2.1 Introduction

The term data and information are often used interchangeably, but there is a distinction. Data is the raw material that is processed to provide information. Information is data that has been processed into a form that is meaningful to the requirement and is of real or perceived value in current or prospective decisions.

Information can be:

(a) true or false: It may coincide with reality or not
(b) new: It may be completely new to the recipient
(c) incremental: It may update or add new increments to information already available
(d) corrective: It may be a correction of past false information
(e) confirmatory: It may confirm existing information

Information is associated with uncertainty. The reason for having information is to reduce uncertainty so that the correct choice can be made. If there is no uncertainty, there would not be a need for information to influence the choice.

Not all data that is communicated has information value. Classification and compression, organisational summarisation, filtration and interfaces are used to reduce the volume of data storage and especially to reduce the amount of data transmitted to human receivers. (22)
A system is composed of interacting parts that operate together to achieve some objective or purpose. A system is not a randomly assembled set of elements, but consists of elements which are joined together because of a common purpose, goal or objective. Thus a system can be defined as any set of objects and ideas, and their interrelationships which are ordered to a common goal or purpose. (12)

Systems can be abstract or physical. An abstract system is an orderly arrangement of interdependent ideas or constituents. e.g. a system of theology is an orderly arrangement of ideas about god, man, etc. A physical system is a set of elements which operate together to accomplish an objective. Circulation system, transport system, etc. are examples of a physical system.

Systems can also be classified as deterministic and probabilistic, closed and open. A deterministic system operates in a perfectly predictable manner. The interaction among parts is known with certainty. It is possible to know the state of the system at a given point of time, the description of its operation and the next state of the system also can be predicted or inferred exactly without any error. e.g. a robot which performs the job exactly according to the set of instructions. In case of probabilistic system a certain degree of error is always attached to the prediction of what the system will do. e.g. an ordering system. Here, the average demand, the average order booking or cancellation, etc. may be defined but the exact value at any given time is not known. A closed system is relatively isolated from the environment but may not be completely closed.
An automatic machining is a relatively closed system because it accepts only previously defined inputs, processing methods and provides previously defined outputs. Open system, exchange information, material or energy with the environment. The exchanges may be random or undefined. Open system can adopt to changes in their environment in such a way to continue their existence. A business organisation is a open system which often adopt changes according to the changing competition, changing markets, government policies, etc. (23)

A general model of a system is input, process and output. A system may have many inputs or outputs. Each system is composed of subsystems which in turn are made up of other subsystems. The interaction and interconnections between the subsystems are termed interfaces.

2.2 Information System in Perspective

An information system can be defined as a system to collect, process, store, transmit and display information. (83)

The information system receives data and instructions, process the data according to the instructions and outputs the results. The basic system model of input, process and output is suitable in the simplest information processing system. It may be a rare occasion when all data come in at the same time. The information processing function frequently needs data that was collected and processed in prior period. A file storage is therefore added to the information system model as shown below.
When the data storage is added, the information processing function includes not only the transformation of data into information but also storing of data for subsequent use. This basic information processing model is useful in understanding not only the overall information processing system but also the individual information processing applications. Each application may be analysed in terms of input, storage, processing and output.

The information processing system has functional subsystems such as the hardware system, the operating system, the communication system and the database system. It also has application subsystem such as tendering and invoicing, order entry, billing, payroll and personnel. The relation between these two subsystems are shown in Figure 2.

The information system for an organisation consists of a formal, structured system and an informal or unstructured system. The formal structured system operated by the organisation is available to every one who is authorised to obtain the information. It may be called as public system. The informal or
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<th>Application Subsystems</th>
<th>Functional Subsystems</th>
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<td>Hardware</td>
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Figure 2: Interaction of functional subsystems and application subsystems in information system

unstructured system which also serves all persons in the organisation who might happen to connect with it. The informal information flow via telephone calls, conversations at coffee/lunch time, notes on the bulletin board, articles clipped from the newspapers and sent around the office, call from sales representatives, etc. Other than formal and informal public systems, many private information systems exist among personnel in organisations. Some
of these are highly structured. e.g. an executive may maintain a file of data for use in decision making. The executive may maintain reference material in the office which is available only to the executive. It is known as formal private system. Many individuals also have their own private information system which operate in a non-structured way. (23)

2.3 Organisation - Information Relation

Any organisation can be viewed as a system composed of three sub-systems, viz. the operating subsystem, the management subsystem and information subsystem. The same can be seen in an international export organisation.

The operating subsystem includes all the activities, material flow and people directly related to performing the primary functions of the organisations, e.g. bidding, invoicing, order booking, selling, accounting, etc.

The management subsystem includes all the people and activities directly related to planning, controlling and decision making aspects of the operation subsystems. e.g. determining what product or services to be exported, deciding of opening an office in a foreign country, outline the responsibilities of such offices, pricing policies of a product, etc.

The information subsystem is a collection of people, machines, ideas in a manner that meets the formal information requirements of an organisation. Its purpose is to satisfy information requirements including accounting and routine operational needs; planning, controlling and decision making needs of
all levels of management and the needs of concerned parties external to the organisation.

The nature of interaction of these three subsystems are shown in the following model (Figure 3).

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**Figure 3: Interaction of information subsystems within an organisation and outside world**

The actual performance of the operating subsystem is represented by a variety of data input to the information sub-
systems. The information subsystem processes these data and produces information for the management subsystem (e.g. performance reports) and other segment of operating subsystem (e.g. a customer order is input and processed or is converted to a production order or inventory withdrawn notice) or external users (e.g. a bidding document or an invoice, a purchase order, a report to government). The needs and requirements of external environment within which the organisation exists, interface with the information subsystem as a series of data inputs (e.g. tender notice, export order, government report requirements, industry statistics). These inputs are also processed and provided to the operating or management subsystem. The management subsystem provides a variety of data inputs to the operation subsystem, external users and other levels of management. These inputs might be objectives, budgets, forecasts, schedules, work orders and so on.

Further analysis indicates that the information subsystem serves all departments or functions (i.e. horizontal integration) and all levels of management (i.e. vertical integration) (12). The information flow of an international export organisation is indicated in Figure 4.

2.4 Input Design of Information System

The features presented earlier indicate the essential role of information in the performance of jobs and integration of the same to effect an overall performance. Information acts as a binder of the activities. Information has role of setting specific task to action and transferring the input of this act
Figure 4: Information flow model for international export organisation

to the next one. It works as in a genetic code. The DNA and RNA are essential communication or information carriers for living beings. So is the ionic aspects of information and atomic aspects of information.

As seen mere possession and storing of information is of no avail. What is essential is the systemic flow of the same for the timely synergisation of diffused infobits into
knowledge bits. The design of such a system calls for the following aspects.

1. Knowledge of the application area of information system that is the functional aspects of information, the interactors or the users who perform these information, their behavioural characteristics, and information utilisation capacities.

2. The information sources, services and products that can provide in a raw form or processed form the needed information relevant to the function. In particular, the properties of information such as availability, transferability, renewability, reliability, flexibility for further modelling into specific domains of knowledge.

3. The mechanisms, media and professional expertise needed for identifying, accessing and processing information into absorbable forms for utilisation and effectiveness in enhancing the performance of various functions. These mechanisms or processors in today's world is made up of computer-based information systems in addition to ever effervascent information professional and specialists.

2.5 The Theme of the Investigation

The focus of this thesis, is to find a system which could gather, store, process and provide access to information
that can trigger coordinative activities for decision-making in international tendering system. The environmental scanning of international tendering is done with a view to develop a database which can prototype the cues for information needs and synchronously supply the need information. The logistics of decision-making, the basic designs of international tendering, the expanding developments in computerised informatics, and the dovetailing of all these into a homogeneous information system for modelling activities is presented in this document.