

Chapter 2

A Study of Information System for Sales Order Processing

According to the problem that occurs in the sales order processing system, there need to be a proper information system and database to support the activities in order to become more efficient and effective. Dealing with these problems in a right way is to develop a conceptual design for the information system and database as a starting point where in future the company could further into considering the plans into implementation stage. The theoretical considerations that are used as tools will be identified in this chapter.

2.1 Introduction of Information System

In any organization, information is an essential part for the operations and management. The scope of information system in an organization is limited by the data; the cost of retrieval and distribution; the value of the information to the user; and the capability of humans to accept and act on the information. A computer-based management information system is designed to both reduce the cost and increase the capabilities of organizational information processing.

A management information system is essentially a federation of information systems that are designed to support the functional subsystem of the organization. Each functional subsystem requires application to perform all information processing related to the function although this may involve calling upon a database, a model base and some computer programs, which are common to all functional subsystems. Within each functional subsystem, there will be applications for transaction processing, operation control, managerial control, and strategic planning

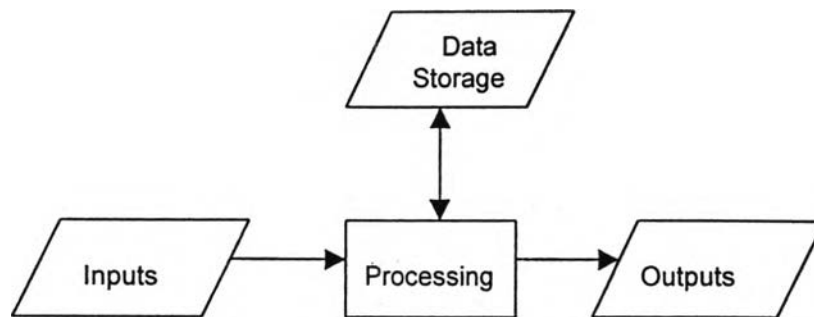


Figure 2.1: Basic information system model

The sales and marketing function generally includes all activities related to the promotion and sales of products or services. The transactions are sales order, promotion orders, etc. The operational control activities include the hiring and training of the sales force, the day-to-day scheduling of sales and promotion efforts, and periodic analyses of sales volumes by region, product, customer, etc. Managerial control concerns comparisons of overall performance against a marketing plan. Information for managerial control may include data on customers, competitors, competitor products, and sales force requirements. Strategic planning for the marketing function involves consideration of new markets and new marketing strategies. The information requirements for strategic planning include customer analyses, competitor analyses, consumer survey information, income projection, demographic projections and technology projection.

2.2 Planning for Information System

Since the information resources environments are complex, therefore to achieve the success, planning is vital. Information systems planning should be developed on the basis of the organization's strategic plan. The information system plan describes the structure and content of the information system and how it is to be developed.

The stages of planning consists of:

- 1) Information systems goals, objectives
- 2) Current capabilities
- 3) Forecast of development
- 4) The specific plan
- 5) Maintenance of the Master Plan

2.3 Information System Analysis

System analysis is an approach to look at an entire problem in context, to systematically investigate the objectives of the system and the criteria for system effectiveness, and to evaluate the alternatives in terms of effectiveness and cost. The results of the analysis is questioning of the objective and criteria, formulation of new alternatives, etc. until the problem, the objectives, the assumptions, and the cost effectiveness of alternatives are clarified.

2.3.1 Synthesis of a management information system structure

The MIS structure has been described in terms of support for decision making, management activity, and organizational functions. These three approaches will now be synthesized into a management information system structure. In order to describe an existing or planned information system, it is essential to use a conceptual framework.

2.3.2 Conceptual structure

The conceptual structure of a management information system is defined as a federation of functional subsystems, each of which is divided into four major information processing components: transaction processing, operational control information system support, managerial

control information system support, and strategic planning information system support. Each of the functional subsystems of the information system has some unique data files, which are used only by that subsystem. There are also files, which need to be accessed by more than one application and need to be available for general retrieval. These files are organized into a general database managed by a data management system.

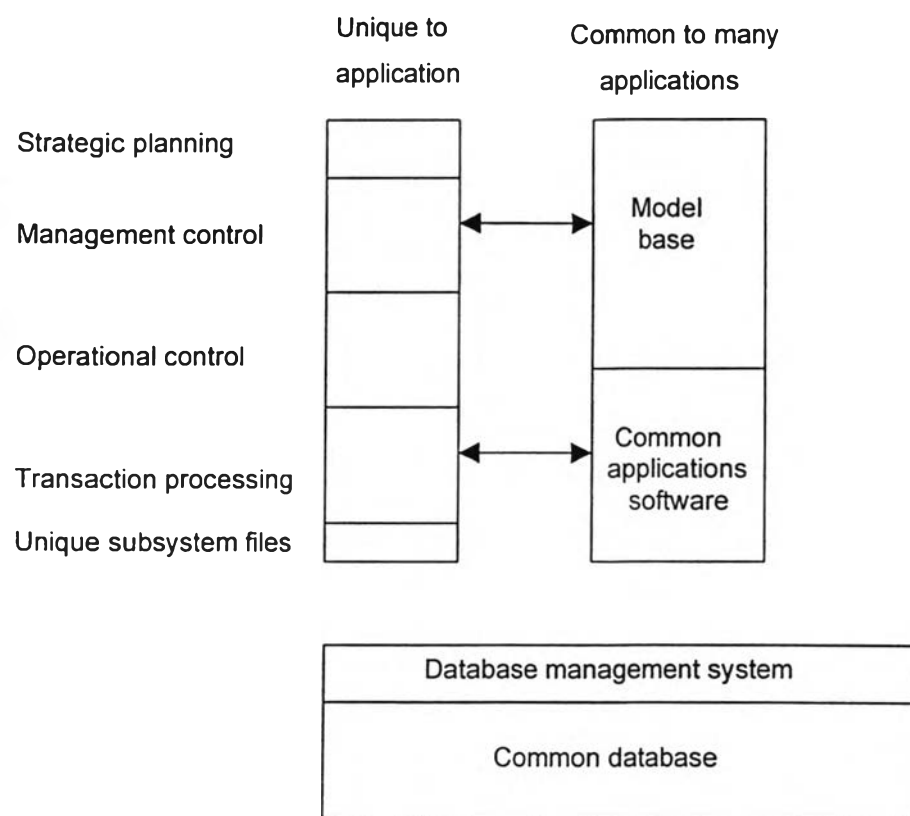


Figure 2.2: The information subsystem for a function

Source: Management Information System, Gordon B. Davis, page43

2.4 Business Process Analysis

Business System Planning (BSP)

The conceptual design of the information system for the sales order processing in the sales and marketing department will be based on the Business System Planning (BSP) methodology by IBM and the Database design methodology by Fred R. McFadden and Jeffrey A. Hoffer.

In the BSP methodology users requirements are identified which are the general information and processing requirements. All these requirements are the first step in the major steps in database design. Data base design is the process of developing data base structures from user requirements for data. It starts with requirement analysis, which identifies user needs (present and future) for data. It then proceeds by translating these user requirements into first a conceptual, then a physical data base design. The resulting design must satisfy user needs in terms of completeness, integrity, performance constraints, and other factors. The diagram is shown in figure2.3.

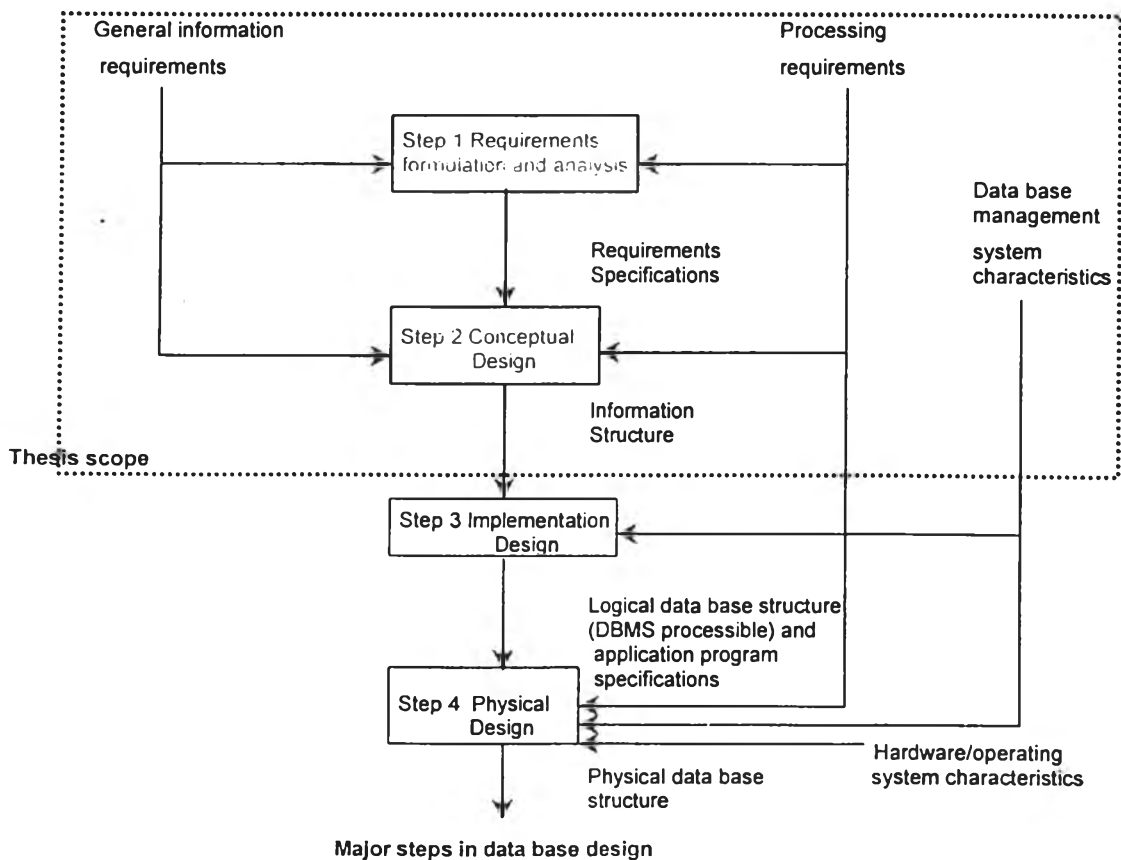


Figure 2.3: BSP methodology

The steps of database design includes:

2.4.1) Requirements Formulation and Analysis

The purpose of requirement formulation and analysis is to identify and describe the data that are required by the organization. The major inputs to this process are user information requirements and processing requirements. These requirements are identified through interviews with users. The output from requirements formulation and analysis is a set of requirements specifications for conceptual design.

2.4.2) Conceptual Design

The purpose of conceptual design is to synthesize the various user views and information requirements into global data base design. This design is called the conceptual data model and may be expressed in several forms. The conceptual data model describes entities, attributes, and relationships and is independent of specific data models and data base management systems.

2.4.3) Implementation Design

The purpose of implementation design is to map the conceptual data model into an internal model that can be processed by a particular DBMS. First, the conceptual data model is mapped into a hierarchical, network, or relational data model. Then DBMS-processible schema and subschemas are developed using the data description language for the DBMS to be used. Implementation design is considered an intermediate step between logical and physical data base design.

2.4.4) Physical Design

Physical design is the last stage of data base design. It is concerned with designing stored record formats, selecting access methods, and deciding on physical factors such as record blocking. Physical design is also concerned with data base security, integrity and backup and recovery.

As mentioning in the scope of research, this thesis will develop a conceptual design of the sales order processing system and would be the first two steps of the database design. The steps include the requirement analysis and then conceptual design. The diagrams below are the steps in the requirement analysis and the conceptual design.

2.5 Information Requirements Analysis

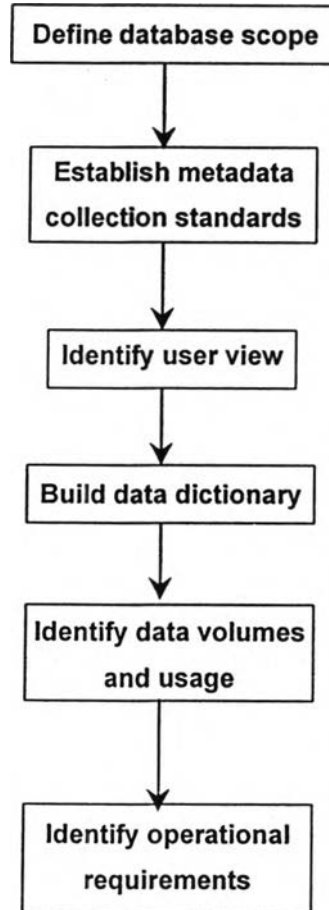


Figure 2.4: Steps in requirements analysis

2.5.1 Conceptual design of Information System

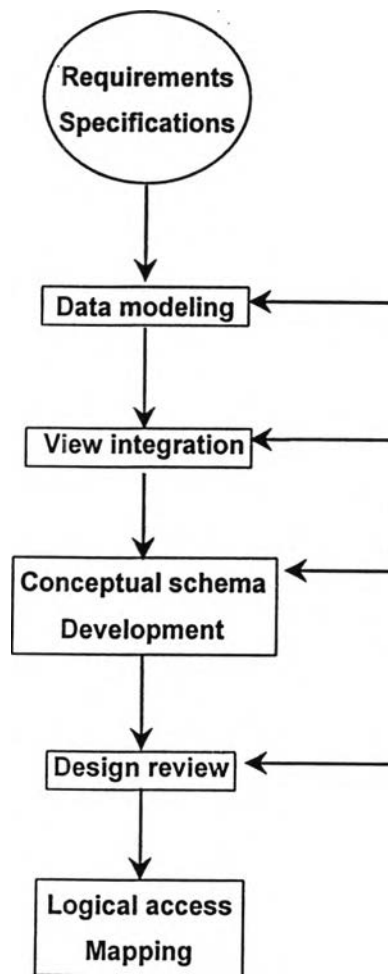


Figure 2.5: Steps in conceptual design

2.6 Analysis of Sales Order Processing

In general, the ideal sales order processing structure consist of:

1. Sales quotes
2. Sales orders
3. Pick/ Packlist
4. Shipments
5. Print invoice
6. Post invoice

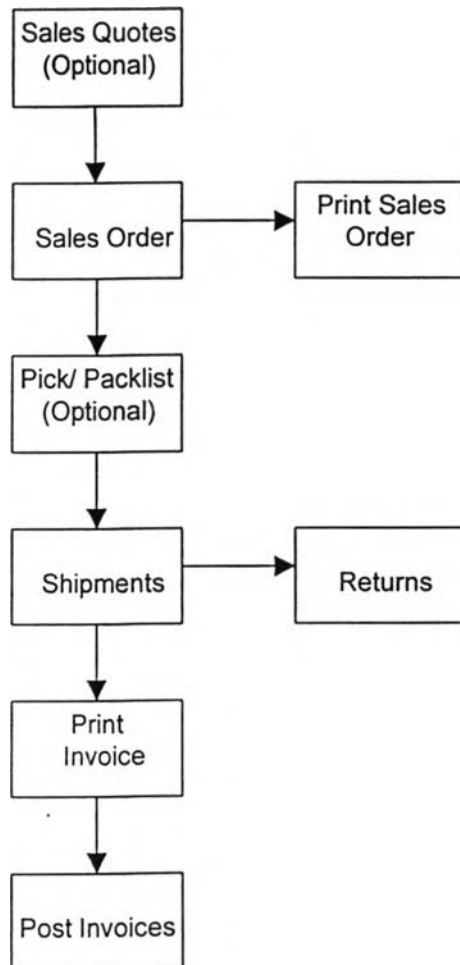


Figure 2.6: Sale Order Process

In recording of an order, there are a lot of use of data both new data and data from prior processing as shown in the table below.

Step	New data entered	Documents produced
Order entry	Sales representative Identification Customer identification Items ordered Quantity of each item	Order acknowledgement Credit exception notice Order register Picking document Item out of stock, to be ordered
Shipping Invoice	Actual quantity shipped Freight cost	Shipping document Invoice register Sales journal Back-order register
Collection	Amounts received Return and allowances	Customers statements Return and allowance register Cash receipts journal Account receivable aging
Analysis		Inventory status Sales by representatives, district, customers, or other category

Table 2.1: New data and data from prior processing in a sales order process

2.7 The IDEF methodology

IDEF or Integrated DEFINition methods are a structured approach to enterprise modeling and analysis. They are used to perform modeling activities in support of enterprise integration.

The original IDEF methods were developed for the purpose of enhancing communication among people who needed to decide how their existing systems were to be integrated which was the result of the U.S. Airforce Program for

Integrated Computer Aided Manufacturing (ICAM). The aim of the ICAM program was to increase manufacturing productivity through the systematic application of computer technology.

There are six variants of the IDEF methodology, which were defined for specific purpose as following:

2.7.1 IDEF0 – Function Modeling Method. It is designed to allow the description of a system's functions through the process of function decomposition and categorization of the relations between functions.

2.7.2 IDEF1 – Information Modeling Method. It is designed to allow the description of the information that an organization deems important to manage to accomplish its objectives.

2.7.3 IDEF3 – Process Flow & Object State Description Capture Method. It is developed to support the structuring of descriptions of the user view of the system.

2.7.4 IDEF5 – Ontology Description Capture Method. It is developed to serve as a method for fact collection and knowledge acquisition.

2.7.5 IDEF1X – Data Modeling Design Method. It is developed to assist in the design of semantic data model.

2.7.6 IDEF4 – Object-Oriented Design Method. It is developed to address the need for a design method to assist in the production of quality designs for object-oriented implementations.

2.7.1 IDEF0

IDEF0 is one of the most widely known tools for functional modeling. It is a top-down hierarchical method, which provides a description of functions and processes in manufacturing.

IDEF0 models are made up of three distinct components, which are diagrams, text and glossary all cross referenced to each other. Each diagram represents activities in a pictorial form and is the most important element of any IDEF0 model. The codes that are used for graphical representation are ICOM (input, control, output, and mechanism) and each diagram can be decomposed indefinitely, depending on the level of detail intended. For each diagram, there are supporting text, designed not repeat information presented in the diagram but rather to annotate and elucidate. Then, a glossary is provided to ensure that the terminology used is meaningful across functional and organizational boundaries.

As IDEF0 is a top-down approach, it is a very appropriate tool for the visualization of complex systems and so provides a structured representation of the functions, information and objects which are interrelated in a manufacturing system.

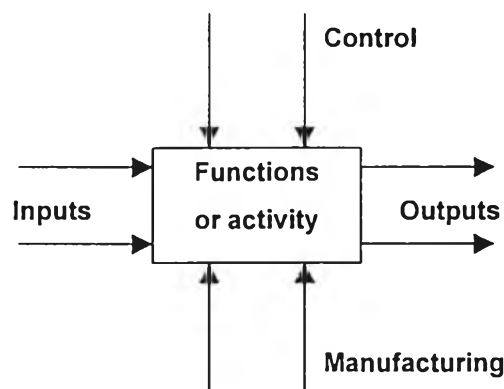


Figure 2.7: IDEF0 model

Inputs and Controls are objects or data required performing an activity as following:

- 1) Controls trigger an activity or modify an activities behavior represents by an arrow enter the box from the topside.
- 2) Inputs are objects or data that are transformed by the activity represent by an arrow enter the box from the left-hand side.
- 3) All activities must have at least one control arrow but may not necessarily have an input arrow.

Objects and data resulting from an activity are outputs and are represented by an arrow leaving the right-hand side of the box. The mechanism by which an activity is performed, is represented by an arrow enter at the bottom of a box.

2.8 Project Management

The system approach may be applied to project management. Each subsystems of the overall system to be developed is carefully defined as to its objectives, interfaces to other subsystems, and time for delivery. Since each subsystem is defined to be relatively independent, its development can also be monitored relatively independently. Subsystems can be assigned to be different members of a project team. Usually, however, a single project manager is responsible for the entire project.

A project planning and control system monitors each subsystem. The progress of each subsystem is followed with respect to such factors as time schedule and performance of completed system components. As changes are made in specifications or time schedules are altered, the project management

system communicates the necessary information to each subsystem that is affected. Planning and control are guided by system objectives. Performance for the project is measure by overall system performance rather than by the performance of the separate subsystems.

2.9 Literature Surveys

1) HANDBOOK of MRP II and JIT: John N. Petroff, [1]

This book provides the hands-on guidance and ready-to-use tools. It helps improving the planning, scheduling and control while avoiding common and costly mistakes. Although, it does not have much contribution to this thesis but it provides some knowledge in the field of manufacturing which is needed for the thesis.

2) MIS (Management of Information System), [2]

This book contributes the over all idea of Management Information System (MIS) in a business. It convinced the importance of using computer as an assisting useful tool in each department of that business. It also shows the application of MIS in each level of business from operational level to management level. The explanation in this book give a very good and broad picture of MIS in an organization but do not provide the details and the method of applying the MIS in the business.

3) Data base Management: Fred R. McFadden and Jeffrey A. Hoffer, [3]

Data base management was developed to meet an unfilled need, which provides a balance between managerial and technical issues. It consists of four parts that are firstly basic concept, secondly data base architecture, thirdly data base design and administration and fourthly data base implementation. The material in this book provides a deeper dimension of the MIS, which is about the data, resource of organizations and the management of that resource.

4) IBM Business Systems Planning: Information Systems Planning Guide, [4]

This book is about Business System Planning (BSP) which is a structured approach to assist a business in establishing an information systems plan to satisfy its near-and long-term information needs. It guides the approach and presenting specific guidelines for conducting a BSP study. BSP could be applied to all institutions in the public sector and all industries in the private sector. This methodology contributes directly to the problem of the company I am up to. It also gives the basic concept of implementing the Information system planning.

5) Business Computer Systems: David M. Kroenke and Kathleen A. Dolan, [5]

The text provides source material for all of the fundamental philosophy and structure of the business computer system. The 3 conceptual based framework are the Five-component model, the System Development process and Systems Concept. It contributes the knowledge of the transaction processing system for the sales and marketing department, which is needed for this thesis.

6) . Computer based production and inventory control: Spencer B. Smith, [6]

This book provides the knowledge about computer based production and inventory control. It covers the selection, implementation, and management of modern computer-based systems of production and inventory control. It includes coverage of the concepts and principles on which the systems are based and also present the subsystems, techniques, and databases, which

comprise these systems. The knowledge provided in this book is essential for the thesis.

7) Management Information Systems; conceptual foundations, structure and development: Gordon B. Davis, Margrethe H. Olson, [7]

The scope in this text is an organizational information system as broadly defined. It includes standard operational information systems, information systems for management control, information systems for strategic management, decision support systems, office information systems and knowledge work support systems. It provides the more theoretical understanding of the information systems which contributes to the case study.

8) MFG/PRO Financial Management Student Guide, Copyright qad.inc 1992, [8]

The text is designed to provide knowledge how to use the MFG/PRO account receivable, account payable and general ledger modules which also includes sales order processing modules. It also covers other MFG/PRO functions as they pertain to accounting for example, invoicing and purchasing functions. The text is very useful since it provide the modules and the flow of the sales order processing subsystem. Besides that, it also illustrate other modules that link with the sales order processing subsystem in order to give an overview of what subsystems are involved.

9) Modern System Analysis and Design; Jeffrey A. Hoffer, Joey F. George, Joseph S. Valacich, [9]

This book covers the concepts, skills, methodologies, techniques, tools and perspective essential for a person to successfully develop information systems. There are revisions of some basic principles and also covers the

themes including clear linkage of all dimensions of systems description and modeling, process, decision and temporal logic and data modeling. It also discussed in sections about the analysis of the system including conceptual data modeling for system requirements which is the main subject for this thesis. In addition, this text presents a scenario of a case study company in U.S.A. to provide clearer understanding.

10) Analysis and Design of Information System, Second Edition; James A. Senn, [10]

The text is designed to provide knowledge of how to analyze and design the information system. The text consists of many of the technical issues and provides examples which even give clearer pictures of how to design and analyze the information system. It has provide more in dept understanding in order to accomplish this study.

11) Information System Concepts for Management, Fifth Edition: Henry B. Lucas, [11]

The scope in this text covers the concepts of information system in terms of management aspects. It provides the overview of an organization and what the concepts of management information system are. It also gives the problems, limitations and approaches when implementing information system in an organization.

12) Managing an Information System: James R. Menching, [12]

This book also provide a lot of management issues concerning information system. It also provides the way to manage information system in an organization efficiently. Besides that, it also provides theoretical aspects in order to manage information system effectively.

13) Principles of Information System, A managerial approach: Ralph M. Stair, [13]

This text covers the principles of information system in terms of managerial approach. It provides broader knowledge and important principles that are needed in order to develop an information system. It is a very useful text and contributes much understanding to this study.

14) Modern Production/ Operations Management: Elwood S. Buffa, [14]

This text provides issues about the production and operation management field. There are technical contents and the importance of the operation functions in a modern organization. It has been useful to the study in terms of giving more understanding of the different types of production in an organization.