Transaction Processing Systems

Transaction processing systems (TPS) are the basic systems that serve the operational level of the organization. A transaction processing system is a computerized system that performs and records the daily routine transactions necessary to manage business; they serve the organization's operational level. The principal purpose of systems at this level is to answer routine questions and to track the flow of transactions through the organization. Examples are hotel reservation systems, payroll, employee record keeping, and shipping. At the operational level, tasks, resources, and goals are ***predefined and highly structured***. The decision to grant credit to a customer, for instance, is made by a lower level supervisor according to predefined criteria. All that must be determined is whether the customer meets the criteria. Figure (13) depicts a payroll TPS, which is a typical accounting transaction processing system found in most firms. A payroll system keeps track of the money paid to employees. The master file is composed of discrete pieces of information (such as a name, address, or employee number) called data elements. Data are keyed into the system, updating the data elements. The elements on the master file are combined in different ways to make up reports of interest to management and government agencies and to send paychecks to employees. These TPS can generate other report combinations of existing data elements.

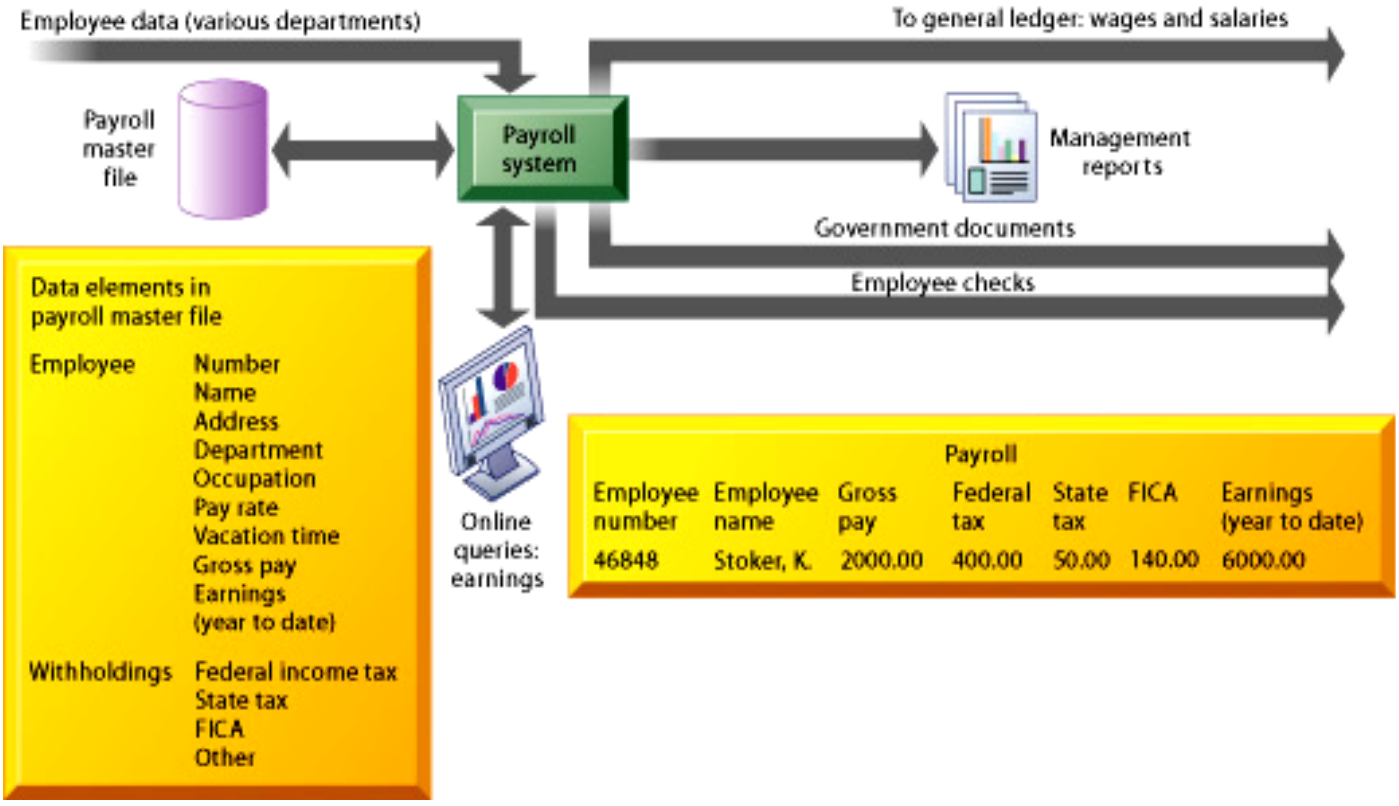

Figure (13) A symbolic representation for a payroll TPS

A payroll system is a typical accounting TPS that processes transactions such as employee time cards and changes in employee salaries and deductions. It keeps track of money paid to employees, withholding tax, and paychecks. Managers need TPS to monitor the status of internal operations and the firm's relations with the external environment.

Management Information Systems

Management information systems (MIS) designates a specific category of information systems serving management-level functions. Management information systems serve the management level of the organization, providing managers with reports and often online access to the organization's current performance and historical records. Typically, MIS are oriented almost

exclusively to internal, not environmental or external, events. MIS primarily serve the functions of **planning, controlling, and decision making** at the management level. Generally, they depend on underlying transaction processing systems for their data. MIS summarize and report on the company's basic operations. The basic transaction data from TPS are compressed and are usually presented in long reports that are produced on a regular schedule. Figure (14) shows how a typical MIS transforms transaction level data from inventory, production, and accounting into MIS files that are used to provide managers with reports. In the system illustrated by this diagram, three TPS supply summarized transaction data to the MIS reporting system at the end of the time period. Managers gain access to the organizational data through the MIS, which provides them with the appropriate reports.

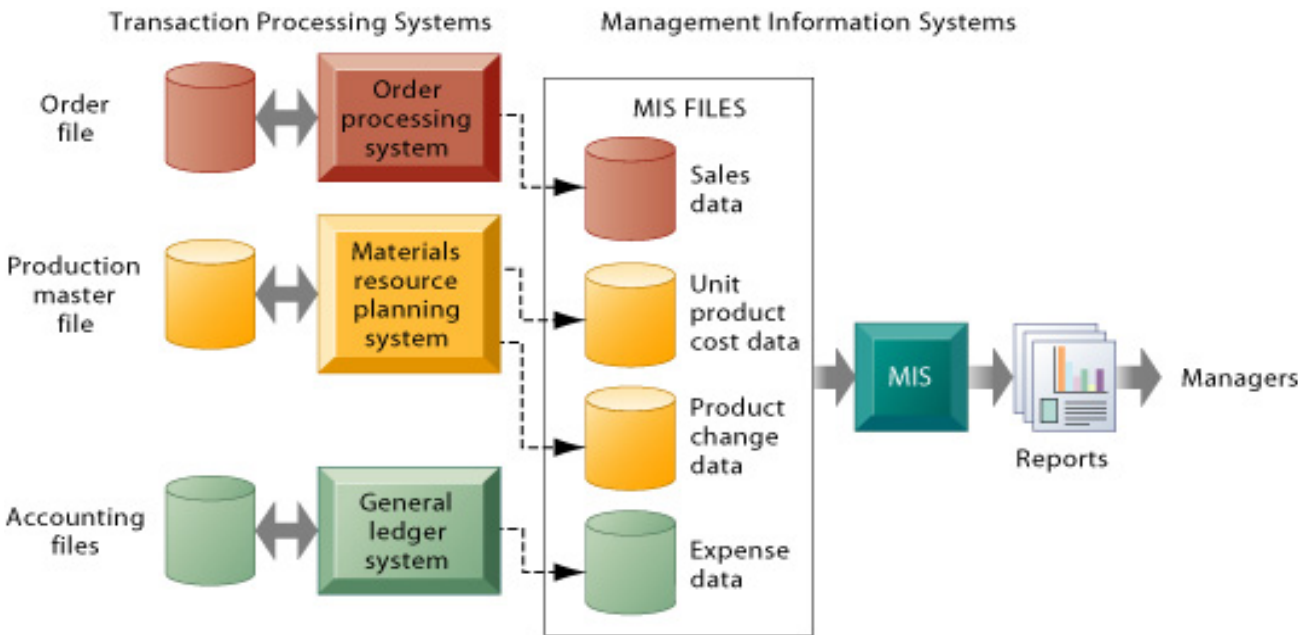

Figure (14) How MIS's obtain their data from the organization's TPS

MIS usually serve managers primarily interested in weekly, monthly, and yearly results, although some MIS enable managers to drill down to see daily or hourly data if required. MIS generally provide answers to routine questions that

have been specified in advance and have a predefined procedure for answering them. For instance, MIS reports might compare total annual sales figures for specific products to planned targets. These systems are generally not flexible and have little analytical capability. Most MIS use simple routines such as summaries and comparisons, as opposed to sophisticated mathematical models or statistical techniques.

Decision-Support Systems

Decision-support systems (DSS) are information systems located at the organization's management level that combine data and sophisticated analytical models or data analysis tools to support semi-structured and unstructured decision making. Decision-support systems also serve the management level of the organization. DSS help managers make decisions that are unique, rapidly changing, and not easily specified in advance. They address problems where the procedure for arriving at a solution may not be fully predefined in advance. Although DSS use internal information from TPS and MIS, they often bring in information from external sources, such as current stock prices or product prices of competitors.

Clearly, by design, DSS have more analytical power than other systems. They use a variety of models to analyze data, or they condense large amounts of data into a form in which they can be analyzed by decision makers. DSS are designed so that users can work with them directly; these systems explicitly include user-friendly software. DSS are interactive; the user can change assumptions, ask new questions, and include new data.

An interesting, small, but powerful DSS is the voyage-estimating system of a subsidiary of a large American metals company that exists primarily to carry bulk cargoes of coal, oil, ores, and finished products for its parent company. The firm owns some vessels, charters others, and bids for shipping contracts in the open market to carry general cargo. A voyage-estimating system calculates financial and technical voyage details. Financial calculations include ship/time costs (fuel, labor, capital), freight rates for various types of cargo, and port expenses. Technical details include a myriad of factors, such as ship cargo capacity, speed, port distances, fuel and water consumption, and loading patterns (location of cargo for different ports).

The system can answer questions such as the following: Given a customer delivery schedule and an offered freight rate, which vessel should be assigned at what rate to maximize profits? What is the optimal speed at which a particular vessel can optimize its profit and still meet its delivery schedule? What is the optimal loading pattern for a ship bound for the U.S. West Coast from Malaysia? Figure (15) illustrates the DSS built for this company. The system operates on a powerful desktop personal computer, providing a system of menus that makes it easy for users to enter data or obtain information.

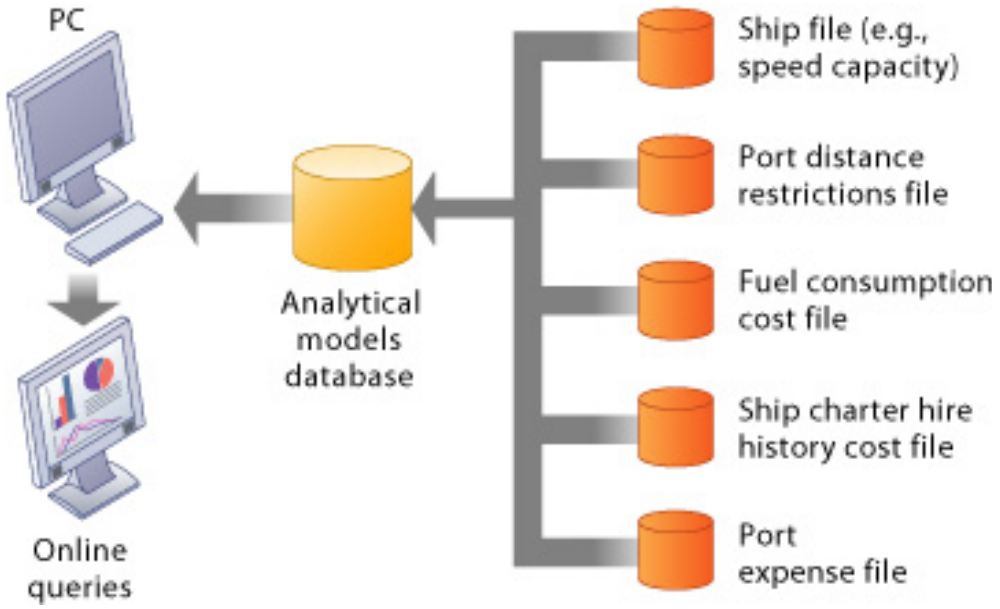

Figure (15) Voyage-estimating decision-support system

Executive Support Systems

Senior managers use executive support systems (ESS) to help them make decisions. ESS serves the strategic level of the organization. They address non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution.

Executive support systems (ESS's) are designed to incorporate data about external events, but they also draw summarized information from internal MIS and DSS. They filter, compress, and track critical data, displaying the data of greatest importance to senior managers.

ESS employs the most advanced graphics software and can present graphs and data from many sources. Often the information is delivered to senior executives through a portal, which uses a Web interface to present integrated personalized business content from a variety of sources.

Unlike the other types of information systems, ESS is not designed primarily to solve specific problems. Instead, ESS provides a generalized

computing and communications capacity that can be applied to a changing array of problems. Although many DSS are designed to be highly analytical, ESS tends to make less use of analytical models.

ESS assist in answering include the following: In what business should we be? What are the competitors doing? What new acquisitions would protect us from cyclical business swings? Which units should we sell to raise cash for acquisitions? Figure (16) illustrates a model of an ESS. It consists of workstations with menus, interactive graphics, and communications capabilities that can be used to access historical and competitive data from internal corporate systems and external databases such as Dow Jones News/Retrieval or Standard & Poor's. Because ESS are designed to be used by senior managers who often have little, if any, direct contact or experience with computer-based information systems, they incorporate easy-to-use graphic interfaces. This system pools data from diverse internal and external sources and makes them available to executives in an easy-to-use form.

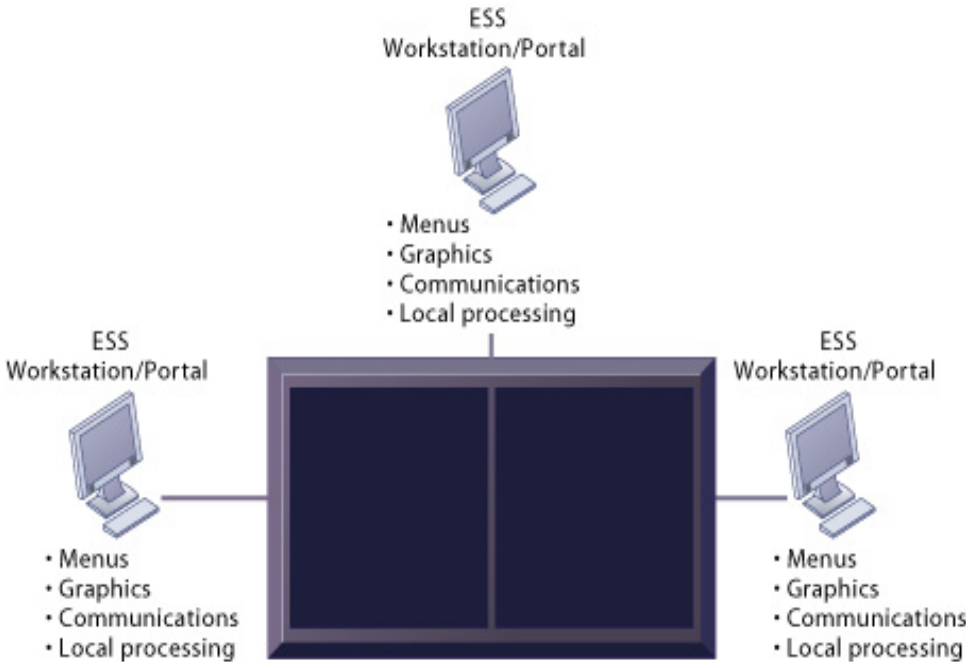

FIGURE (16) Model of a typical executive support system

Relationship of Systems to One Another

Figure (17) illustrates how the systems serving different levels in the organization are related to one another. TPS are typically a major source of data for other systems, whereas ESS is primarily a recipient of data from lower-level systems. The other types of systems may exchange data with each other as well. Data may also be exchanged among systems serving different functional areas. For example, an order captured by a sales system may be transmitted to a manufacturing system as a transaction for producing or delivering the product specified in the order or to a MIS for financial reporting.

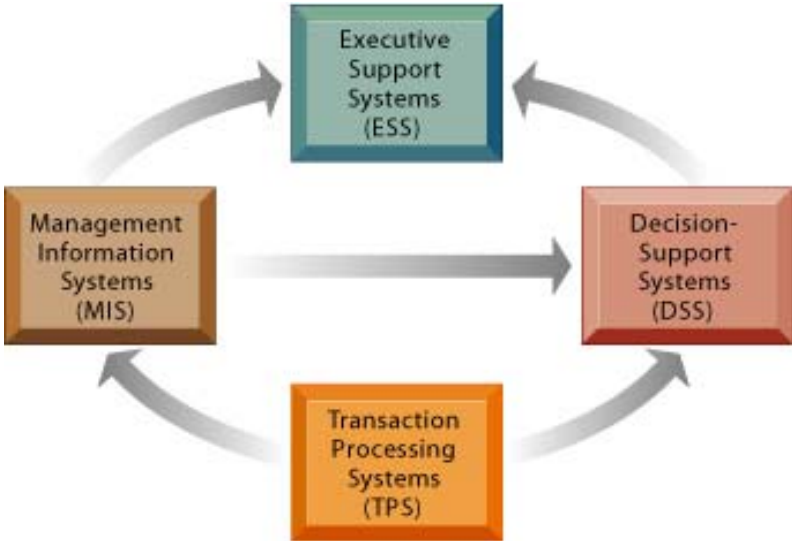

FIGURE (17) Interrelationships among systems

The various types of systems in the organization have interdependencies. TPS are major producers of information that is required by the other systems, which, in turn, produce information for other systems. These different types of systems have been loosely coupled in most organizations. It is definitely advantageous to integrate these systems so that information can flow easily between different parts of the organization and provide management with an

enterprise-wide view of how the organization is performing as a whole. But integration costs money, and integrating many different systems is extremely time consuming and complex. This is a major challenge for large organizations, which are typically saddled with hundreds, even thousands of different applications serving different levels and business functions. Each organization must weigh its needs for integrating systems against the difficulties of mounting a large-scale systems integration effort.