Midland Bank, British Bank of Middle East, etc.

(iii) Trade literature

(iv) Company brochures and annual reports

(v) Specialised magazines such as Engineering News Records, News Reports, etc.

(vi) Bank, economic and political journals, newspapers

(vii) World Bank and other financial organisations and country reports

(viii) Direct contact with bank, government departments, foreign embassies

(ix) Export credit guarantee depts of export-import banks

(x) Statistical yearbooks of the UN and World Bank

(xi) Atlases and encyclopaedias

(xii) Commercially available databases

9.3.3.3 Processing and Output

The data for the database will be processed to get information like types of companies in a country's foreign trade, type of companies actively involved in foreign trade of one particular product, principal foreign market for different types of machine tools, a complete list of all firms
involved in export and import in the country, a ranking by export and import volumes of the top traders.

9.3.4 Company's Own Profile

The objective of this file is to provide company's own internal information which is required to identify its status in international competition and thereby helps in making bid or no-bid decisions or in formulating a pricing structure for a particular bid.

9.3.4.1 Input Coverage and Design

The emphasis on input coverage will be mainly on various activities of the company, its financial position, its achievements and set-backs. The input coverage of an export company is highly influenced by the nature and the organisational structure of the company, whether the export company is a part of an organisation such that it exports products of its own manufacturing units or it only exports products of other manufacturers (only acts as an export agent) or it exports both its own products as well as of others, whether the company acts as an export house or a trade house or it is in a free trade zone area.

The input coverage very much depends on the answers to the following questions.

(a) Which products and services are provided most profitably in the recent past. Can the profitability of some be improved. Is there a large demand for the profitable product.
(b) What add-on services or product features differentiate this company from the competitors. Does this differ by the customer groups or/and by products offered.

(c) Are there costs that can be reduced quickly to offset volume declines. What costs will influence directly with increases in sales.

(d) Are there types of customers that are more profitable than others. Where are they located. Why are they more profitable. Can business be expanded with these customers.

(e) Are all assets producing similar returns. Can direct management of the asset base improve profitability. (21,24)

Some of the significant data elements which are identified for creation of own company profile (considering the company has a manufacturing unit and exports other manufacturers' products) are:

Company's name
Address
Postal Address
Telephone Number
Telex Number
Cable
Year of establishment
Type of Company
Size of Company (Number of employees)
  In Manufacturing
  In Domestic Sales
  In Exporting
  Total number
Manufacturing Units/Branches
  Name
  Address
  Products manufactured
  Manufacturing capacity
  Production Schedule
Inspection Facility
Standards Followed
Capability in Supplying Customerised Products
Marketing Data
Export Channels
  Field Office
  Agent
  Other representatives
Products
  Products manufactured
  Brand name
  Product Performance
    Domestic market
    Foreign market
  Own Product available for export
Own Products Exported

Others' Products Exported/Supplier's Name

Export Value (productwise/valuewise/yearwise)

Commission earned (productwise/valuewise/yearwise)

Technical services (productwise/valuewise/yearwise)

Project works (productwise/valuewise/yearwise)

Financial status

Financial Resources

Loan/Credit Received

Loan/Credit Provided

Delivery Performance (past)

Delivery Condition (Present)

Packaging Facility

Guarantee Condition

Pricing Policy

Customers

Active

Domestic

International

Potential

Domestic

International

Membership

Tender Performance

Special Features

Tenders Submitted

Tenders got Awarded/Orders Received

Database Creation Date

Database update date (latest)
Financial data of the company will be accessed from financial file of the company.

9.3.5 User Industry and Customer Register

Profiles of user industries of an export company help in the market planning and market research processes. The aggregate information is used to analyse trends and prospects of the user industries. Monitoring trends and prospects thus give useful information on sales possibilities or the lack of it.

A machine tool export company has a very large number of users which contribute to the total machine tool sales. These users can be grouped according to their category such as Railway, Defence, Automotive, Educational/Research institutions, etc. Thus the growth and prospects of these user industries more or less directly affects the sales of a particular export company as well as the total machine tool sales.

9.3.5.1 Input Coverage and Design of User Industry

The user industry profile format should be designed such that it can incorporate both qualitative and quantitative data on salient aspects to determine industry's prospects and trends. Different user profile format is required for different group of users.

Some of the important data elements which will be included to create a user industry profile are indicated below.
Industry
Country
Brief History
Major Companies
Statutory Factors Governing Industry
Demand Gaps
Resource/Raw Materials Status
Significant Achievements
Buying Patterns
Raw Materials
Locally available/imported
Capital Goods
Locally available/imported
Areawise Distribution of Units
North
South
East
West
Total
Marketing Procedures
State of Competition
Industry Prospects
Creation of Capacity (additional)
Forecasts
Opportunities/threats
Government views/policies
State of Technology
Estimated Demand/year
### Sources of Finance

Commercial/Industrial Association

### Status of Industry

#### Age

<table>
<thead>
<tr>
<th>Number of Units:</th>
<th>In Public Sector</th>
<th>In Private Sector</th>
<th>In Joint Sector</th>
<th>In Small Scale Sector</th>
</tr>
</thead>
</table>

#### Capacity

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Licenced Capacity</th>
<th>Installed Capacity</th>
<th>Utilised Capacity</th>
</tr>
</thead>
</table>

#### Production Targets

<table>
<thead>
<tr>
<th>Actual Production</th>
<th>Sales</th>
</tr>
</thead>
</table>

#### Stocks

<table>
<thead>
<tr>
<th>Stocks</th>
<th>Raw Materials</th>
<th>Working Progress</th>
<th>Finished Goods</th>
</tr>
</thead>
</table>

#### Exports

<table>
<thead>
<tr>
<th>Exports</th>
<th>Imports</th>
</tr>
</thead>
</table>

#### Capital Expenditure

<table>
<thead>
<tr>
<th>Wholesale Price Index</th>
<th>Percentage of Contribution to GNP</th>
</tr>
</thead>
</table>

#### Export Company's Sales to the User Industry
9.3.5.2 Data Collection for User Industry

The best way to collect data is to correspond with various manufacturers' associations. It may also be necessary to visit various financial institutions to collect financial information. Government statistical departments, and research bureaus, ministry for industry, major manufacturers are important sources of information. For example, to collect information about a user industry in India, financial institutions like RBI, ICICI, IDBI, Stock Exchanges, government statistical departments like CSO, DGCI & S, DGTD and research bureaus like CRB, CMIE are some of the important institutions to collect information. Apart from these various published documents including press releases, publications of various companies within the industry also provide important information of an industry.

However, there are three major limitations in collecting information, viz.,

(i) availability and authenticity of statistics
(ii) change of government and its policies
(iii) time factor to collect data/information

9.3.5.3 Processing and Output

The input data will be processed to obtain answers to the following type of questions.

(a) Which user industries make up the market and what are their relative sizes
(b) How did the user industry evolved.
   Introductory products and firms
(c) Success and failures
(d) What are the trends in sales over the past five to ten years
(e) Is the market stable, growing or declining
(f) What are the major reasons for recent market trends and events
(g) Are there important changes anticipated for the near future.

9.3.5.4 Input Coverage and Design for Customer Profiles

Profiles of major customers within the user industries, apart from aiding market planning, helps in drawing individual attention. For example, if a customer is desisting from expanding on account of non availability of funds, the export company could possibly obtain or help to obtain credit/loan from financial institutions.

The following questions are answered while building a database to help in decision making.

(a) What are the characteristics of target customer. Are there significant differences in these characteristics for competitors.

(b) What variations are there in customer characteristics with heavy, medium & light usage
(c) What is the purchase cycle for various products. Are there differences in purchase frequency by brand. Why

(d) How is product loyalty exhibited. Do customers tend to use one product exclusively or to select from a set of acceptable products. If the latter, do different products deliver different benifits

(e) What percent of the market accounts for heavy consumption (80/20) principle. What of these customers do various competitors have

(f) What is the message by target customer group that must by conveyed to respond directly to their unsolved problems.

(g) Are some types of marketing programmes more effective than others for these groups.

Since the decision of bid or no-to-bid very much depends on the financial status of the potential customers, the input coverage for customer database must stress on storing of accurate data on financial position of the customers. (21)
9.3.5.5 Data Collection

The major sources to collect customer information are similar to that of the sources mentioned in Sec 9.3.5.2. The past experience with the customer (if applicable) is an important source of information. Sometimes it is possible to collect information directly contacting the customers/potential customers. Company's field office and foreign agents also provide valuable information about customers.

9.3.5.6 Processing and Output

Data will be processed to obtain answers to the queries as mentioned in Sec. 9.3.5.3.

9.3.6 Product Profile

Three types of product information is necessary to handle international tendering operation, viz. product information of one's own company, product information of other supplier companies and product information of competitor companies. Depending on number of products produced in each category, number of models available for each product and number of variants available in each model, one can decide whether to create a single database or three different databases. However, to avoid complication in creating, maintaining and processing, it is better to create three different databases for product information following same database structure.

The main purpose of these product databases is to match the specifications of the tender with the specifications of the products available for export, so that a most suitable
product is offered to the prospective customer. Comparison of characteristics of the selected product(s) with that of the probable competitors products helps a bidder to guess his position in the international competition and also gives an idea for modification of the products suitably. It is extremely necessary to describe the product(s) in the bid correctly and precisely so that the bids evaluation authority can know exactly what the bidder has offered.(57)

9.3.6.1 Input Coverage and Design

The characteristics of one type of machine tool varies widely from another type of machine tool. For example, the characteristics of a turning machine is quite different from the characteristics of a grinding machine. Some of the major parameters of a few machine tools are listed in Annexure II. Though there are certain characteristics which are common to all machine tools (manufacturers' name, product name, type of product, model name, price, size, control, speed) but they are not sufficient to describe a machine tool in depth. Thus it is necessary to adopt sufficient flexibility in designing the product databases, such that each machine tool can be described with its unique characteristics. However, a general format for collecting information on each machine tool is described below.

1. A brief description to identify the type of machine

2. A general description indicating its functions
3. Parameters of the machines, e.g. size of the machine, motions, type of holding fixtures, size of the parts that are to be machined (workpiece size), speed and feed range, machine cycle, a brief statement of how the machine is to be operated

4. Machine components and standard accessories

5. Special accessories and attachments

6. General information such as, standards, warranties, operating and maintenance instructions, recommended spare parts lists, foundation, floor plans

7. Price (basic ex-works price), various incentives offered by the Government of India for each type of machine tool.

For easy handling of information the parameters are grouped into five levels.

**First Level:** It includes parameters which provide information related to identification of the machine. Name of the product, general description, model/type of product

**Second Level:** It covers parameters to indicate main specifications of the product

**Third Level:** It includes parameters to indicate specifications of standard accessories and special accessories.
Fourth Level: Cost related parameters are included at this level such as basic ex-work price, cash compensatory support, duty drawback for each product.

Fifth Level: Includes parameters to indicate standards followed, installation and maintenance conditions, spare parts, etc.

9.3.6.2 Data Collection and Recording

Data are collected from different sources like trade literature, drawings, working instruction manuals, product dictionaries, government agencies, technical articles in periodicals, exhibitions-previews, reviews, catalogues of exhibitions, direct visit to exhibitions, price lists, etc. It is easy to collect information about one's own product but it is quite difficult to collect information about competitor's products as they are not available in one source and mostly all information is not available in printed form. Not only data collection, data evaluation is also a major job in a product database preparation.

It is absolutely necessary to follow a standardised procedure while recording data as they are collected from different sources which follow different format, e.g. different units are used to express dimensions, speed, different terminology to express same specifications, different currency to express price. Thus formulation of a standardised procedure is necessary to express various specifications of each
product. A coding technique is also required to record the data in coded form. It is found that the product codes followed by various organisations like DGTD, IMTMA(27,46) various machine tool manufacturers and export-import organisations are not very satisfactory for this purpose. A seven digit product code is formulated representing family of the product, product make and variant number which will be suitable for this purpose.

Example:

<table>
<thead>
<tr>
<th>Family</th>
<th>Product</th>
<th>Make</th>
<th>Variant No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>11</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>(turning machine)</td>
<td>(Precision lathe)</td>
<td>(Particular model)</td>
<td>e.g. length of bed</td>
</tr>
</tbody>
</table>

9.3.6.3 Processing and Output Design

Data will be processed to obtain reply to the following types of queries.

(i) list of products by country of origin
(ii) list of products by name of company (manufacturer)
(iii) list of products by type of machine
(iv) Comparative study of a particular specification of a particular type of product
(v) Comparative study of a group of specifications of a particular type of product
(vi) Comparative study of all specifications (parameters) of a particular type of product
The output should be designed depending on the queries. In case of listing, the required product or products are listed with their specifications. In case of a comparative study, it should be designed in such a way that at a glance a particular specification of a product of various manufacturers can be compared.

9.3.7 Tender Database

This file will include relevant information about tenders which are accepted for bidding.

9.3.7.1 Input Coverage and Design

The purpose of this file will be to supply necessary information to prepare bids and also to generate various management reports. The significant data elements which are identified for creation of this file are:

- Name of the tender floating authority
- Address
- Name of the Financing body/organisation
- Address
- Name of the customer
- Address
- Tender number
- Tender floating date
- Tender closing date
- Product specifications
- Type of price to be quoted
- Information on tender received on
9.3.7.2 Data Collection

Data for this file will be collected mainly from tender documents. Data generated by various transactions will also be included in this file.

9.3.7.3 Processing

As mentioned earlier this file will be processed mainly for preparation of bids and generating various management reports (see Sec 9.3.8).

9.3.8 Bid Preparation

In practice, when bid is prepared according to the detailed specification of the products mentioned in the tender and the price of the products are calculated according to the required quantity of the products, then it is called proforma
invoice. Thus proforma invoice is a formal document indicating the exporters' intention to sell and are usually addressed to the prospective buyer. In case, the seller (prospective) prepares a document where only the unit price of the required product is mentioned and the quantity of the product required is not taken into consideration in the pricing, then it is called a quotation. The product selection procedure also varies from preparation of quotation to preparation of invoice. In the former, a range of products are selected and options are given to the buyer to select a particular one whereas in case of a proforma invoice, a particular product is selected depending on the tender specifications. Thus, quotation is treated as more casual document than a proforma invoice in practical situations and are mostly required for pre-qualification bid or registration purposes. Therefore, not only the proforma invoice preparation facility is expected from the proposed information system for bidding against a tender, it could be adopted for quotation purpose.

9.3.8.1 Input Coverage and Design

A number of input data have to be drawn from various databases and then processed to obtain the required output. The input data requirement for quotation/proforma invoice varies from one to another depending on the tender terms and conditions, but some of the common input data are:

(i) The consignee or buyer: The complete name and address of the buyer
(ii) Description of the product: Description of the products indicating the technical specification and physical features according to the tender specifications required.

(iii) Maximum quantity to which the invoice is prepared (in case of proforma invoice)

(iv) Price: Price of the product depending on the terms and conditions of the tender (See Sec. 6.7.2.1)

9.3.8.2 Processing and Output

The bid will be prepared on the basis of direct interaction with the system, where a user expects response from the system based upon a specific interrogation of the database; facilities will be provided to input required data directly into the system for further processing and obtaining required output. The following broad processes will be involved in bid preparation.

(i) Selection of most suitable product by matching required specifications. It should be noted that for engineering products like machine tools, 100% match with tender requirements is a rare occurrence. However, some of the significant specifications must match (the choice and the rank of specifications will be provided by the user) for a machine to be included in the bid.
(ii) Readjustment and modification of specifications of the selected product(s)

(iii) Unit price calculation (according to the delivery and other conditions of the tender) for each of the selected item

(iv) Total price calculation taking into consideration quantity of each product (in case of a proforma invoice)

(v) Printing of quotation or proforma invoice according to user requirement

(vi) Printing of covering letter

(vii) Management reports generation

At first, to enter into the system, the user will enter a password to establish his identity and will get the predetermined privilege of using the system. As soon as the user identification is established, a list of functions available to the user will be displayed as a menu as follows.

**Bid Preparation**

1. Selection of product(s)
2. Modification of specifications
3. Price calculation (unit price)
4. Total price calculation
5. Print bid
6. Enquiry
7. Management reports generation

**USER:** Make a selection
The user has to make a selection by pressing the appropriate key. If key "1" is pressed, product selection options will be displayed upon the screen.

### Product Selection

1. Call company's product profile  
2. Call supplier's product profile  
3. Call competitor's product profile  
4. Input the required product specifications  
5. Selection of specifications for matching  
6. Matching  
7. Listing of matched products  
8. Reselection  
9. Evaluation of selected product with competitors  
10. Product selection over

**USER:** Make a selection

If the user selects key "1" of the above screen, the company's own product profile database will be available on-line for execution. The same product selection screen will be displayed for further selection. By pressing key "4" the user will be able to input the required specifications for a product (as stored in tender database). By pressing key "5", the user will be able to select various significant specifications and will be able to input significant factors for matching purpose. By pressing key "6", the required specifications of the product will be obtained from tender file and will be matched with the corresponding specifications of the company's product and the specifications of the selected product will be displayed on the screen. If a list of the selected product specifications and the corresponding required
specifications list is required on hard copy then a printed copy of the list will be available by pressing the key "7". In case there is no suitable match, it will be possible to repeat the selection procedure by calling the suppliers' product profile database. It will be possible to evaluate the selected product specifications with that of the competitors, so that the bidder will be in a position to judge the probability of his winning the bid and also the possible scope of negotiation with the manufacturer or supplier regarding modification of the specifications of the selected product(s).

After finishing one function, same menu screen will reappear and only by pressing the key "10", bid preparation screen will appear again. It will also be possible for a user to save the result of a particular function. e.g. once the required specifications are input and selection of significant specifications are ranked - they could be saved for future processing.

In case the user selects the key "2" of the Bid preparation screen, then the following screen will be displayed.

### Product Modification

1. Call selected product profile
2. Incorporate modifications

USER: Make a selection
By pressing key "2", the main modification screen will appear as follows.

**Main Modification**

1. Machine code
2. Any change in main spec.
3. Any change in elec. description
4. Any change in std. accessories
5. Like to select special accessories

**USER:** Press Enter button

After pressing "Enter key", the next screen will appear depending on the "yes" or "no" condition entered in the previous screen. For example, if "Y" is input in the third condition, i.e., change is required in electrical description, the following input screen will appear for inputting modified data.

**Electrical Description Modification**

1. Phase
2. Voltage
3. Cycle
4. Supply

**USER:** Press Enter button
In case of change of main specification, standard accessories and special accessories, provision will be provided to change not only the specification value but also the sequence of specifications according to the tender documents. It will be possible to change a special accessory as a standard accessory or a standard accessory as a special accessory. Since these changes will affect the price of a product, all modifications should be carried out before price calculation.

If it is necessary to change the specification values of main specifications or the sequence of main specifications, then by inputting "Y" in main modification input screen the following input screen will appear.

| Code | Specification Value |
At this stage, the code for main specifications will be entered to the required sequence and the corresponding modified specification value will be entered wherever necessary.

Similar procedure will be followed in case of modification of standard accessories or special accessories.

Once one modification function is over, the system will automatically display the Main Modification screen again to select the next function. Once all modifications are over, the system will automatically display Bid Preparation menu screen.

If the user is interested in unit price calculation of the selected product, by pressing key "3" of Bid Preparation screen the following price calculation (unit price) menu screen will appear.

Provision will be provided to calculate unit price of basic machine and special accessories separately. At later stage, depending on the quantity of the required machine and its special accessories the total price will be calculated.
Facility will be available to input various rate factors which are required for price calculations, such as realisation factor, commission charges, exchange rates, etc. The Ex-works price of the product and corresponding CCS, DBK will be available from the product profile database. The price will be calculated according to the specified formula. (See Sec. 6.7.2.1)

In case of price calculation the spread sheet will be used so that the user will be allowed to ask a series of "what if" questions and can get immediate results. For example, what will be the unit FOB price of the product if we change the realisation factor from 70% to 80% and decrease the commission payable in abroad from 7% to 5%? What will be the profit margin for this new price structure? In all cases, FOB price of a product will be calculated, as FOB price of a product is required for claiming export incentives from the Government of India.
In case total price calculation option is required, the user has to press the key "4" of the Bid Preparation screen. After inputting the required quantity, the total price of the product will be displayed on the screen. It will be possible to store the price calculation on temporary file and printing the bid at a later date.

By pressing key "5", in Bid Preparation menu screen, the following input screen will appear.

```
Buyer's name
Address

Item ref
Proforma invoice
Tender ref
Bidder's ref
Validity date
Customer no.

USER: Press enter
```

Next, screen will appear for inputting the bidder's name, address and other details.
9.3.8.3 Printing the Bid

As soon as enter button is pressed the system will print proforma invoice. For this purpose, the system will automatically access various files like selected product file, modified specification file, price file.

A schematic illustration of the proforma invoice is given in Figure 16.

For printing the covering letter, word-processing software will be used.
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of the machine</th>
<th>Unit Price FOB Indian Port (In Indian Rupees)</th>
<th>Quantity</th>
<th>Total Price FOB Indian Port in Indian Rupees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main Specifications:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.01</td>
<td>.......</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.02</td>
<td>.......</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.03</td>
<td>.......</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.04</td>
<td>.......</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>....</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>....</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Standard Accessories</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.01</td>
<td>.......</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.02</td>
<td>.......</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.03</td>
<td>.......</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.04</td>
<td>.......</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>....</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>....</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Price of Standard Machine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.01</td>
<td>Model (Type) ...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contd.
### Price of Special Accessories

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Total Price FOB Indian Port**

---

**Ocean Freight charges to customer's port**

---

**Total C&F port**

---

(Price in words..............................)

---

Terms and conditions as per enclosure

This proforma invoice is valid till..............

---

For Bidder's Company

Name/Designation

---

Fig 16: Schematic illustration of Proforma Invoice
9.3.8.4 Report Generation

The final bid data will be stored in Tender file for future analysis and report generation. Schematic representations of some of the reports which could be generated on request are shown below.

Report 1:

Company's Name  Page no.:

Machine Modelwise Quotation/Proforma Invoice

submitted during...............to..............................

-----------------------------------------------

Machine  Quantity  Value  Area  Country  Customer  Bidder's  Vali-
Model  Ref  dity

Date

-----------------------------------------------

Report 2:

Company's name  Page no.:

Areawise Quotation/Proforma Invoice Submitted

during.................to.....................

-----------------------------------------------

Region  Country  Customer  Bidder's  Vali-
er  Ref.  dity  Model

Date

-----------------------------------------------
**Report 3:**

Company's name:  

Tender Performance Evaluation (machine's modelwise)  

from ................................ to ................................

<table>
<thead>
<tr>
<th>Machine Qty Value</th>
<th>Area Country</th>
<th>Customer</th>
<th>Bidder's Award Model Status Ref</th>
</tr>
</thead>
</table>

**Report 4:**

Company's name:  

Tender Performance Evaluation (Area wise)  

from ..........................to ........................

<table>
<thead>
<tr>
<th>Area Country Customer Machine Qty Value Award Bidder's Model Status Ref</th>
</tr>
</thead>
</table>
Report 5:

<table>
<thead>
<tr>
<th>Area</th>
<th>Country</th>
<th>Customer</th>
<th>Company's Name</th>
<th>Machine</th>
<th>Qty</th>
<th>Value</th>
<th>Awarded Value</th>
<th>Ref. Company</th>
<th>Machine Model</th>
</tr>
</thead>
</table>

Comparative Evaluation: Company's Performance vs Competitor's Performance (Area-wise)

from ......................... to .........................

Page no.:
### Time Lag for Submitting Bid

<table>
<thead>
<tr>
<th>Tender</th>
<th>Tender</th>
<th>Customer</th>
<th>Area</th>
<th>Country</th>
<th>Machine</th>
<th>Inf. on Tenderdoc.</th>
<th>Bid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floated</td>
<td>Closed</td>
<td>(Date)</td>
<td>(Date)</td>
<td>Model</td>
<td>Tender Received received</td>
<td>Submitted (Date)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Date)</td>
<td>(Date)</td>
<td></td>
</tr>
</tbody>
</table>
9.3.9 Access to Commercially Available External Databases

Various organisations develop databases/data banks on different subject areas and allow on-line accessing of these against a prescribed fee. The prerequisite to use these facilities are:

(a) Choose the most useful databases or data banks by asking questions like who offers what. How much does it cost? What does the database or data bank contain? What needs can it meet?

(b) Acquiring a terminal or a telex machine

A wide range of computer terminals is available in the market, ranging from portable computers, including all varieties of screen, keyboard, printer, model assemblies. The main criterion of selecting a terminal is that the terminal should be teletype compatible. In case of a telex search, the telescriptor acts as a computer terminal and no additional equipment is required. However, not all host computers can be connected to the telecommunication network (telex network) and data transmission speeds are very low and thus quite expensive. In telex searches, user usually does not get a feeling of on-line access as much as a terminal search.

(c) Applying for a password

This password consists of a subscriber number and a word assigned by the host organisation. Generally, a common password is used to access all databases and data banks offer-
ed by the same host and it is also used for invoicing purposes. Application to password involves signing of a contract with the host organisation.

(d) Choosing a Telecommunication Network

Communication between the terminal and the host computer passes through one or more telecommunications networks. Various networks are available like TYMNET, TELENET, UNINET, DIALNET. They are known as dedicated networks. A user of the system has to select one of these networks to establish contact with the host computer. If the user and host computer are nearby, it is possible to communicate through a normal telephone line using switched network.

(e) Consultation of Enquiry Aids

For a given host computer, the databases are handled by a software which deals with user interface. The software can be specific to a given host or can be implemented by several hosts, usually with some variations. Some of the widely used softwares are STAIRS, DIALOG. Search software packages offer specific conditions and command codes, though in most of the cases data retrieval logic is based on Boolean algebra. Various user manuals, practical guide, information update bulletin are usually provided by the host organisation. Sometimes producer of the databases/data bank directly circulates an information bulletin dealing with the database. Specific training workshops are also organised by the host organisation or by its local representatives. Thesaurus or list of terms used for indexing is also available from the producers.
for most of the databases which helps the user to prepare his search strategies. (76)

The operations involved in conducting a typical search are given in Figure 17.

Via Telex Network

Switch on Telex Station

Country Code

Host Computer Code

Software

Identification of subscriber and entering password

Selection of database/databank (If a variety can be accessed)
Figure 17: Operations involved in conducting a typical search

Details of some of the commercial on-line facilities relevant to international tendering are described below.

9.3.9.1 Access to Scan-a-Bid

Scan-a-Bid is the Development Business Exclusive Computerised Database containing all information on development project opportunities, which is also published in the
issues of Development Business. It is produced by the United
Nations, the publishers of Development Business. Now it is
not necessary to wait for delivery of the paper. Within days
or even hours of a procurement notice issued, the information
is available on-line. Thus, on an average a bidder can get
up to two and a half extra weeks to procure tender documents
and can take necessary action for preparation of the bid.

Scan-a-Bid covers procurement notices from the
World Bank, Asian Development Bank and the Commission of the
European Communities. It also covers the monthly operational
summaries of the World Bank and Inter-American Development
Bank. It includes information on World Bank contract awards,
and other advance project notifications.

To connect with the central database, it is neces­sary to have either a computer terminal with a telephone modem
or a telex machine. If an organisation already possesses a
computer or a word-processor without a modem, then acquiring
a suitable modem is necessary. It is possible to connect to
the database as often as one feels necessary to keep abreast
of business opportunities in the Third World. Scan-a-Bid can
be connected any time, seven days a week, except from 0530 to
0700 GMT.

Relevant information can be retrieved by specifying
keywords. For example, by specifying Thailand, all information
pertaining to Thailand can be retrieved. Similarly, by speci­fying 'Machine Tools', all information on machine tools can be
retrieved. It is also possible to specify any combination of words to narrow down a search. An instruction manual is available to the users along with a subscription to Scan-a-Bid.

The monthly Scan-a-Bid fee of US $60 is payable six months in advance. Only subscribers to Development Business can subscribe to Scan-a-Bid. (62)

9.3.9.2 Access to DIALOG On-line Information Services

Information retrieval services from DIALOG Information Services Inc., is available on commercial basis. It is one of the major vendors of business databases providing access to a large number of databases (over 200) which cover a wide range of subject areas like engineering, business, economics and current affairs. All these databases are regularly updated to offer the most recent information. Some of these databases are quite useful for an export organisation involving in international tendering operations and other exporting functions. DIALOG services can be accessed through telephone communication lines from a personal computer or from a terminal or through a international telex facility. Once a user is connected to the DIALOG network, he can call up any file (each database is designated as one or more files). Among the files, some emphasise on company information, some concentrate on statistical data like time series, forecasts and industry statistics.

"Disclosure", "Standard & Poor's Corporate Descriptions", "Moody's Corporate News International", "International
Dun's Market Indentifiers", "D&B Million Dollar Directory" are some examples of databases specialised in company information. Some of these databases have extensive textual and statistical information on public companies in US and other countries, whereas others are particularly strong in providing information on private companies. DIALOG also allows to access various numerical databases (data banks) like, PTS International Forecasts, US Exports which provide statistical data on specific commodities, industries and countries.

Depending on the nature of requirement of data/information, the database coverage and the cost involvement in searching and printing, a user has to select a particular database to access. Various search aids are available either from DIALOG or database producers. A detailed description of some of the databases which are useful for international tendering are given in Annexure I.

9.3.9.3 Access to EEC Databank

Recently the Government of India has entered into an agreement with the European Economic Commission (EEC) for cooperation in several areas including access to European databanks. The Commission has also agreed to consider setting up of an information centre in the Community's New Delhi office to provide Indian users access to specified European databases. The proposed centre would be given necessary hardware and software support to facilitate Indian users access to data networks currently being set up for use within the Community.
It is expected that the Commission would provide free access to the databases including telecommunication costs, in the initial period. The commission has agreed to provide assistance for the setting up of a industrial technology data bank in India. It is decided that the Directorate General of Technical Development (DGTD) will act as the nodal agency for setting up of this data bank. This is expected to be very useful to the Indian industry in identifying suitable industrial partners for collaboration and joint ventures. (28)

9.3.9.4 Establish Contact with Export Promotional Organisations

Various export promotional organisations are in the process of implementing computerisation with special emphasis on compiling data and retrieving appropriate data as and when required.

The Chief Controller of Imports and Exports (CCI & E) and its regional offices at Bombay, Calcutta and Madras are in the process of implementing computerisation. Their main emphasis is on compiling data pertaining to cash compensatory support, list of firms black-listed by the government for violating rule, etc.

At present, an export organisation has to waste a lot of time for collecting information, solving various problems and for completing various formalities with relevance to international tendering and other export operations. When the computerisation program of CCI & E is fully implemented, it
may be possible for any export organisation to access required information from CCI & E data bank through its computerised link, without wasting time. (17)

9.4 Conclusion

The information system development of international tendering, is conceived on the basis of an analysis of information systems. Information requirements modelling has suggested systemic features. This includes transaction modelling informatics for information seeking. The thesis has presented analytic features of system design for information requirement/specification system.

India is in the initial stages of a technological revolution in which computers and robotics are being combined and implemented in such diverse areas as sports, transportation, medicine and manufacturing. In near future MIS managers may be called upon to integrate robot controlling computers with management information systems. Just as natural as the step from mechanisation to automation will be the process of linking automated operations and management information systems. The linkage of production robots to management information systems will allow companies to integrate supplier and customer information into production databases.

During the last decade a new concept has emerged, the expert system in artificial intelligence. Theoretically these systems are capable of reasoning through a procedure comparable to the one adopted by a specialist to solving a
problem pertaining to his discipline. To begin with the
designer of an expert system identifies and collects from
the human expert the knowledge used by the latter. Not just
theoretical knowledge, but also empirical knowledge acquired
from experience and used by the specialist for a successful
application of the theory. A problem arises at the very
outset: the expert is often unable to formulate a knowledge
which to his mind appears "obvious". This single word sum-
marizes the difficulties involved in this venture.

Many expert systems are being developed in the
field of science and engineering as well as in production
planning and manufacturing. The days are not very far when
an expert system will be made available for export management
covering the activities of international tendering.