CHAPTER 2

INTRODUCTION TO TRANSACTION PROCESSING

Most of the events which occur in a business can be sorted into just a few groups: acquisition of materials, labor, and capital assets and the subsequent disbursement of payment; conversion of materials into goods and services using labor and assets; and sales of goods and/or services and the subsequent receipt of payment. Understanding what must happen in each of these cycles and what recordkeeping must be done will greatly enhance your understanding of what must occur within an accounting system.

The chapter opens with an overview of transaction processing. Although you are familiar with the terms source documents, journals, and ledgers, you will find the second part of the chapter enlightening. Because we need ways to represent (and therefore visualize) accounting systems, this chapter presents some system documentation techniques. The last section of the chapter introduces the basic ways in which an information system can use computer technology.

The objectives of this chapter are:

- to understand the broad objectives of transactions cycles;
- to recognize the types of transactions processed by each of the three transaction cycles;
- to know the basic accounting records used in transaction processing systems;
- to understand the relationship between traditional accounting records and their magnetic equivalents found in computer-based systems;
- to be familiar with the documentation techniques used for representing manual and computer-based systems; and
- to understand the characteristic differences between batch and real-time processing and the impact of these technologies on transaction processing.
I. An Overview of Transaction Processing

A financial transaction has been defined as:

an economic event that affects the assets and equities of the firm, is reflected in the accounts, and is measured in monetary terms.

Financial transactions are dealt with by the transaction processing system (TPS) which is organized to handle like transactions in a like manner.

A. Transaction Cycles

Three transaction cycles handle the three basic types of transactions: those related to the acquisition of materials, labor, and capital assets and the subsequent disbursement of payment (the expenditure cycle); the conversion of materials into goods and services using labor and assets (the conversion cycle); and the sale of goods and/or services and the subsequent receipt of payment (the revenue cycle). The interaction between the cycles is represented in Fig. 2-1 on page 51. This figure is worth careful study. Chapters 4 to 8 discuss these cycles in detail.

B. The Expenditure Cycle

The start of business activity is reflected in the expenditure cycle the acquisition of the inputs to production: materials, labor, and fixed assets. Since most business transactions are conducted on a credit basis, your text distinguishes between the physical part of the transaction and the financial part. This is an artificial split and is used for clarity only. Considerably more effort is required when transactions are not conducted on a cash basis.

Four subsystems make up the expenditure cycle:

- Purchases/accounts payable involves the ordering of materials and recognizing the related liability;
- Cash disbursements handles the payment on those liabilities;
- Payroll handles both tasks for the purchase of labor; and
- Fixed assets deals with the acquisition, maintenance and disposal of property, plant, and equipment.
C. The Conversion Cycle

*Conversion* implies changing the form of something to make it different. The conversion cycle handles the activities which occur in a business to combine and convert raw materials to produce a product. There are two subsystems.

- *Production* includes all of the activities related to the physical creation of the product, including planning, scheduling, and controlling the product.
- *Cost accounting* handles the flow of costs through the system, the financial effort.

D. The Revenue Cycle

Businesses exchange their goods and services with customers through the revenue cycle. This may involve both cash sales and credit sales. As with the expenditure cycle, physical and financial parts of the transaction must be recognized. There are two fundamental subsystems.

- *Sales order processing* involves order preparation, credit granting, shipping, billing, and recording.
- *Cash receipts* takes cash receipts all the way to the bank.

II. Accounting Records

A. Manual Systems

Manual accounting systems are *paper based*. All of the information entered and organized in the system is written manually. We call the standard bookkeeping system a *double-entry* system because of the way it works.

This part of the chapter presents good discussion and examples of these paper records. For some of you this may be a review. If not, study it carefully.

1. *Documents* are paper forms used to collect information. There are several basic types of documents.

   a. *Source documents* capture the information needed by the system
(e.g., a sales order). See Fig. 2-2, on page 53.

b. *Product documents* are produced by the system (e.g., a paycheck). See Fig. 2-3 on page 54.

c. *Turnaround documents* start life as product documents and later turn around and become source documents to another part of the same system. (Recall the part of your credit card statement that you return with your payment.) See Fig. 2-4 on page 54.

2. **Journals** are called “books of original entry” because a journal is the first place that information is entered into the accounting system. The term comes from the Latin word for day. A journal is sometimes called a “day-book” to emphasize the fact that it is a chronological list of events. All significant information about an economic event, or transaction, appears together in one of the journals. There are several types.

a. *Special journals* are created to handle like transactions that occur in large numbers. Work is reduced by entries taking only one line with columns for the normal accounts used. Many organizations have sales, purchases, cash receipts, and cash disbursements journals. See Fig. 2-6 on page 55.

b. *Registers* are a subgroup of special journals that serve as logs of activities such as payroll or receiving.

c. A *general journal* is used to initially record transactions for which there is no special journal. These are typically nonrecurring or infrequent transactions. Fig. 2-7, on page 56, shows the form with which you are quite familiar. As its name implies, it is general. Any number of accounts can be listed, one to a line.
3. **Ledgers** serve as the filing/sorting mechanism of the system. Extracting information from the journals would be very time consuming and probably very inaccurate. The pieces of information in the parts of a journal entry are sorted, or *posted*, to a second place that collects information about specific accounts. These filing systems are the ledgers. See **Fig. 2-8, on page 57.**

By using the ledger accounts to collect this information, a balance of an account can be obtained without going through the entire journal. There are two basic types of ledgers.

  a. The *general ledger* collects information about the basic types of accounts. **Fig. 2-9, on page 58,** should look familiar.

  b. *Subsidiary ledgers* collect information about individual accounts of a similar type. Each credit customer has an account in the *accounts receivable subsidiary ledger.* The total of all customer accounts appears in the general ledger in a *control account.* The control account and the subsidiary ledger must be reconciled regularly. This serves to double-check both the control account and the sub-ledger. See **Fig. 2-10, on page 59.**

B. **The Audit Trail**

Because financial information is communicated to interested parties outside the organization, it is important that such parties trust the information that is reported. One thing that creates confidence in financial reports, especially annual financial statements, is the opinion of an *independent, unbiased professional* that the statements are, indeed, a fair presentation of the performance and financial state of the firm. In order to arrive at a judgment, an “audit” is conducted–an extensive examination of the accounting system and the information in it–to yield an *audit opinion.* This *audit opinion* is not conferred casually. A great deal of work is done examining the financial system. The ability to trace an item on a financial statement all the way back to the original
entry in a journal and further, to the source document, is referred to as the **audit trail**. This is assisted in manual systems by the information recorded in the “Post. Ref.” columns of journals and registers. The existence of an audit trail in an automated system should not be assumed. It must be designed into the system.

C. Computer-Based Systems

In this part of the chapter you are introduced to some basic file types used in a computer-based system. These types refer to the nature of the information in the file, not to the physical form the file takes. Study the different types. Their meanings may become clearer as you study the material.

- **master file**, which contains account data (e.g., the general ledger)
- **transaction file**, which contains data on transactions which will update the master file (e.g., a sales journal)
- **reference file**, (a price list)
- **archive file**, the record of past transactions (e.g., prior payroll period).

**Fig. 2-11, on page 61,** represents the relationship between the magnetic files in an audit trail. Use the narrative to improve your understanding of the way in which information can be traced.

III. Documentation Techniques

Any individuals who need to know how a system functions can be helped to **visualize** the operation, by what are called **documentation techniques**. Your book describes five of these. We will have a lot of immediate use for the first three, less for the latter two, although they are used extensively in business. Often, your accounting courses do not give students a good feel for the **movement of data** in the system.

A. Entity-Relationship Diagrams

The representation of **entities** (which can be **resources**, **events**, and **agents** as introduced in Chapter 1’s discussion of the REA model), and the relationships between them, is very important. **Fig. 2-12, on page 63,** shows the symbol set used in **entity relationship diagrams (ERDs)**. This figure also serves as a sample ERD for a sales example. Read this material carefully. Recognize that the arrow heads indicate the nature of the relationship, one-to-one, one-to-many, or many-to-many—not the direction of
anything. The examples given in the book are very clear. Study them well. ERDs will be used extensively later in the book.

B. Data Flow Diagrams

*Fig. 2-14, on page 65,* is a sample of a *data flow diagram (DFD)* created using the symbols shown in *Fig. 2-13, on page 64.* This type of diagram is very simple. Only four symbols are used. Only the flow of *data* is shown, not the movement of paper, not the organizational unit(s) involved, and not how the data is processed. DFDs are very good as a starting point for understanding information movement. They will provide an overview of the procedures that occur in each of the subsystems of the transaction cycles to be discussed in later chapters.

C. Flowcharts

The remaining three document types are all forms of flowcharts. Three flowcharts are presented here: *document, system,* and *program.* Document and system flowcharts have several characteristics in common. They use standard symbols [although each type has its own set], are divided vertically according to organizational unit [we will see later that this helps verify separation of duties—a key control technique], and use special connector symbols to jump between points on a single page and from page to page. These are used to minimize the mess that can result if flowlines cross each other.

* As the name implies, *document flow charts* show the flow of documents, or paper, through the system or part. Document flowcharts use the symbols shown in *Fig. 2-16, on page 68.* In the example, a flowchart of a sales order processing system is created. This is a very long example but is very beneficial. Read the narrative slowly and carefully. The completed flowchart is presented in *Fig. 2-19, on page 71.*

One concept that is introduced here is that of *batch processing.* When a business has large groups of similar transactions, processing them in batches is more efficient and more controllable than handling the transactions individually. Think of how most people do laundry.
• **System flowcharts** are used to show the relationships between parts of a system, namely inputs, processes, and outputs. Although typically used for computer-based systems, they can be used to represent manual systems also. The symbol set for system flowcharts is shown in Fig. 2-20, on page 72. Several of these represent the storage medium involved. This section walks through the process of describing symbolically what happens in the sales order department. The end result is Fig. 2-22, on page 75.

• Each program shown in a system flowchart would be supported by a program flowchart which shows the detail of processing. Fig. 2-23, on page 75, shows the symbols used in program flowcharts. Fig. 2-24, on page 76, presents the logic of the edit program shown in Fig. 2-25, on page 77. If you have little programming experience, read this narrative carefully. It will help you understand how the edit task would be performed.

### IV. Computer-Based Accounting Systems

This last part of Chapter 2 introduces computer-based accounting systems, beginning with the differences between the two basic types: **batch systems** and **real-time systems**.

#### A. Differences Between Systems

**Table 2-1, on page 78**, is a table contrasting batch and real-time systems. There are three criteria that differ: time lag (or the time it takes for the system to reflect a transaction), resources used (in terms of complexity), and efficiency (versus effectiveness).

When decisions must be made between the two types of systems (later chapters) we will consider two characteristics: response time (a measure of the lag) and activity ratio (proportion of a file that is processed each time the file is updated). These will help answer the efficiency v. effectiveness issue.
B. Data Structures

The term data structures refers to the physical and logical way that data is arranged in files and databases. Two criteria are involved: the physical organization of the data on a storage device (which can be either sequential or random) and the way in which the data is accessed.

This material is not simple; however, a general understanding of these two issues of organization and access will make it much easier to grasp the topics that follow. Sequential access is easy to grasp. The various methods of direct access should be read carefully. These involve indexing (think of how any text book is indexed). Large files often may be processed in several ways – sequentially in batches, which is very efficient, and occasionally in a random manner. VSAM is the virtual storage access method, which uses indexing to find individual records.

C. Batch Processing Using Sequential Files

Fig. 2-34, on page 89, represents a very simple processing system: batch with sequential files. Read the narrative thoroughly while referring to the flowchart. Take this very slowly. Pay close attention to the importance of having transaction and master files sorted in the same order.

The discussion refers to Fig. 2-35, on page 91, which shows sequential record structures for the hypothetical system. In the figure are the labels (PK) and (SK). (PK) refers to the primary key for the record—the piece of information that uniquely identifies a record, e.g., your social security number is used by the university to uniquely identify your records, not your name or anything else that might have a duplicate. Try to follow the logic of the processing and not get lost in the details.

D. Batch Processing Using Direct Access Files

Most of the work that we do on PCs involves direct access files—stored on disk or CD-ROM and accessed as we need them. The access method simplifies things immensely. [Direct-access means the ability to go directly to the file or record desired—just as most CD players can find any track you wish to play.] Fig. 2-36, on page 92, is almost the functional equivalent of Fig. 2-34. The earlier flowchart does not show the “billing and reporting program.” In reading the narrative, you should see how much simpler things
can be—but there are costs. On the plus side, sorting is no longer needed. On the minus side, the DASD does not provide automatic backup or “old” data in case of disaster. The old stuff is lost when the new file is created. Study the discussion of file updating carefully.

E. Batch Processing Using Real-Time Data Collection

One hybrid using the best of both worlds is to capture data in real-time and process it in batches. This is shown in Fig. 2-39, on page 94.

F. Real-Time Data Processing

What many people think of when computer processing is mentioned is a situation in which data is captured live and processed immediately—*in real-time*. This section of the chapter introduces the concepts of *distributed processing* and *networking*. Study Fig. 2-40, on page 96, carefully and contrast it to Fig. 2-39. This is just an introduction. Don’t be intimidated.

Review Questions for Chapter 2: 1-10, 12, 13, 16-22, 26-29, 32, 33

Discussion Questions for Chapter 2: 4, 5, 7, 11-17