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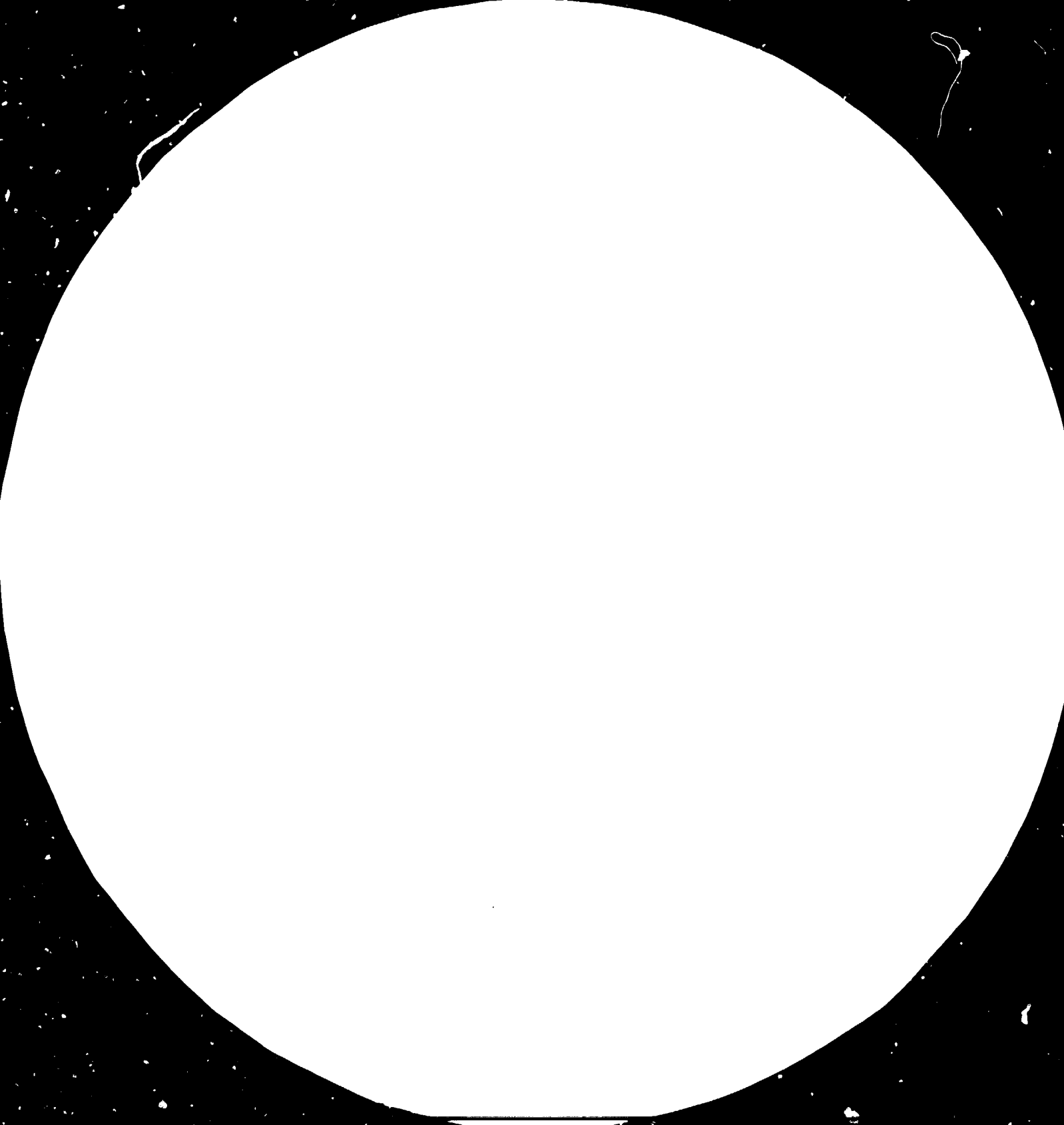
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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

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MANUAL
ON DOCUMENTATION
AND
INFORMATION
SYSTEMS
FOR FURNITURE
AND JOINERY PLANTS
IN DEVELOPING
COUNTRIES

Horacio P. Brion
Luis M. Mariano
María Pizar Brion Carza



UNITED NATIONS

1984

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna

**MANUAL ON DOCUMENTATION
AND INFORMATION SYSTEMS
FOR FURNITURE
AND JOINERY PLANTS
IN DEVELOPING COUNTRIES**



UNITED NATIONS
New York, 1984

PREFACE

The United Nations Industrial Development Organization (UNIDO) has, over the years, provided considerable technical assistance to existing furniture and joinery plants in developing countries. It has also conducted a number of training courses and seminars for managers of small and medium-sized furniture and joinery plants from the developing countries.

In many developing countries furniture and joinery are still produced either at the craft or at the "mechanized craft" level. Even when new equipment is purchased, the machines are considered to be there to serve the workers and not vice versa. Thus, in spite of the introduction of machines, production is often planned and managed as though it were a craft operation. Many factories are owned and managed by individuals who employ their close relatives and have no methodology for planning and controlling production. Because of this situation, owners are not in a position to produce large series, be it for local or for export markets, or to delegate authority to employees, since they have no way of controlling them.

Because UNIDO felt the need for a manual on documentation and information systems for furniture and joinery plants in developing countries, it entrusted a team of Philippino specialists, headed by Horatio P. Brion and comprising also Luis M. Mariano and Maria Pilar Brion Carza, to prepare this Manual. Although the examples given relate to the Philippines, the material is applicable in most developing countries.



Explanatory notes

Dollars (\$) have been used as the unit of currency throughout the Manual for the sake of convenience.

Numbers in parentheses indicate a minus amount (in tables only).

In tables and forms a dash indicates that the amount is nil or negligible.

The following abbreviations are used in this Manual:

DR	Delivery receipt
Inv.	Invoice
DRI	Delivery receipt/invoice
OR	Official receipt
JO	Job order
SO	Sales order
FG	Finished goods
RGR	Returned goods receipt
MRIS	Materials requisition and issuance slip
RR	Receiving report
Inc.	Incorporated
RMR	Returned materials report
DLT	Direct labour ticket
ILT	Indirect labour ticket
DLL	Direct labour loss ticket
VP	Vice-president
Admin.	Administration
Dr.	Debit
Cr.	Credit
RPM	Revolutions per minute
mps	metres per second
Bal.	Balance
I.D. No.	Identification Number

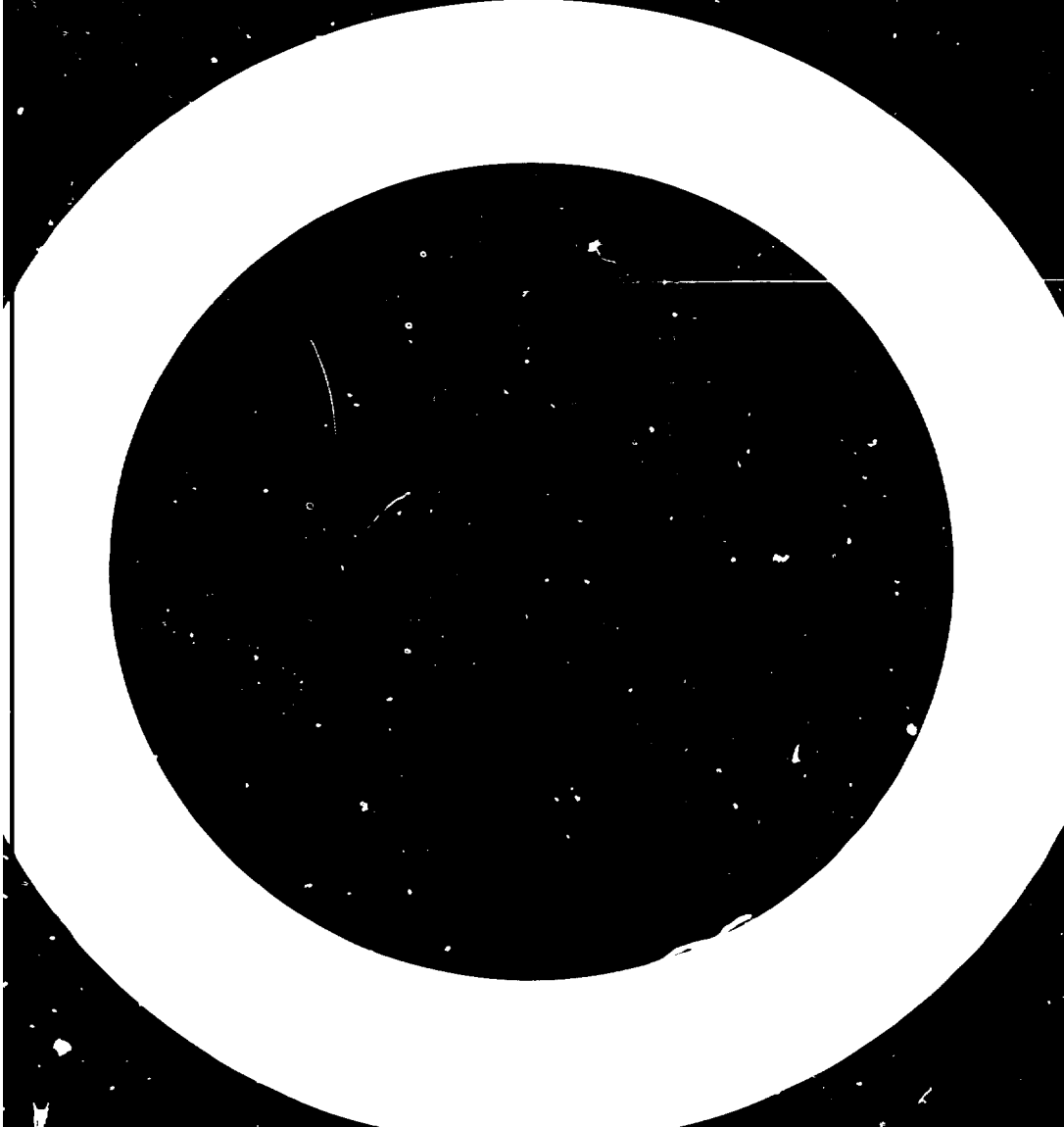
The following technical symbols and abbreviations were used:

dia.	diameter
TMS	time motion study
MTM	method time measurement
2C/Btr	No. 2 common and better (lumber grade)
cu.m./mo.	cubic metre per month (lumber consumption rate)
TBA	tire, battery and accessories, vehicle servicing coverage
3Ø	3-phase, electrical service rating

The views expressed are those of the author and do not necessarily reflect the views of the secretariat of UNIDO.

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The forms and figures in this Manual have been reprinted as received without formal editing.



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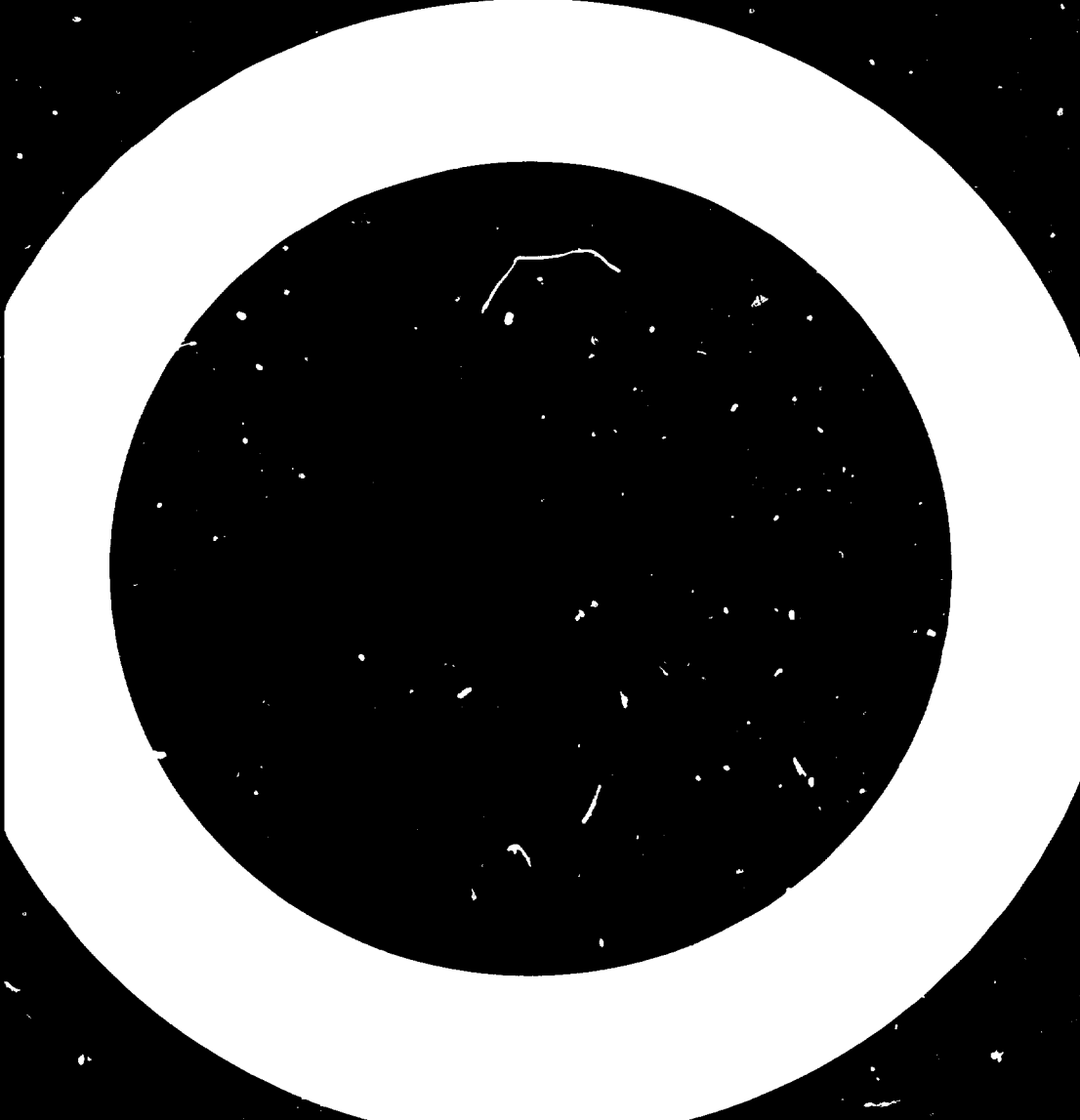
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INTRODUCTION

This Manual was written in the hope of meeting the more common documentation needs in the information systems of small-, medium- and large-scale furniture and joinery firms in developing countries. However, the diversity in the scope of needs and the marked difference in levels of sophistication and type of technologies used in each plant led to an unexpected number and variety of forms presented in this Manual.

An attempt has been made to formulate a documentation and information system for the family-type of small-scale furniture and joinery firm, as presented in chapter II. It is recognized that some family-type small furniture firms may need a system other than that presented in chapter II, particularly small firms that are in the process of expanding their operations. The need to delegate operating responsibilities and authority among key personnel other than the owner-manager of these small firms has become necessary. The owner-manager of such firms may find use for some of the forms presented in latter chapters of this Manual.

Fear of competition from personnel who may decide to establish their own business has been a major barrier to delegation of responsibility and authority by the owner-manager of a family-type small-scale furniture or joinery firm. The security features built into the information system and corresponding documentation presented in this Manual should help allay such fears. These security features include:

(a) Pre-numbering of accountable forms to facilitate immediate check-up and control of sensitive transactions;

(b) Use of different colours for copies of documents to ensure that each copy goes to the intended department or officer of the firm;

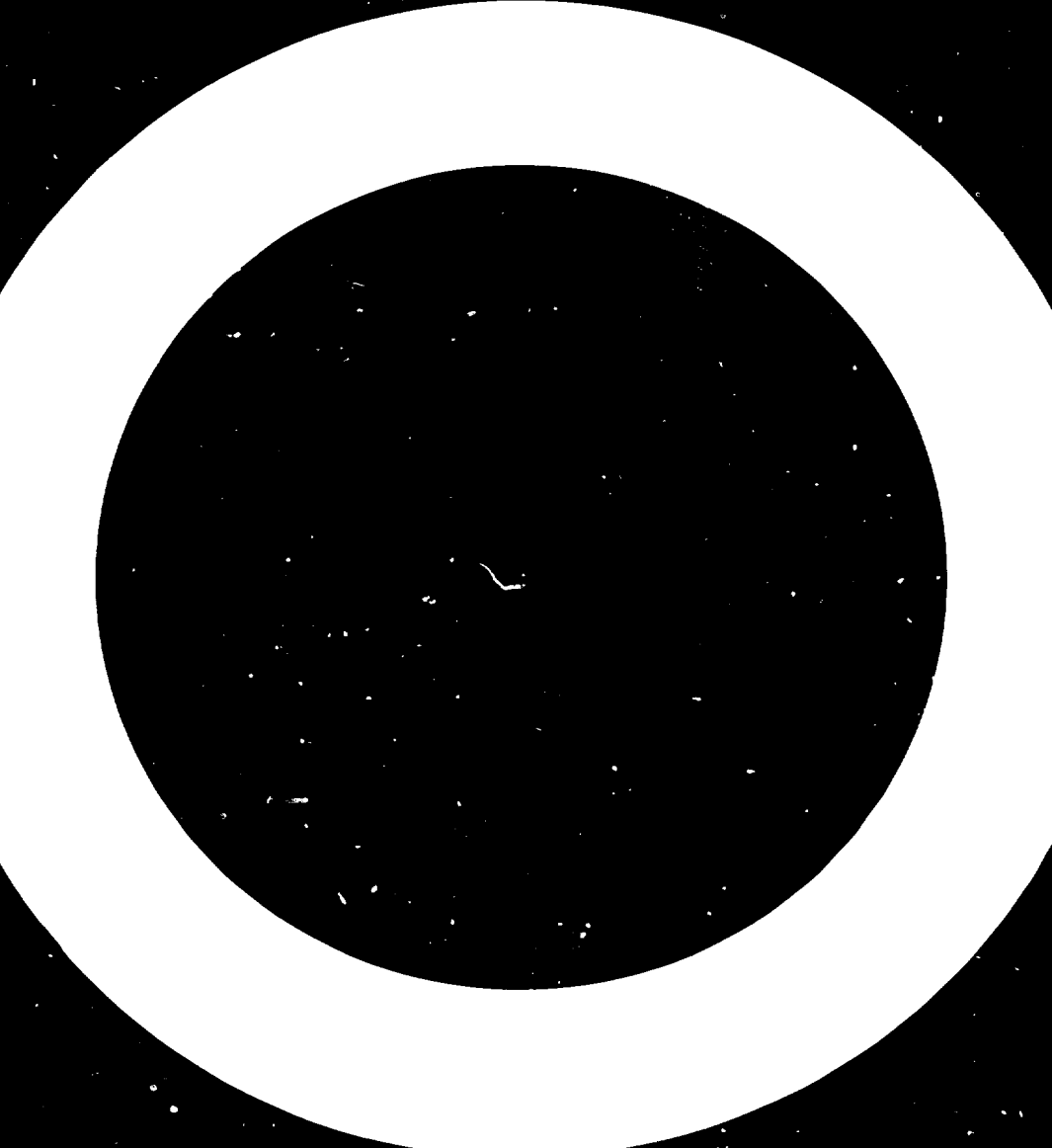
(c) Alternative methods for instances where carbon paper is not readily available;

(d) Methods of dispensing copies of documents to provide an immediate check on the forms already filled out and issued.

The security features also assure that no one in the organization except the general manager or owner would be in possession of all vital information regarding the firm's operations.

The forms and information systems presented in chapters III to IX should be of interest to managers, industrial engineering and supervisory staff of medium- and large-scale furniture and joinery manufacturing firms. Space does not allow for the presentation of all possible forms needed in the production and supporting operations of furniture and joinery firms. However, solutions to the more common documentation needs of medium and large-scale firms are presented, and efforts were made to present a number of variations to the form wherever it would help the readers decide which method would be best suited to and compatible with their firms' operations.

Chapter X is on computerization of information system for the more advanced furniture and joinery firms in developing countries. It is hoped that the guidelines presented in this chapter will be of help to managers of medium- and large-scale firms when they have to decide when, how and what to computerize.



I. OVERVIEW OF FURNITURE AND JOINERY PRODUCTION

A. Objectives

The production of furniture and joinery products involves a number of activities that are geared towards the attainment of certain objectives set by the producer - or imposed on the producer by customers because the product must be produced to suit the customer's tastes and desires. Production costs must be such that the product can be sold at prices the customers are willing to pay. In the case of most small and some medium-sized shops, more than one unit and type of furniture or joinery product must be delivered on or before a specific time agreed upon between the producer and the buyer. In more advanced furniture or joinery manufacturing firms which have attained some degree of product specialization and operate on serial production basis, the main concern is the production of interchangeable product components of the desired quantity and specifications that fit one another to make the complete furniture or joinery product. All parts must be available at the assembly line when needed. Manufacturing becomes more challenging when the quest for profits or returns to the entrepreneur is made the paramount goal of the manufacturing enterprise, whether small, medium or large.

Thus, the objective of the manufacturer in general is to be able to produce furniture and joinery products with the desired quality and quantity, within a specific period of time and at a cost that gives rise to a price that is acceptable to the customer and at the same time that provides satisfactory returns to the entrepreneur.

B. The need for monitoring and control

The success of an enterprise, no matter how small, will depend on the ability of the entrepreneur to keep track of the progress of daily work, the available stock of materials and supplies and the work load of production machinery and equipment. Among other things, the attendance and productivity of workers and employees, the financial position (disbursement and collections) and product deliveries need close daily attention in order to ensure smooth and continuous operations and customer satisfaction.

In a small shop, all the control functions may be done by the entrepreneur. However, as the manufacturing operation develops and becomes more complex, it becomes necessary to hire people to execute some or all of these functions. In medium- and large-scale manufacturing plants, the entrepreneur often does not have the time to obtain first-hand information and must rely on regular reports submitted by employees hired to do the job. Information on the activities and accomplishments of the sales, production, finance and accounting personnel, plant engineering and other component divisions of the manufacturing organization need to be concise, accurate and up-to-date so that the entrepreneur is able to obtain a picture of the actual operations from the reports submitted. The entrepreneur (or the managing deputy) can then take action on existing problems or adopt preventive measures against anticipated problems.

The basic information needs of the entrepreneur or the managing deputy are essentially the same for a small, medium or large furniture or joinery plant. These can be grouped into four categories: labour, materials,

machinery and money. In larger and more complex manufacturing operations, a fifth element, time, is of equal importance. The manner and frequency of reporting, however, will depend upon the needs of management. Among the production parameters that should be checked daily are: amount of production, materials and supplies used, labour usage and machine utilization. Periodic reports are also needed to maintain the desired inventory levels of production materials and supplies, cutting tools, machine spare parts and plant maintenance supplies. Daily reports on expenditures, collections, sales and product deliveries are also needed.

The sources of information are as diverse as the type and quantity of information. Often the same information is needed by two or more units of the organization but in different forms. In many cases, particularly in shops that manufacture different types of furniture or joinery products, a realistic allocation of production costs is needed to obtain reliable profitability pictures for each product. In more advanced manufacturing enterprises, the same information is needed by management in order to make decisions on making or buying a product or some of its components, discontinuing production of certain products or increasing marketing support of products. Efforts to decrease production costs in the face of significant market competition are more effective when based on reliable and up-to-date cost data on the product and its components. Furthermore, the formulation of feasible long-range manufacturing and marketing programmes depends to a great extent on the accuracy of data and information on past and current performance.

There is thus a need for a system that will enable the people using information to interpret the data accurately. The rationalization of information-gathering, collation and distribution activities in the manufacturing enterprise becomes a necessity if the monitoring and control system is to be effective and responsive to the needs of management. The current trend towards the computerization of information- and data-gathering systems is another aspect that must be considered in designing new or improving existing monitoring and control systems. Some features of conventional reporting systems are not adaptable to computerization. It would be advantageous for furniture and joinery manufacturing enterprises with potential for growth to consider the requirements of a computerized system when redesigning or improving the existing monitoring and control system.

C. Overcoming resistance to a monitoring and control system

The success of new monitoring and control systems in furniture and joinery manufacturing plants, particularly in developing countries, depends on how the system is received by the people who must use it. Any change in an existing system brings fears and doubts in the minds of the workers, employees and, in some cases, even the entrepreneur.

Since monitoring and control systems in factories affect the activity of workers, it is to be expected that any effort to introduce a new system or to revise an existing system will meet with some degree of resistance to any change that may alter the daily routine of the workers. Those who plan to install or revise monitoring and control systems in their factories should learn the reasons for workers' resistance to changes in their work routines.

In more advanced small furniture or joinery shops, and even in some medium-sized factories, production activities still revolve around the skills of artisans who have spent years in learning and developing their skills and work techniques. The artisans tend to be secretive and "selfish"; they consider these skills their own and would rather keep the knowledge to themselves, for reasons of job security. Thus, they look at the installation of a monitoring and control system as an intrusion into their secrets and a danger to their means of earning a livelihood. This attitude also pervades among the owners of small and medium-sized shops who were, and probably still are, artisans themselves. Since the installation of a monitoring and control system would bring strangers into their factories and expose their operations to potential or current competitors, the entrepreneur takes more time than is necessary to think about the change.

In large and more advanced medium-sized furniture and joinery plants more resistance to any change in the monitoring and control system is found among the "old-timers", who feel that they are too old to learn new techniques. Workers who are leaders in medium-sized and large factories tend to interpret organizational changes that may be required by a new monitoring and control system as an effort by management to erode their position. Specialists in medium-sized and large factories react in the same manner as artisans and leaders to changes in the monitoring and control system. They feel that their secrets are endangered or that their image among fellow workers will be tarnished by the change in the monitoring and control system. A new system would entail more responsibility and thus more work for factory supervisors.

In addition, workers, supervisors and entrepreneurs may object to changes in the monitoring and control system for economic reasons: a new system, particularly if it involves computerization, would immediately or eventually lead to fewer jobs; a new system would require more paper work, thus subtracting from the workers' productive time; and a new system would add to overhead costs. The low level of literacy of workers in most furniture and joinery plants in developing countries is another factor that makes the owners of small and medium-sized enterprises hesitate to introduce monitoring and control systems in their factories.

Other handicaps to the introduction of monitoring and control systems in the furniture and joinery industry in developing countries include difficulties in obtaining office materials (paper, pens, pencils etc.), machines (typewriters, calculators, adding machines, copying machines etc.) and even clocks, particularly in the less developed countries.

Most of the reasons for objections to the installation or revision of a plant's monitoring and control system are psychological. Therefore, activities should be undertaken long before the actual introduction and installation of the system to prepare the workers to accept the proposed system. Such activities should involve not only the workers but also the supervisory, technical support and management staff of the organization. The new system must first be "sold" to the people before it is finalized or installed. Knowledge of the characteristics of the workers as a group will help system designers to come up with a system that is more suitable to the situation.

A technique for introducing work systems that has proven successful in many industrial and commercial undertakings is the involvement of the workers themselves, even as early as the preliminary studies, to determine the type of monitoring and control system to be adopted. Workers would not be likely to resist or object to a system that they had helped to plan and establish. More participation from supervisory staff in the preliminary studies on the monitoring and control system is also advantageous, for they are in the best position to point out the existing plant conditions that may adversely affect the successful introduction and implementation of the proposed system.

Preparatory activities should also include programmes for workers on the principles and objectives of the proposed system. Honest objections or comments from the workers and supervisors to certain features of the proposed or existing system should be welcomed by management: the worker is made to feel a part of the system and will thus be more willing to participate in the implementation of the system. Workers and supervisors should also be made aware that the proposed changes are needed to keep the company competitive on the market, thus assuring continued operations, which in turn means that workers can keep their jobs or perhaps look forward to better paying jobs.

The above suggestions for overcoming resistance to a monitoring and control system are general and should be modified to suit local conditions.

II. DOCUMENTATION NEEDS AND INFORMATION SYSTEMS IN SMALL FAMILY-TYPE FURNITURE AND JOINERY SHOPS

A. Characteristics of the small family-type shop

Most small-scale furniture and joinery shops in developing countries are family owned and operated and employ less than 10 regular workers who are usually family members. Other relatives or friends are called upon to lend a hand at peak times. The head of the family is usually the entrepreneur and more often than not started his career as an artisan furniture or joinery maker.

The beginnings of many firms in the medium- and large-scale sectors of the industry in developing countries can be traced to these small family-type furniture or joinery shops. However, the growth of these small shops to medium- and large-scale factories is accompanied by frustrations and hardships in developing an adequate and effective information system and the corresponding documentation, which needs to be responsive to the changing needs of the enterprise. This chapter is devoted specifically to the information system and documentation needs of the family-type furniture or joinery shop and should provide the small-scale entrepreneur with a starting point and a guide to the rationalization of monitoring and control activities that can increase with the growth of the enterprise.

1. Organization and personnel

The functional responsibilities in the small family-type shops are handled by the entrepreneur who, more often than not, performs all the major functions (management, selling and manufacturing) in the enterprise. In many cases, however, one of the shop workers is designated head of the production unit but with very limited authority. Thus, from the operational point of view, only two units may be distinguished in the small family-type furniture or joinery shop: (a) the management unit and (b) the production unit. Sales and collection, purchasing, finance and accounting are directly discharged by the entrepreneur, while production, machinery and plant maintenance and stock-keeping are performed by the production unit.

2. Manufacturing facilities

The shop is often located behind the display store, if there is one, and both are sometimes housed in the residence of the entrepreneur. The total floor area of the building is very small, usually around 100 m², with about half of it occupied by the production area. A number of work benches and production fixtures are often crowded into this small area with barely enough passage ways for the movement of workers and work in progress.

Equipment in the small shop consists primarily of hand tools. Occasionally, there are small shops with a few pieces of machinery, usually a table saw and a drill press. More prosperous small shops might have a small planer and a dovetailing fixture with a detachable hand routing tool or a universal woodworking machine. Carpenters (the usual name for workers in the industry) have to improvise assembly jigs and fixtures to facilitate their work on a product. Often the jig or fixture is torn down after completion of a product or adapted to make another jig or fixture for the next product to be assembled.

The normal work load of a small shop would be one order (composed of a few pieces of furniture or joinery items) at a time. At peak times two or three orders at most are processed simultaneously.

The carpenter works on the product from machining to assembling, while finishing and upholstery operations are done by other workers. The workers are usually paid on the basis of work done (sub-contract system). Cash advances for the sub-contracted work are common in the industry, so that little is usually left to be paid to the worker when the contracted job is completed.

3. Other characteristics

Down payments are usually required for goods ordered, with the balance payable upon delivery of the goods. Purchases of materials and supplies are made on a cash basis. The inventory of materials and supplies is just enough for the orders on hand. The inventory of finished goods usually consists of display items only because limited financial capacity prevents the entrepreneur from maintaining a larger inventory of finished goods. Completed orders for furniture or joinery items are delivered to the customer as soon as they are finished. The customer usually pays for the goods upon delivery, so the entrepreneur usually delivers the products as promptly as possible to the customer. Only a few small shops have vehicles for delivery purposes; the usual practice is to hire delivery vehicles when the need for them arises. If a small shop can afford to maintain a delivery vehicle, it is used for both business and family errands.

B. Information system for a small family-type shop

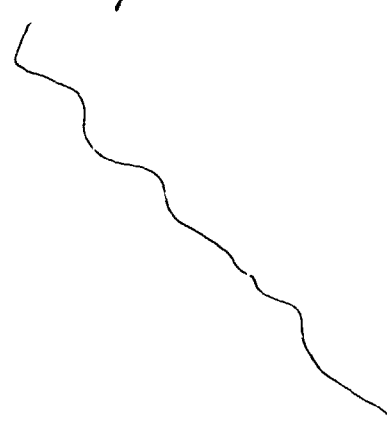
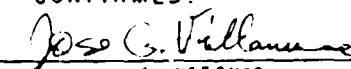
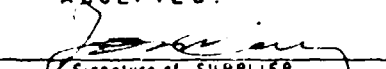
Entrepreneurs of small firms that conduct business in the same small place nevertheless need to monitor and control the activities of the firm, especially when they are out of the shop selling products or collecting payments for items delivered to customers.

The present section provides the entrepreneur with a tool to monitor and control the activities of the firm; at the same time it could be a starting point for the development of a rational and organized information system that would be responsive to the needs of growing operations. The forms presented in this chapter are filled out according to the information needs of a hypothetical small furniture shop, owned and operated by Mr. J. F. Cruz, which eventually grew to become the Expertise Woodworks Corporation, whose information system and documentation needs are used as examples throughout the present Manual.

1. Sales/production order (form No. 1)

The sales/production order, has the multiple functions of a sales order, a production order and a sales contract.* This is possible because Mr. Cruz personally discharges the selling and production functions of his firm. There is therefore no need for other documents to relay the information that a sales contract has been signed and that production activities for the order should be initiated.

*The sales order becomes a legally binding contract the moment the client signs it.

EXPERTISE FURNITURES 1747 QUEZON BLVD., QUEZON CITY, METRO MANILA				
SALES / PRODUCTION ORDER				
Date: <u>4 April</u> , 19 <u>75</u>			SPO No. <u>75-011</u>	
Please PRODUCE and DELIVER the items listed below, on or before <u>30 April</u> , 19 <u>75</u> , to the following customer:				
Name and Address of Customer: <i>Mr. and Mrs. Jose C. Villanueva</i> <i>123 Gen. Malvar St., Rainbow Sub-division,</i> <i>Diliman, Quezon City</i> <i>Metro Manila</i>			Terms of Payment: <i>50% Down Payment;</i> <i>Balance, C.O.D.</i>	
Quantity	Unit	Description of Product	Unit Price	Amount
1 (one)	Set	Dining Room Set: 1 Table with six (6) chairs, upholstered seats; and one (1) Buffet Cabinet; clear lacquered walnut finish; as per attached drawings.	\$750. ⁰⁰	\$ 750. ⁰⁰
				
(SEVEN HUNDRED FIFTY DOLLARS)				
Attachments No. of Sheets		TOTAL AMOUNT ----- \$750. ⁰⁰		
Presentation Drwgs. 3		Above Order, Terms & Conditions CONFIRMED:		
Full-Size Drawings 2				
Working Drawings 8				
Sketches -				
		Above Order, Terms & Conditions ACCEPTED:		
		 Signature of CUSTOMER		
		 Signature of SUPPLIER		
		JOSE C. VILLANUEVA Name of CUSTOMER in Print		
		JOSE F. CRUZ Name of SUPPLIER in Print		

Three copies of the form are prepared and distributed as follows: (a) the original is kept in the master files of the firm; (b) one copy is given to the customer; and (c) one copy, usually with the price and amount of the contract blocked out, is used as a guide in the production of the furniture items in the shop. Complete sets of drawings, if available, are attached to the original and production copies, while presentation drawings only are attached to the customer's copy.

The form is arranged in the following manner:

(a) Date. The date the agreement was signed by the customer and the furniture maker;

(b) Sales/production order number. The control number assigned to the order;

(c) Due date. The expected delivery date of the order to the customer;

(d) Name and address of customer. The complete name and address of the customer. A sketch of the customer's location is sometimes drawn on the back of the third copy as a guide for delivery of the goods;

(e) Terms of payment;

(f) Quantity and unit. The quantity ordered, usually written in words below the figure to avoid confusion, and the unit of measure;

(g) Description of product. A complete description of the products ordered. In the example, the furniture pieces that compose a set are enumerated;

(h) Unit price and amount. In the example, the price agreed upon is for the set of eight pieces. In other cases, however, the amount is obtained by multiplying the unit prices by the number of furniture pieces on order. To avoid mistakes, the total amount of the order is written in words at the bottom of the column in addition to the figures written in the total amount block;

(i) Attachments and number of sheets. Drawings or sketches of the products ordered, as agreed upon with the customer. Usually only presentation drawings or sketches are presented to the customer for approval. Pictures of furniture from magazines, catalogues or newspapers are sometimes used to illustrate the furniture design to be copied. Full-size and working drawings are prepared in the shop after the sales contract has been closed;

(j) Signatures of customer and supplier. The customer and the supplier sign the sales/production order in the respective blocks to indicate their agreement on the details, terms and conditions of the order.

2. Delivery receipt/invoice (form No. 2)

The delivery of a completed order is documented by a delivery receipt, which also serves as an invoice. Almost all orders are cash-on-delivery, which is often necessary owing to the meagre finances of small firms.

FORM No. 2

EXPERTISE FURNITURES 1747 QUEZON BLVD., QUEZON CITY, METRO MANILA				
DELIVERY RECEIPT / INVOICE				
Date: <u>27 April</u> , 19 <u>75</u>			ORI No. <u>75-016</u>	
Sold and Delivered to: <u>Mr. & Mrs. JOSE C. VILLANUEVA</u> Address: <u>123 Gen. Malvar St., Rainbow Subd., Diliman, Q. C.</u>				
Quantity	Unit	Description of Product	Unit Price	Amount
1 (one)	Set	Dining Room Set: one (1) Table with six (6) chairs, upholstered seats; and one (1) Buffet cabinet; clear lacquer walnut finish; as per approved drawings.	\$750. ⁰⁰	\$ 750. ⁰⁰
		Less: Down Payment - (375. ⁰⁰)		
(THREE HUNDRED SEVENTY-FIVE DOLLARS)				
Reference SPO No: <u>75-011</u>			TOTAL AMOUNT----- \$ <u>375.⁰⁰</u>	
Delivered by: <u>R. C. Santos</u> Driver, Expertise Furniture		Prepared by: <u>F. A. Talon</u> Clerk, Expertise Furniture		RECEIVED above listed goods in GOOD order & condition: Customer: <u>JOSE C. VILLANUEVA</u> <u>123 Gen. Malvar St., Rainbow Subd., Q. C.</u> By: (Mrs.) <u>Gloria A. Villanueva</u> <u>123 Gen. Malvar St., Rainbow Subd., Diliman, Quezon City</u>

Form No. 2 is arranged as follows:

- (a) Date. The date the delivery is made;
- (b) Delivery receipt/invoice number. The control number assigned to the delivery receipt/invoice;
- (c) Sold and delivered to. The name of the customer. The customer's complete address is written on the next line;
- (d) Quantity and unit. These entries should be exactly the same as the corresponding entries in the sales/production order form No. 1;
- (e) Description of product. This entry should be exactly the same as the corresponding entry in the sales/production order form No. 1;
- (f) Unit price and amount. The entries should be exactly the same as the corresponding entries in form No. 1. The amount of down payment is entered below the amount entry;
- (g) Reference sales/production order number. The control number on the sales/production order;
- (h) Total amount. The balance to be paid upon delivery, determined by subtracting the down payment from the amount of the order. The total amount is written in words at the bottom of the block containing the description of the product;
- (i) Delivered by. The name and position in the supplier firm of the person making the delivery;
- (j) Prepared by. The name of the person who prepared the delivery receipt/invoice;
- (k) Received. The customer's acknowledgement. The name and address of the customer is written in this block. The person receiving the goods signs on the space provided, and the address is also indicated below the signature.

3. Official receipt (form No. 3)

All payments to the firm are documented on an official receipt, as follows:

- (a) Official receipt number. The control number assigned to the official receipt, usually pre-printed;
- (b) Date. The date payment is received;
- (c) Name and address of the person paying. These entries are written on the first and second blank spaces of the receipt;
- (d) Amount paid. Entered in words. The corresponding figure is written on the next blank space;

FORM No. 3

EXPERTISE FURNITURES
1747 QUEZON BLVD.,
QUEZON CITY, METRO MANILA

OFFICIAL RECEIPT

No. 75-016

Date: 4 April, 19 75

RECEIVED from Mr. & Mrs. Jose C. Villanueva, 123 Km. Makina St.,
Rain Bow Sub-division, Diliman, Quezon City the amount of
Three Hundred Seventy-five only Dollars (\$ 375.00)
in (partial, ~~full~~ payment for: one (1) set Dining Room Furniture,
eight (8) pcs., SPO No. 75-011.

FORM of PAYMENT:

Cash: \$ 375.00

Check:

Total: \$ 375.00

for: JOSE F. CRUZ

(Mrs.) Fe V. Cruz
Signature of Proprietor/Manager

(Mrs.) FE V. CRUZ
Name in Print, Proprietor-Manager

(e) Partial or full payment. The non-applicable word is crossed out to indicate whether the payment being made is partial or fully covers the agreed amount due;

(f) Form of payment. The form of payment, whether in cash or by cheque;

(g) Signature. The person receiving the payment signs to acknowledge receipt of payment. In the sample form No. 3, payment was received by the wife of the proprietor-manager, who was authorized to receive payments for and on behalf of the firm.

4. Materials and labour usage record (form No. 4)

A record of the materials and labour used in the manufacture of furniture products is necessary in order to keep track of actual costs. Form No. 4 is an example of a document for that purpose. Entries in the record are made daily by the general purpose clerk of the firm. A record is prepared for each product type included in an order. The entries in form No. 4 refer to the six dining chairs that form part of sales/production order No. 75-011. Corresponding records are also prepared for each of the product types included in the order (a record for one table and another record for one buffet cabinet).

The form is filled out in the following manner:

(a) Product. The description of the product and the quantity;

(b) Sales/production order number. The sales/production order number that appears on form No. 1;

(c) Customer. The name of the customer who ordered the product;

(d) Date. The date materials were issued and labour used for the production of the furniture item;

(e) Materials used. The description and quantity of material issued for the production of the item. On days when no material was issued for the product, a line is drawn on the blank space;

(f) Labour used. The type of work performed on the product, the name of the worker and the number of hours worked on the product on the given day;

(g) Checked by. The person who checked the materials and labour used on the product signs in this column. In the sample form, the owner, Mr. Cruz, did the checking of the entries in the other columns.

5. Production status (figure 1)

A blackboard painted with the production status format shown in figure 1.A can be used for the daily monitoring of production. Entries are written on the board with a piece of chalk and are up-dated at the end of each working day.

The production status board shown in figure 1.A is filled out as follows:

EXPERTISE FURNITURES
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

MATERIALS & LABOUR USAGE RECORD

Product: Dining Chairs (6 pcs.)

SPO No.: 75-011

Customer: Mr. & Mrs. J. C. VILLANUEVA

Date	Materials Used		Labour Used			Checked By
	Description	Quantity	Work Performed	Worker	No. of Hours	
1975 7 April	Lamin Plywood, 4mm x 1220 x 2440mm	1 Sheet	Carpentry	C. Cruz	7	J Cruz
"	Narra, Kilm-Dried Lumber 50mm x 100mm x 3660mm	6 pcs.	Carpentry	A. Vela	7	J Cruz
8 April	—	—	Carpentry	C. Cruz	8	J Cruz
"	—	—	Carpentry	A. Vela	8	J Cruz
10 April	Finishing Nail, 50 mm.	½ Kg.	Carpentry	C. Cruz	8	J Cruz
"	Woodscrew, No. 10 x 38mm	144 pcs.	Carpentry	A. Vela	8	J Cruz
"	Weldwood Glue	¼ kg.	—	—	—	J Cruz
11 April	Leatherette, Tan, Plain	2 m.	Carpentry	C. Cruz	8	J Cruz
"	—	—	Carpentry	A. Vela	8	J Cruz
"	—	—	Upholstering	B. Reyes	4	J Cruz
12 April	—	—	Carpentry	C. Cruz	8	J Cruz
"	—	—	Carpentry	A. Vela	8	J Cruz
"	—	—	Upholstering	B. Reyes	8	J Cruz
13 April	Sandpaper, 3/0, Barast	½ m.	Carpentry	C. Cruz	6	J Cruz
"	—	—	Carpentry	A. Vela	8	J Cruz
"	—	—	Upholstering	B. Reyes	6	J Cruz
15 April	Clear Lacquer	4 lit.	Carpentry	A. Vela	8	J Cruz
"	Sanding sealer	4 lit.	Varnishing	R. Reyes	7	J Cruz
"	Lacquer Thinner	4 lit.	Varnishing	P. Cruz	7	J Cruz
"	Woodstain, Walnut	1 lit.	—	—	—	J Cruz
"	Wood filler, Walnut	½ lit.	—	—	—	J Cruz
16 April	—	—	Varnishing	R. Reyes	8	J Cruz
"	—	—	Varnishing	P. Cruz	8	J Cruz

EXPERTISE FURNITURES										
PRODUCTION STATUS			As of: <u>15 April</u> , 19 <u>75</u>							
SPO No. / Customer	PRODUCT	Quantity	Work Assigned	Name of Worker	TODAY			ACCUMULATED		
					Scheduled	Actual	Balance	Scheduled	Actual	Balance
75-011 J. Villanueva	Dining Chairs	6 (six)	Carpentry	A. Vela/C. Cruz	2	2	xxx	6	6	xxx
			Painting	R. Reyes/P. Cruz	2	1	(1)	2	1	(1)
			Upholstering	-	-	-	6	6	xxx	
"	Dining Table	1 (one)	Carpentry	C. Cruz	1	-	(1)	1	-	(1)
			Painting	-	-	-	-	-	-	
			Upholstering	-	-	-	-	-	-	
"	Buffet Cabinet	1 (one)	Carpentry	C. Reyes/A. Vela	1	-	(1)	1	-	(1)
			Painting	-	-	-	-	-	-	
			Upholstery	-	-	-	-	-	-	
			Carpentry							
			Painting							
			Upholstering							
			Carpentry							
			Painting							
			Upholstering							

Figure 1. Production status
A. Daily

(a) As of. The date;

(b) Sales/production number and customer;

(c) Product. The description or name of the product being manufactured. In the example, three items under sales/production order No. 75-011 are in production in the shop: dining chairs, a dining table and a buffet cabinet;

(d) Quantity. The number of pieces of each item being manufactured, in both figures and words;

(e) Work assigned. The type of work being done or scheduled for each item;

(f) Name of worker. The name of the worker or workers assigned to each type of work on the product;

(g) Today. This block is composed of three columns: scheduled, referring to the quantity of each product expected to be completed on the day; actual, indicating the quantity of each product actually completed; and balance, indicating the difference between the scheduled and the actual production. The mark xxx indicates that production met the scheduled target for the day. When actual production is less than the scheduled quantity for each product and operation, the entry is enclosed by parenthesis (). If available, different coloured chalks may be used, for example, white for xxx, red for production behind the schedule and green for production ahead of schedule;

(h) Accumulated. The production performance for the order. Data are in the three columns entered in the same manner as for the "today" block but the figures are for accumulated production performance.

In figure 1.B the same data are posted in the appropriate columns and give an overview of the production status for the entire week.

6. Cash advances record (form No. 5)

A record of cash advances made to workers is kept on form No. 5. The form gives a running account of the payments and balances for services rendered by workers. A record is made for each worker and is filled out as follows:

(a) Name of worker. The name of the worker to whom cash advances were given;

(b) Type of work. The type of work usually assigned to the worker;

(c) Date. The date on which the cash advance was made;

(d) Sales/production order. The sales/production order number and the name of the customer;

(e) Sub-contract amount. The amount agreed upon between the worker and the employer for the particular sales/production order. The amount will

change only when the record refers to another sales/production order;

(f) Cash advance. The amount advanced to the worker on the date indicated in the first column;

(g) Balance. The amount remaining to be paid to the worker under the sales/production order indicated in the second column;

(h) Acknowledgement. The worker to whom the cash was advanced signs in the column to acknowledge receipt of the cash advanced on the indicated date and the balance due after the cash advance was made.

This form would not have to be printed. A ruled pad paper or a notebook could be used for the purpose.

7. Worksheet - monthly costs summary (form No. 6)

A monthly summary of costs provides the small entrepreneur with a tool for monitoring and controlling production operations. The summary also helps in the preparation of business reports which are usually required by local laws. Furthermore, the summary may be used as a guide in pricing future orders.

The material and labour costs entries in form No. 6 were taken from data provided in the materials and labour usage record (form No. 4). The overhead costs are estimates based on the overhead participation in the total costs of similar products previously manufactured by the enterprise.

The costs worksheet is completed as follows:

(a) For the month ending. The date of the last day of the month covered by the worksheet;

(b) Sales/production order number. The code numbers of all the sales/production orders completed or started during the month. In form No. 6, one order (SPO-75-011) was completed and two other orders (SPO-75-012 and SPO-75-013) were started but not yet completed by the end of the month;

(c) Work-in-process, beginning. The value of work in process for each sales/production order at the beginning of the month. In the example, all three orders were started during the month and there was no order pending at the end of the preceding month (31 May 1975). Thus, there are no entries in this column in form No. 6;

(d) Charges. The entries in the materials and labour columns are taken from the materials and labour usage column in form No. 4 and the cash advances record, form No. 5. Entries in the overhead column are estimated on the basis of previous production of similar furniture items. In the example, the overhead charges amount to about 11% of the direct costs (materials and labour charge) for SPO-75-011 and SPO-75-012 and about 17% of direct costs for SPO-75-013.* The sum of the materials, labour and overhead charges for each sales/production order is entered in the totals column;

*The estimated overhead rates vary depending upon the rates established during previous production runs of similar furniture items. Hence, if there are five (5) furniture items, there would be five (5) different overhead rates.

(e) Work-in-process, to-date. The value of all the charges from the date that work on the sales/production order was started in the shop. In the example, work on all the three orders was started during the month, hence, the figures in the total charges column were extended to the work-in-process, to-date column. Where work on an order was started during the preceding month(s), the entries in this column should be larger than the corresponding entries in the total charges column;

(f) Work-in-process, credit, and finished goods, debit. The value of the order that was completed during the month. The example shows that SPO-75-011 was completed during the month. Hence, the total work-in-process, to-date entry for the sales/production order was carried over to these two columns: the finished goods account was debited and the work-in-process account was credited with the value of the completed goods. Thus, there is no entry in the work-in-process, ending, for this particular sales/production order. Another order, SPO-75-012, was started later in the month, and the records show that part of the goods ordered (valued at \$76.00) under the sales/production order was completed by the end of the month. Thus, the work-in-process account was credited with \$76.00, while the finished goods account was debited with the same amount. The entry \$175.90 is made in the work-in-process, ending, for SPO-75-012, which is determined by subtracting \$76.00 from the work-in-process, to-date account. A third order, SPO-75-013 was started in the last week of the month and nothing was completed by the end of the month. Thus, no entries are made in the finished goods, debit and work-in-process, credit columns, and the amount of work-in-process, to-date is carried on in the work-in-process, ending column.

(g) Totals. The totals for each column are made to close the summary at the end of the month.

More details on the preparation and use of the worksheet - monthly costs summary are given in the section on the cost accumulation process in chapter VIII.

III. THE FLOW OF INFORMATION BETWEEN UNITS

A. Flow of information between sales and operating units in small and medium-sized firms

The most basic and frequently used type of information transmitted from sales to other operating units of the enterprise are related to: (a) products sold; (b) products delivered to customers; (c) collections; and (d) status of finished goods inventory. Periodic reports on total sales, types of product sold, amounts collected and still receivable and sales forecasts for specific periods in the near future are also useful to management. In small-scale furniture or joinery shops where the marketing and manufacturing functions are performed by the entrepreneur and where both marketing and manufacturing offices are usually located within the same building or compound the documentation of sales information is not as organized and formal as it is in larger organizations where the marketing operations are separate and at some distance from the other operating units. Nevertheless, the basic flow of information is essentially the same for small-, medium- and large-scale operations.

The following sections trace the flow of information and corresponding documentation between sales and other operating units, based on the functional organization chart shown in figure 2. In firms where the organizational set-up differs from that shown in figure 2, the information and documentation flows would have to be changed to correspond to the manner in which the basic functions are assigned to operating divisions.

1. The sales order (form No. 7)

The sales order, once it is received and confirmed at the manufacturing end provides the basis for the production and service units of the enterprise to start activities to process and complete the order.

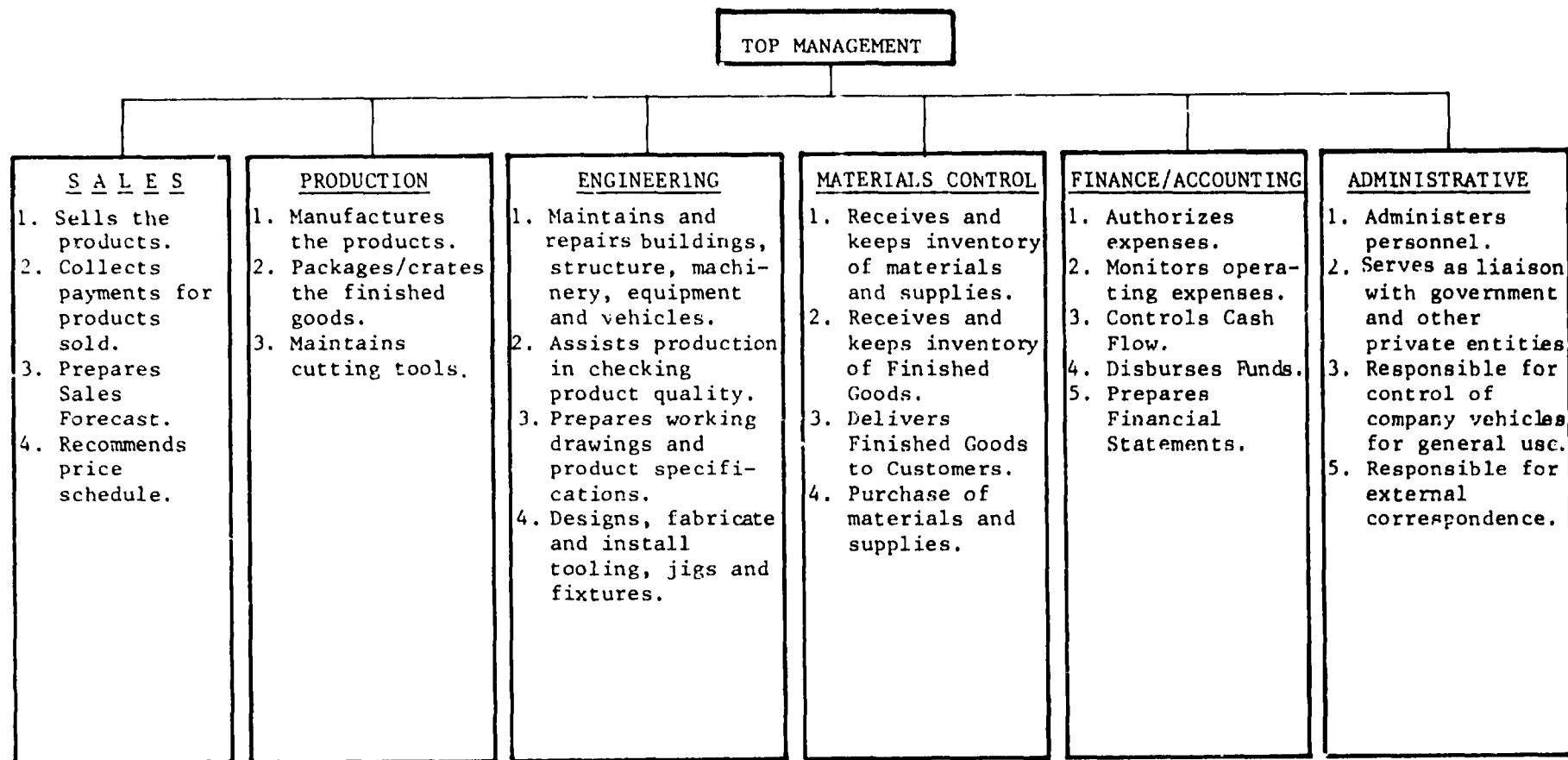
The main information required in the sales order includes: the name and address of the customer, the quantity and description of the products to be manufactured (or delivered), when and where to deliver the products, the unit and total prices of all product types ordered and the terms of payment for the order.

The sales order form is pre-numbered to facilitate the monitoring and control of sales. The total value of the order should be written in words and the sales order must be signed by an officer (usually the sales manager) authorized by the enterprise's management.

The format of form No. 7 could be used in small-, medium- and large-scale operations. The entries are for an order for 1,000 sets of folding tables with folding stools. The form is filled out in the following manner:

(a) Control number. For reference purposes. It can be manually written, stamped or pre-printed as long as consecutive numbers are used for control purposes;

(b) Date. The date the sales order is prepared;



Note: In small and medium size firms, Production, Engineering and Materials Control are combined into one Division.

Figure 2. Basic functional organization chart
furniture and joinery manufacturing firms in developing countries

EXPERTISE WOODWORKS CORPORATION
 1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

SALES ORDER

S.O. - 82/075

Date: 30 January 1982

To: **The Manufacturing Division, Attn: The Production Manager**
EXPERTISE WOODWORKS CORPORATION

Please deliver the following article(s) to:

Name and address of Customer:

ROXANNE TRADING CORPORATION
 Broadway Centrum, Aurora Blvd.,
 Quezon City, Metro Manila

Terms of Payment:

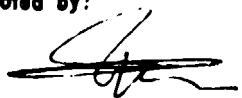
CASH-ON-DELIVERY

Quantity	Unit	Product Description	Unit Price	Amount
1,000	sets	<p>Model GS 3636 Folding Table</p> <p>Each set is composed of one(1) Table and four(4) stools.</p> <p>All materials to be Philippine Mahogany, 8-12% moisture content; finished in natural semi-gloss lacquer.</p> <p>Packed in corrugated fiberboard boxes, one(1) set/box</p> <p>Assembling instruction sheet to be furnished with each pack.</p> <p>Description of contents to be indicated on outer flaps of box with country of origin also marked.</p> <p>Schedule Date of Delivery : On or before 30 May 1982.</p> <p>(TWENTY THOUSAND U.S. DOLLARS ONLY)</p>	\$20/set	\$20,000.00

Copy Distribution:

- Production
- Sales
- File

Order noted by:



SALES MANAGER

Date:

Order confirmed by:



PRODUCTION MANAGER

Date:

(c) To. The division or department that will produce the goods; or the name of the firm that will manufacture the product(s) if the job is sub-contracted;

(d) Name and address of customer. The customer's full name and address where the product(s) will be delivered;

(e) Terms of payment. How the customer will pay for the delivered product(s);

(f) Quantity. The total number of units on order in figures;

(g) Unit. The appropriate standard unit. When the word "sets" is used as the unit, the quantity and description of the items that make up one set of the product should be indicated in the product description column;

(h) Product description. The complete description of the product(s), model number (if any), drawing reference, materials to be used, moisture content of lumber required, finish and finishing materials to be used; packaging (in unit or bulk packs, crating, palletizing); special assembly or set-up instructions sheets; marking on box containers to indicate country of origin; and target schedule of delivery. (Note that the total amount of the order is written in words immediately after the description.);

(i) Unit price;

(j) Amount. The total amount of the order is determined by multiplying the unit price by the number of units on order and is written in figures in the amount column;

(k) Copy distribution. Copies of the sales order are distributed to company units indicated by check marks in the corresponding squares. "File", in this example, refers to the central files of the company which are in the accounting department, operating under the finance division. Thus finance has advance information on sales orders as the accounting department prepares the cash flow forecast. Production does not keep a copy of the confirmed sales order but is issued a job order;

(l) Order noted by. The signature of the head, sales unit, authorizing the order and the date the sales order was signed;

(m) Order confirmed by. The head of the production (or recipient unit) signs on the indicated space and enters the date the sales order was signed to signify conformity. In case any changes are needed, the sales order is returned to the sales unit without the manufacturing head's signature, with an appropriate note for the required changes.

In small furniture or joinery shops, where such staff or service functions as purchasing, materials control, production scheduling and control, warehousing and shipping are carried out by only a few people, the sales order follows a very simple flow with a minimum amount of paperwork. Since the entrepreneur, more often than not, is the head of both marketing and manufacturing units, the sales order is automatically used as the order to produce. Production instructions, in the form of drawings, bill of materials and all data used to cost the product when the offer was made or when, in the

case of production for stock, the sales price was determined are transmitted together with the sales order to the factory, which starts production as soon as the required materials are available. In this set-up, however, feeder data on the various factors affecting production are not readily available for study, review and analysis. Therefore, follow-up work is usually done in person by the entrepreneur.

The situation is very different in the case of medium-sized and large plants. In medium-sized plants, service functions to production exist as distinct units of the organization, although in a limited scope; in large factories, the small details pertaining to activities affecting production are readily available for review and analysis.

The "sales order processing" section of figure 3 shows the general flow pattern that is followed by the sales order after the sales unit has prepared the order under the framework of the basic organizational chart shown in figure 2.

If the folding table with folding stools are regular products of the firm, delivery to the customer is made from inventory of the product. However, in the case of sales order SO-82/075, the folding table with folding stools is not a regular product and therefore is not in the regular finished goods inventory of the firm. Delivery to the customer has to wait for complete manufacture of the product. Production activities are initiated on the basis of a job order, which is prepared to correspond to the sales order.

2. The job order (form No. 8)

In small-scale industries where there are no staff assigned to perform specialized service functions, the customer's purchase order is usually used as the authority for the entrepreneur to start production.

However, in medium- and large-scale industries where such defined service functions as accounting, engineering, quality control, materials control etc. are established and where work areas are too large and widespread for one entrepreneur to cover, such specialized service functions depend on a job order as the authorization to proceed.

Form No. 8 is a suggested format for the job order. The entries refer to sales order SO-82/075. The job order is prepared as follows:

(a) Control number. The control number may be handwritten, stamped or pre-printed, whatever is convenient and economical. A master control listing should also be maintained to keep track of what job order numbers have been issued. Accounting normally monitors the controls;

(b) Customer. The customer for whom the product(s) are being manufactured. If the product is a standard item being manufactured to increase the firm's inventory, "for stock" is inserted instead of the customer's name;

(c) Address. The address of the customer, the place where the products are to be delivered;

(d) Quantity;

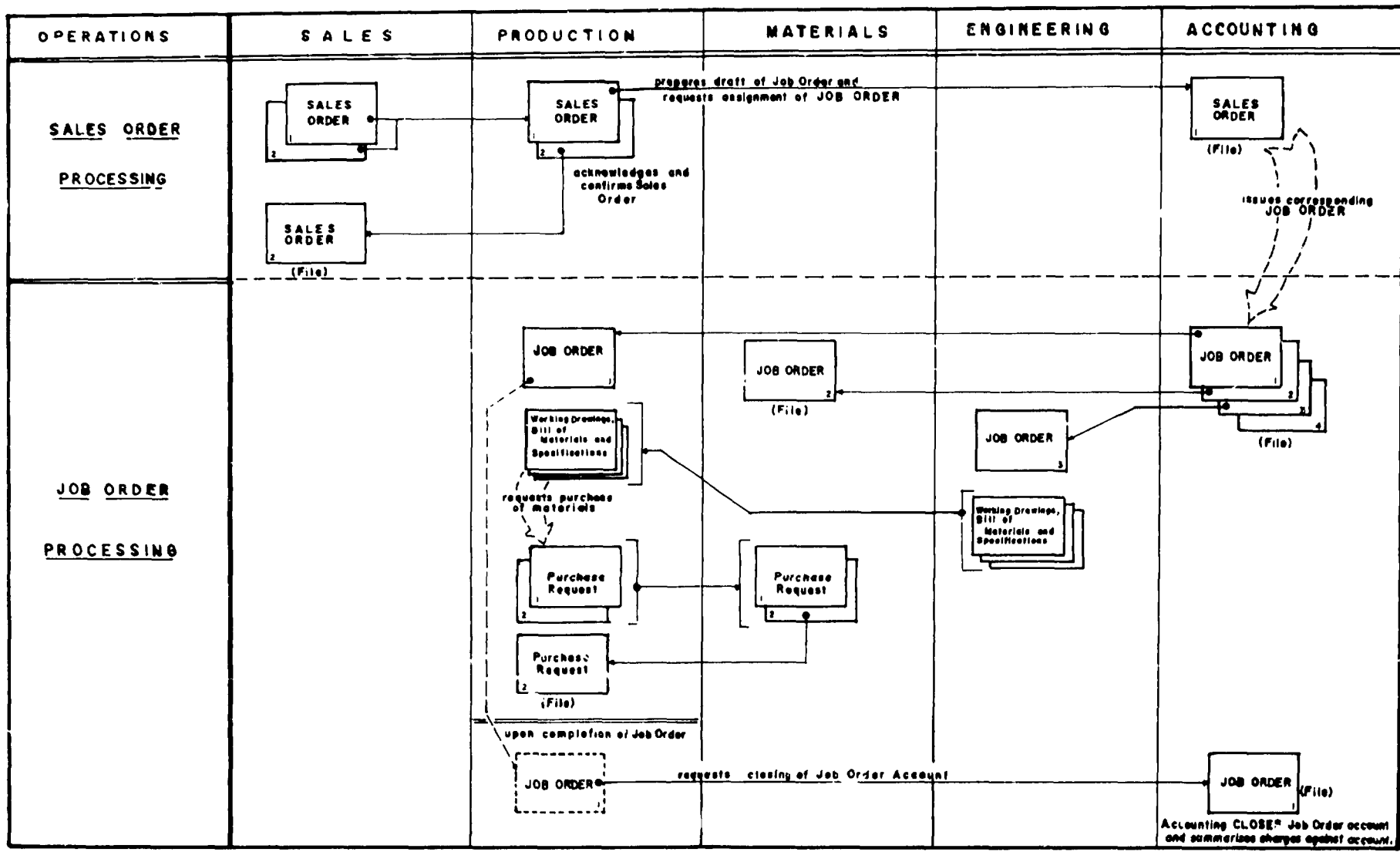



Figure 3. Flow diagram of sales orders and job orders

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

Quantity		Unit	Description of Product(s)	
1,000		sets	Model GS 3636 Folding Table Each set consists of : One (1) piece Folding Table Four (4) pieces Folding Stools <u>Refer to Drawing for Model GS 3636 for details.</u>	
Types of Materials to be used:		All solid Philippine Mahogany, 8-12% Moisture Content		
Type of Finish:		Natural, semi-gloss lacquer		
Unit Packaging:		Pack one (1) set/box, Corrugated Fiberboard box.		
Crating / Palletizing		N O N E		
Special Instructions: Instruction sheet required for setting up of folding furniture. One (1) sheet per box. Mark outer flaps of box with description and quantity of contents and country of origin.				
Estimated Starting Date	Estimated Completion Date	Delivery Schedule:		
2 May 1982	24 May 1982	On or before 30 May 1982. Partial Delivery Allowed.		
Copy Distribution: <input type="checkbox"/> Production <input type="checkbox"/> Materials Control <input type="checkbox"/> Engineering <input checked="" type="checkbox"/> Accounting		Refer to SALES ORDER Number: SO - 82/075	Prepared by: <i>R. R. Cruz</i> Production Clerk Date: 2 Feb., 1982	Approved by:  CONTROLLER Date: 5-7-82

JOB ORDER


J.O. - 82/135

Customer:

ROXANNE TRADING CORPORATION

Address:

Broadway Centrum, Aurora Blvd., Quezon City, Metro Manila

Quantity		Unit	Description of Product(s)	
1,000		sets	Model GS 3636 Folding Table Each set consists of : One (1) piece Folding Table Four (4) pieces Folding Stools <u>Refer to Drawing for Model GS 3636 for details.</u>	
Types of Materials to be used:		All solid Philippine Mahogany, 8-12% Moisture Content		
Type of Finish:		Natural, semi-gloss lacquer		
Unit Packaging:		Pack one (1) set/box, Corrugated Fiberboard box.		
Crating / Palletizing		N O N E		
Special Instructions: Instruction sheet required for setting up of folding furniture. One (1) sheet per box. Mark outer flaps of box with description and quantity of contents and country of origin.				
Estimated Starting Date	Estimated Completion Date	Delivery Schedule:		
2 May 1982	24 May 1982	On or before 30 May 1982. Partial Delivery Allowed.		
Copy Distribution: <input type="checkbox"/> Production <input type="checkbox"/> Materials Control <input type="checkbox"/> Engineering <input checked="" type="checkbox"/> Accounting		Refer to SALES ORDER Number: SO - 82/075	Prepared by: <i>R. R. Cruz</i> Production Clerk Date: 2 Feb., 1982	Approved by:  CONTROLLER Date: 5-7-82

(e) Units. The standard unit of measure of the product - pieces, sets etc.;

(f) Description. The full name of the product to be manufactured. The description should include: the model number; overall dimensions if any; the reference drawings; the raw materials to be used in the manufacture of the products, such as wood, wood species and the required moisture content. If the wood needs further lamination, the veneer facings to be used should be indicated. Under finishing, the type of finishing materials to be used and the customer's preferred finishing sequence and colour should be indicated. The type of packing (unit or bulk) and type of container (boxes or containers) should be noted. Other special requirements, such as markings on the box, crates or pallet, should be indicated. When required, especially for knocked-down furniture products and folding units, the special instructions should indicate that instruction sheets should be included with the packaged product;

(g) Estimated starting date;

(h) Estimated completion date;

(i) Delivery schedule;

(j) Copy distribution;

(k) Sales order number;

(l) Prepared by and date. The name and signature of the accounting officer preparing the job order and date when the job order was prepared;

(m) Approved by. The name and signature of authorized officer who approves the job order.

Copies of the approved job order are distributed to production, materials control, engineering, quality control and accounting. Engineering furnishes the materials and service requirements of the job order to materials control, accounting, quality control and production. Additional data on cutting schemes, production working drawings and specifications and other working standards are also furnished to the production unit. The production unit schedules its operations based on commitments and requirements agreed in the sales order. In the process, individual regular reports (as required by management) on material withdrawals, supplies, hardware and finishing materials used and labour expended are forwarded to the accounting unit.

*The dates are only guidelines used by accounting to keep track of the various charges entered into the project. The production division scheduling staff normally advises accounting of these estimates, after considering their other production commitments.

3. The delivery receipt (form No. 9)

Upon completion of the job order, the finished products are either forwarded to the warehouse for storage or delivered to the customer if already due. A delivery receipt has to be completed to document the transaction. In some firms, the finished goods warehouse is placed under the direction of the sales unit. In most cases, however, the finished goods warehouse is placed under the materials control unit, as shown in the functional organization chart (figure 2). No matter what the organizational set-up is, the finished goods warehouse initiates the request to deliver the finished products (see delivery receipt processing, figure 4), and the accounting unit prepares the delivery receipt in quadruplicate. Where the finished goods warehouse is under the sales unit, the delivery receipt is prepared by the latter. The fourth copy is retained by the unit that prepared the delivery receipt, while the other three copies are forwarded to the finished goods warehouse. The third copy is retained by the warehouse, while the other two copies accompany the product(s) to be delivered. One of the two copies, signed and acknowledged by the customer, is returned to the accounting unit. The signed copy is then used as the basis for preparing the sales invoice.

Form No. 9 is a suggested format for the delivery receipt. The principal information entered on the delivery receipt are: the control number; the date of delivery (in some firms, the time of delivery is also required); the name and address of the customer; the quantity and description of the product(s) being delivered (the same description as on the corresponding sales order); and the name, position and signature of the customer or the person receiving the product(s) for the customer. The customer should be requested to inspect the goods and write "received the above goods in good order", or similar statement, on the receipt, for the protection of the furniture or joinery manufacturer.

The entries in the example refer to the first delivery of 500 sets of folding tables with folding stools, under sales order SO-82/075.

4. Returned goods receipt (form No. 10)

At times, part of the delivery to the customer is returned to the furniture or joinery manufacturer for one reason or another. A formal report on the return of the product(s) is prepared to serve as a basis for adjusting the billing to the customer and to serve as basis for any remedial action that should be taken to make the returned goods acceptable to the customer and prevent a repetition of defects in the future.

Form No. 10 is a suggested format for the returned goods report. The principal information required is: (a) the date the goods were returned; (b) the name and address of the customer; (c) the quality and description of the goods returned; (d) the delivery receipt and sales order numbers; and (e) the reason for customer's rejection of the product(s). The entries in the example refer to one set of folding table with folding stools that was returned to the manufacturer because of the metal hinge which attaches one of the stools to the table was faulty.

Four copies of the report are prepared and distributed to sales, production, quality control (engineering) and accounting.

FORM No. 9

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

DR 82/5778

DELIVERY RECEIPT

Date: 19 May 1982

RECEIVED from **EXPERTISE WOODWORKS CORPORATION**
the products listed below as (partial / ~~complete~~) delivery against our order:

Quantity	Unit	Product Description
500	sets	Model GS 3636 Folding Table with four (4) Folding Stools each, as per agreed specifications. (FIVE HUNDRED SETS) x x x

Copy Distribution:

Customer

Accounting

Materials Control

Sales

Delivery authorized by:

Calder Pinaro
F.G. Warehouse Officer

Reference Sales Order:

SO- 82/075

RECEIVED above goods in good order and condition.

Customer: Roxanne Trading Corporation
Broadway Centrum, Quezon City, M. M.

By: _____

Signature : _____

Name in Print: _____

Title/Position: _____

Date Received: _____, 19 _____

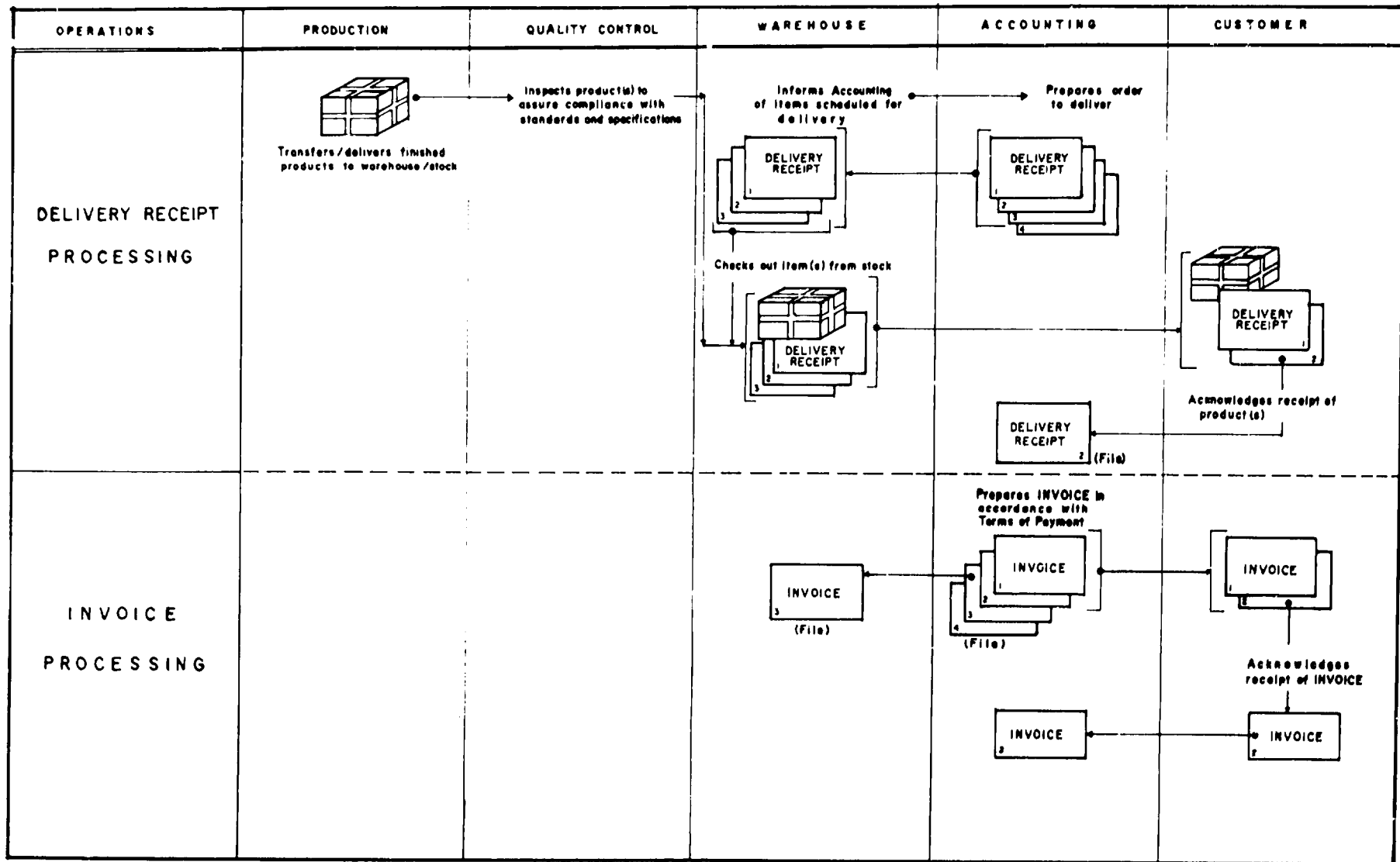


Figure 4. Flow diagram of delivery receipts and sales invoices

FORM No. 10

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

RGR No. 82/927

RETURNED GOODS RECEIPT

Date: 20 May 1982

RECEIVED the following goods from:

Customer: ROXANNE TRADING CORPORATION
Address: Broadway Centrum, Quezon City, Metro Manila

Quantity	Unit	Description of Product(s)
One (1)	set	Model GS 3636 Folding Table with four (4) Folding Stools each.
		<div style="display: flex; justify-content: space-around;"> x x </div> <div style="display: flex; justify-content: space-around;"> x x </div> <div style="display: flex; justify-content: space-around;"> x x </div> <div style="display: flex; justify-content: space-around;"> x x </div>

Reason(s) for Return:

Defective hinge on one (1) of the stools.

Copy Distribution:

- Customer
- Production
- Accounting
- Sales

Return Authorized by:

Carlos Primer
F.G. Warehouse Officer

Reference Documents

S.O. 82/075
D.W. 82/5778

Received by:

Sergio Paz
Signature

SERGIO PAZ, 126

Print Name and I. D. Number

5. The sales invoice (form No. 11)

The sales invoice is a billing document notifying the customer of the correct amount to be paid to the furniture or joinery manufacturer for goods delivered. It is a common practice in small, medium-sized and large firms to send the invoice together with the acknowledged delivery receipt to facilitate payment by the customer for product(s) ordered and delivered in accordance with the written agreements and conditions in the sales order.

Form No. 11 is a suggested format for the sales invoice. The entries required on the invoice are:

(a) Control number. The control number may be manually written, stamped or pre-printed, whatever is convenient and economical. A control sheet for sales invoices (giving names to whom invoices are addressed, in consecutive numbers) should be maintained for control purposes;

(b) Sold to. The name of the customer (person or firm);

(c) Address;

(d) Quantity. The total quantity (number) of goods already delivered to and received by the customer;

(e) Unit. The standard unit of measure - pieces, sets etc.;

(f) Unit price. The unit price as agreed or specified in the sales order;

(g) Total amount. The total amount due (the quantity multiplied by the unit price);

(h) Reference delivery receipts. Where one or more than one deliveries are made, indicate the delivery receipt control numbers, quantities delivered and the dates of delivery to facilitate accounting;

(i) Prepared by and date. The person who prepared the invoice and the date the invoice was made;

(j) Certified correct. Signature of the supervisor authorized to approve sales invoices.

The "invoice processing" section of figure 4 shows the general flow diagram of the sales invoice. It is normal practice for the accounting unit of a firm to prepare the sales invoice, although in some cases the sales unit prepares the sales invoice.

6. Summary of daily sales (form No. 12) and periodic summary of sales (form No. 13)

Periodic summaries of sales are essential tools in marketing and management activities. At the sales unit level, sales are accumulated daily and are usually reported to management every week. The weekly sales reports are summarized monthly and annually. In some cases, particularly in highly competitive market situations, quarterly and biannual summaries are required by management.

FORM No. 11

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA


INVOICE

INV- 82/2478

Sold to: ROXANNE TRADING CORPORATION

Address: Broadway Centrum, Quezon City, Metro Manila

Quantity	Unit	Description of Product (s)	Unit Price	Total Amount
1,000	sets	Model GS 3636 Folding Table with Folding Stools (TWENTY THOUSAND U.S. DOLLARS ONLY)	\$20/set	\$20,000.00

Copy Distribution : <input type="checkbox"/> Customer <input type="checkbox"/> Accounting <input type="checkbox"/> Materials Control <input checked="" type="checkbox"/> File Copy	Reference Delivery Receipt (s): DR-82/5778-500 sets 19 May 1982 DR-82/5793-500 sets 26 May 1982	Prepared by: <i>R. de las Alas</i> Billing Clerk Date: <u>26 May 1982</u>	Certified correct by:  COMPTROLLER
---	--	---	--

EXPERTISE WOODWORKS CORPORATION
 1747 QUEZON BLVD., QUEZON CITY, METRO MANILA


FORM No. 12

SUMMARY of DAILY SALES

SALES AREA _____

HEAD OFFICE _____

Date: 30 January 1982

Products Sold		Quantity and Unit	Amount	Name and Address of Customer
Model No.	Product Name			
GS-3636	Folding Table with 4 folding stools	1,000 sets	\$20,000.00	ROXANNE TRADING CORPORATION Broadway Centrum, Quezon City, M.M.
LR-011	"De Luxe" Living Room Set, upholstered	1 set	600.00	Mr. & Mrs. Pedro X. Reye 5 Gen. Lim St., Proj. 4, Q.C., M.M.
DR-102	"De Luxe" Dining Room Set for 4 persons	1 set	700.00	Mr. & Mrs. Pedro X. Reyes 5 Gen. Lim St., Proj. 4, Q.C., M.M.
BR-022	"Supreme" Bedroom Set	3 sets	1,500.00	Mr. & Mrs. Pedro X. Reyes 5 Gen. Lim St., Proj. 4, Q.C., M.M.
LR-012	"Supreme" Living Room Set	1 set	800.00	Mrs. G. P. Arce 2 Chico St., Proj. 6, Q. C., M.M.
TOTAL SALES for the Day			\$23,600.00	Prepared by: 

Copy Distribution
 Accounting
 Production
 Sales

Sales Assistant
 Date: 31 January 1982

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

PERIODIC SUMMARY of SALES

FORM No. 13

For the Period: 1 January to 31 March, 1982

Products	Customer Group				Sub-Totals
	Residential	Commercial/Industrial	Institutional	Government	
A. Home Furnishings:					
1. Bedroom Furniture	\$ 7,500	----	-----	\$ 7,500	\$ 15,000
2. Living Room "	10,500	----	-----	----	10,500
3. Dining Room "	6,800	\$15,000	-----	45,000	66,800
4. Kitchen Furniture	3,500	----	-----	6,500	10,000
5. Others	750	850	-----	-----	1,600
Sub-Total	\$29,050	\$15,850	-----	\$59,000	\$103,900
B. Office Furnishings:					
1. Office Desks	\$ 800	\$ 5,000	\$15,000	\$ 2,000	\$22,800
2. Office Chairs	600	6,800	12,000	1,500	20,900
3. Settee	---	3,200	5,000	600	8,800
4. Dividers/Shelves	---	1,750	2,800	-----	4,550
5. Others	---	250	750	850	1,850
x x x x x x x					
Sub-Total	\$ 1,400	\$17,000	\$35,550	\$ 4,950	\$58,900
C. School Furnishings:					
1. Pupil's Desk	---	----	\$12,000	\$ 6,000	\$18,000
2. Teacher's Table	---	----	4,500	1,600	6,100
3. Teacher's Chair	---	----	1,200	800	2,000
4. Cupboards	---	----	2,500	700	3,200
5. Others	---	-----	250	100	350
Sub-Total	\$ -----	-----	\$20,450	\$ 9,200	\$29,650
D OTHER FURNISHINGS:					
1. Plants Box	\$ 850	\$ 2,500	\$ 3,500	\$ -----	\$ 6,850
Totals for Customer Groups	\$31,300	\$35,350	\$59,500	\$73,150	-----
GRAND TOTAL SALES for the Period					\$199,300

Copy Distribution:

Accounting Production Sales

Verified and checked

[Signature]
Sales Manager
Date: 5 April, 1982

Form No. 12 is a suggested format for the daily summary of sales. The important entries on the report are: (a) name or description (model number if used) of product sold; (b) quantities of product sold; (c) amount of sales for each product; (d) name and address of the customer for each product sold; and (e) the total amount of sales for the day. Three copies of the daily sales summary are prepared and distributed to accounting, production and sales copy file.

Form No. 13 is a suggested format for the weekly, monthly, quarterly, semestral or annual sales summary. The products are indicated by product groups and the customers are also grouped. Sub-totals for each product and customer groups are indicated, together with the total sales for the period.

7. Receipts for collections (form No. 14)

In firms that employ collectors, it is the practice to issue provisional receipts for the amount paid. The official receipt (form No. 3), prepared by the accounting unit, is issued to the customer later, after the collector turns over the cash collections to the company cashier. When payment is made by cheque the official receipt is issued only after the cheque has been cleared by the bank.

Form No. 14 is a suggested format for the provisional receipt. The main information required on the receipt is: (a) date of receipt of payment; (b) the name and address of the customer; (c) the amount paid; (d) the form of payment - cash, cheque etc.; (e) the description of the goods and invoice number for which payment is being made; and (f) the signature of the authorized collector. Normally, three copies of the provisional receipt are prepared. The original is issued to the customer; a copy is transmitted to the cashier (finance or accounting unit), together with the cash or cheque, and the last copy is retained by sales.

The entries in Form No. 14 refer to the payment made on the delivery of the first 500 sets of folding tables with folding stools under SO-82/075.

8. Reports on collections (form No. 15)

Summaries of collections are prepared according to the needs of management. Normally, a daily report on collections is required. Based on the daily reports, a periodic (weekly, monthly etc.) collection report is prepared.

Form No. 15 is a suggested format for the report on daily collections. The principal data include: (a) date covered by the report; (b) sales order number; (c) provisional receipt numbers; (d) names of customers; (e) amount paid on the day; (f) total collection for the day; and (g) signature of the employee who prepared the report. Two copies of the report are made. The original is transmitted to accounting (to the cashier), accompanied by the corresponding copies of the provisional receipt issued and the cash and cheque collections for the day. A copy is retained by the sales unit for its files.

FORM No. 14

EXPERTISE WOODWORKS CORPORATION 1747 QUEZON BLVD., QUEZON CITY METRO MANILA, PHILIPPINES		PROVISIONAL RECEIPT PR- <u>02/185</u>	
		Date: <u>23 May</u> , 19 <u>82</u>	
RECEIVED from <u>ROXANNE TRADING CORPORATION</u> <u>Broadway Centrum, Quezon City, P.I.</u> the amount of <u># TEN THOUSAND' only #</u> Dollars (<u>\$ 10,000.-</u>)			
in (partial/full) payment for: <u>Sales Order No. 82/075</u> <u>Folding Table with Folding Seats.</u>			
FORM of PAYMENT:			
Cash:	<u>-</u>		
Check:	<u>\$ 10,000.-</u>	MBTC	
Money Order	<u>-</u>	# 1113	
Total	<u>\$ 10,000.-</u>		
		Signature of Collector: <u>[Signature]</u>	
		Name in Print: <u>L. C. PANGILINAN</u>	
		I.D. No.: <u>5379</u>	

FORM No. 15

EXPERTISE WOODWORKS CORPORATION
 1747 QUEZON BLVD., QUEZON CITY, METRO MANILA
 SUMMARY of DAILY COLLECTIONS

Payment received on: 23 May, 19 82

Sales Order No.	Provisional Receipt No.	Customer and Address	Amount Paid Today
82/075	PR-82/188	ROXANNE TRADING CORPORATION Broadway Centrum, Quezon City, Metro Mla.	\$ 10,000.-
82/072	PR-82/189	BARCEGAS DEPARTMENT STORE 118 New York St., Quezon City, Metro Mla.	\$ 10,000.-
82/078	PR-82/190	BANAWÉ CHILDREN'S HOSPITAL 1338 Banawe St., Quezon City, Metro Mla.	\$ 1,500.-
Total Collected Today -----			\$ 21,500.-

Copy Distribution:
 Accounting (Cashier)
 Sales

Verified and checked:
Laugilina

Date: 24 May, 19 82

9. Summary of finished goods inventory (form No. 16)

Some medium-sized and large furniture firms in developing countries, particularly those with extensive marketing operations, keep inventories of finished goods in widely dispersed warehouses to meet area needs. For purposes of inventory control, the sales unit is required by management to submit periodic reports on the status of the finished goods inventory in the warehouses under the responsibility of the sales unit.

Form No. 16 is a suggested format for the purpose. The format may be used for weekly, monthly or any other periodic inventory report. The same form may be used in the preparation of a consolidated inventory report for the whole firm. The main entries in form No. 16 are: (a) the period covered by the inventory; (b) the location of the warehouse or depot; (c) the description of the products in stock; (d) the quantity of each product in stock; (e) the unit value of each product; (f) the total value of each product in stock; and (g) the total value of the inventory under the responsibility of the sales unit. All entries, except for the unit and total values, are furnished by the unit preparing the inventory report. The entries under the unit value and total columns are filled in by the accounting unit. Three copies of the form are prepared and distributed as follows: the original to accounting, a copy to materials control and a file copy for the sales unit.

The entries in form No. 16 are for a monthly summary of the finished goods inventory in warehouses under the responsibility of the sales unit.

10. Sales forecast (form No. 17)

The planning of a firm's operations in the near future (quarterly, biannually or annually) is facilitated by the preparation of projections or forecasts of sales. In small furniture and joinery firms, the preparation of sales projections is not usually a matter of formal procedure. Nevertheless, the small entrepreneur has in mind some sort of sales forecast which will help to plan for future operations. The danger in this method is that the basic considerations and assumptions used in formulating the sales forecast are often not easily recalled. Thus, it is difficult for the entrepreneur to make operational adjustments to fit changing market conditions.

The sales forecast form is presented here as a tool to help small, and perhaps some medium-sized, furniture and joinery firms make a rational estimation of expected sales in the near future. The large and the more advanced medium-sized firms may have their own set of established guidelines for sales forecasting. The principal features, however, are very similar to those presented in form No. 17.

The product grouping in the form corresponds to the product lines manufactured by a hypothetical furniture firm. The customer groups refer to the type of customer that had purchased products in the past. The sales performance for the past period is presented for comparison with current performance and the expected sales during the next corresponding period. Reasons for the expected change in sales levels between the previous, current and forecast periods are also presented as the basic considerations and assumptions used in arriving at the forecast figures.

Five copies of the forecast are prepared and distributed to accounting, production, materials control, engineering and sales file copy.

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

FORM No. 16

SUMMARY of FINISHED GOODS INVENTORY
as of 31 March, 1982

Products	HEAD OFFICE		Angeles Branch		Cebu City Branch		Davao City Branch		Totals	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
A. Home Furnishings										
1. Bedroom Furniture	5 sets	\$2,500	2 sets	\$ 1,000	3 sets	\$1,500	2 sets	\$1,000	12 sets	\$ 6,000.00
2. Living Room Furniture	2 sets	1,200	---	-----	2 sets	1,200	2 sets	1,200	6 sets	3,600.00
3. Dining Room Furniture	3 sets	2,100	2 sets	1,400	2 sets	1,400	2 sets	1,400	9 sets	6,300.00
4. Kitchen Fixtures	----	-----	---	-----	---	-----	---	-----	-----	-----
x x x x x x										
B. Office Furnishings										
1. Office Desks	4 ea.	800	2 ea.	400	4 ea.	800	2 ea.	400	12 ea.	2,400.00
2. Office Chairs	12 ea.	600	6 ea.	300	8 ea.	400	4 ea.	200	30 ea.	1,500.00
3. Settle	3 ea.	360	2 ea.	240	2 ea.	240	1 ea.	120	8 ea.	960.00
4. Dividers/Shelves	2 ea.	150	1 ea.	75	2 ea.	150	---	-----	5 ea.	375.00
x x x x x x										
x x x x x x										
C. School Furnishings										
1. Pupil's Desk	---	---	---	---	---	---	---	---	-----	-----
2. Teacher's Table	---	---	---	---	---	---	---	---	-----	-----
3. Teacher's Chair	---	---	---	---	---	---	---	---	-----	-----
4. Cupboard	---	---	---	---	---	---	---	---	-----	-----
x x x x x x										
D. Other Furnishings (Specify)										
1. Hatracks	2 ea.	50	---	---	---	---	---	---	2 ea.	50.00
2. Plant Box	6 ea.	60	---	---	---	---	---	---	6 ea.	60.00
TOTAL VALUES:		<u>\$7,820.00</u>		<u>\$3,415.00</u>		<u>\$5,690.00</u>		<u>\$4,320.00</u>		<u>\$21,245.00</u>

- Copy Distribution:
- Accounting
 - Materials Control
 - Sales

Verified and checked:

SALES MANAGER

Date: 4 April, 1982

FORM No. 17

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

SALES FORECAST FOR THE PERIOD July 1st to 30 Sept. '82

	<u>Previous I Quarter '82</u>	<u>Current II Quarter '82</u>	<u>% Change Previous to Current</u>	<u>Forecast III Quarter '82</u>	<u>% Change Current to Forecast</u>
I. BY THE PRODUCT LINES :					
A. Home Furnishings	\$ 103,900	\$ 98,600	- 5.1%	\$ 125,000	+26.8%
B. Office Furnishings	58,900	62,000	+ 5.3	65,000	+ 4.8
C. School Furnishings	29,650	48,000	+62.2	30,000	-37.5
D. Others (Specify)	6,850	7,600	+10.9	8,000	+ 5.3
Total Sales -----	\$ 199,300	\$ 216,200	+ 8.5%	\$ 228,000	+ 5.5%
II. BY THE CUSTOMER GROUP :					
A. Family	\$ 31,300	\$ 29,500	- 5.8%	\$ 48,000	+62.7%
B. Commercial/Industrial	35,350	48,750	+37.9	75,000	+53.8
C. Institutional	59,500	73,500	+23.5	50,000	-32.0
D. Government	73,150	64,450	-11.9	55,000	-14.7
Total Sales -----	\$ 199,300	\$ 216,200	+ 8.5%	\$ 228,000	+ 5.5%

III. BASIC CONSIDERATIONS AND ASSUMPTIONS FOR THE FORECAST :

1. Sales of School Furnishings are expected to go back to I Qtr. Level after school opens June 16.
2. Slight increase of 5% in Sales of Office Furnishings is expected based on current negotiations.
3. Home Furnishings sales expected to pick-up towards middle of III Qtr., as commercial customers start building furniture inventory in preparation for coming Christmas season.
4. Hat racks, plant boxes, etc., are expected to maintain slight increase to match increase in Home Furnishings Sales.

Copy Distribution:

- | | |
|---|--|
| <input type="checkbox"/> Accounting | <input type="checkbox"/> Production |
| <input type="checkbox"/> Engineering | <input type="checkbox"/> Materials Control |
| <input checked="" type="checkbox"/> Sales | |

Recommended :



Sales Manager

Date : 30 May, 19 82

B. Documentation needs and flows for other firms

Just as the information and documentation flow is affected by the type of organizational set-up of a firm, the marketing scheme also influences changes in the documentation needs, entries and formats which form the communications vehicle between sales and the other operating units of the firm. The forms presented in section A of the present chapter are for furniture and joinery firms that sell on contract basis, the usual practice in a great number of small and medium-sized firms. Usually, the large furniture and joinery manufacturing firms and the more advanced medium-sized firms, particularly those that have more or less specialized product lines, sell from inventory only. Nevertheless, some of these firms also accept orders on contract basis during slack periods when production capacity is available in order to maximize the utilization of their manufacturing facilities. The following paragraphs indicate the changes in documentation needs, entries and formats for firms that sell from inventory and those that sell both from inventory and on contract basis.

1. Sales from inventory

The documentation needs of a firm that sells from inventory is best understood by considering the general operating characteristics of such a firm: (a) manufacturing operations are based on a predetermined schedule of targets for selected furniture or joinery products; (b) production operations are geared to maintain pre-established minimum-maximum levels of finished goods inventory; and (c) the production and sale of products other than the selected line of products is not allowed. Furthermore, firms that sell from inventory usually are not engaged in the retail sale of their products; marketing is conducted mostly through distributors. These furniture or joinery manufacturers sell larger volumes of a product than manufacturers that sell on contract basis.

These general operational characteristics of a firm that sells from inventory give rise to the following changes in documentation needs, entries and flows:

(a) The sales order (form No. 7) should be addressed to materials control (under the organizational set-up of figure 2), instead of the production unit. Thus, there is no need for production to confirm that the order can be produced under the conditions stated in the sales order. On the copy distribution list, "production" should be replaced by "materials control";

(b) There is no need for a job order (form No. 8), as production activities for the product have already been authorized under the operations plans previously approved for the fiscal year. In case a sales order will deplete the inventory of a particular product below the minimum level, the deficiency is made up by adjusting the target outputs for the succeeding weeks upon receipt of the periodic inventory report by the production unit;

(c) "Production" should be replaced by "materials control" in the copy distribution list in form No. 12, the summary of daily sales. All other features of the summary should remain the same;

(d) The "product" column of the periodic summary of sales (form No. 13) should list only the product or product lines manufactured by the firm. "Materials control" replaces "production" in the copy distribution list. All other features of form No. 13 should remain the same;

(e) The summary of finished goods inventory (form No. 16) as prepared by the sales unit may be discontinued inasmuch as the main source of deliveries to customers will come from the finished goods warehouse. Any inventory of finished goods maintained by the sales unit will probably be display items, which will not change significantly within the fiscal year and whose inventory will not require a formal document such as form No. 16;

(f) All other forms and their corresponding flows that were presented in section A remain the same: delivery receipt (form No. 9); returned goods receipt (form No. 10); sales invoice (form No. 11); provisional receipt (form No. 14); summary of daily collections (form No. 15); and sales forecast (form No. 17).

2. Sales both from inventory and on a contract basis

Documentation needs, entries and flows originating from the sales unit of furniture or joinery firms that sell both from inventory and on contract are basically the same as those presented in section A, except for the following:

(a) In the sales order (form No. 7) "materials control" should be added to the copy distribution list. However, the sales order should be addressed to the materials control unit if the product is to be sold from inventory, and production would not be given a copy of the sales order. On the other hand, the sales order should be addressed to production if the product is sold on a contract basis, and materials control would not be given a copy of the sales order;

(b) The job order (form No. 8) is prepared only for products sold on a contract basis. The entries and flow of the document should remain the same;

(c) "Materials control" should be added to the copy distribution list in the summary of daily sales (form No. 12); all the other entries on the form should remain the same. Thus, four copies of the summary should be prepared instead of three;

(d) The "product" column of the periodic summary of sales (form No. 13) will require additional space for the product lines sold from inventory. "Materials control" should be added to the copy distribution list. The revised format is shown in form No. 18;

(e) All other forms in section A should remain the same.

3. Summary of changes in documentation

The table below summarizes the changes in documentation originating from the sales unit, depending on the type of sales.

LIBERTY FURNITURE MANUFACTURING CO., INC.
1111 E. DE LOS SANTOS AVE., CUBAO, QUEZON CITY, METRO MANILA

PERIODIC SUMMARY of SALES

For the Period: 1 April to 30 June, 19 82

FORM No.18

Products	Customer Group				Sub-Totals
	Residential	Commercial / Industrial	Institutional	Government	
A. SOLD FROM INVENTORY:					
BR-110, Double Bed	\$ 22,500	-----	\$21,000	-----	\$ 43,500
BR-115, Single Bed	6,800	-----	9,800	-----	16,600
BR-026, Dresser Set	16,600	-----	6,800	-----	23,400
LR-015, Divan	25,600	\$ 5,800	11,900	-----	43,300
DR-216, Dining Set (4)	12,800	-----	-----	-----	12,800
DR-221, Dining Set (6)	18,400	-----	-----	-----	18,400
Total ----	\$102,700	\$ 5,800	\$49,500	-----	\$158,000
B. SOLD ON CONTRACT BASIS:					
1. Home Furnishings -					
Bedroom Furniture	\$ 16,000	-----	-----	-----	\$ 16,000
Living Room Furniture	1,600	-----	-----	-----	1,600
Dining Room Furniture	4,800	-----	-----	-----	4,800
Sub-Total ----	\$ 22,400	-----	-----	-----	\$ 22,400
2. Office Furnishings -					
Executive Desks & Chair	-----	\$12,600	\$18,900	\$22,500	\$ 54,000
Clerk's Desks & Chair	-----	8,700	11,500	16,700	36,900
x x x x x x x	-----	-----	-----	-----	-----
Sub-Total ----	-----	\$21,300	\$30,400	\$39,200	\$ 90,900
3. Others -					
Teacher's Table & Chair	-----	-----	\$ 5,500	\$10,500	\$ 16,000
Bar Counter	-----	-----	3,800	-----	3,800
x x x x x x	-----	-----	-----	-----	-----
Sub-Total ----	-----	-----	\$ 9,300	\$10,500	\$ 19,800
Total, Contract Basis ----	\$ 22,400	\$21,300	\$39,700	\$49,700	\$133,100
GRAND TOTALS for the Period-	\$125,100	\$27,100	\$89,200	\$49,700	\$291,100

Copy Distribution:

- Accounting Materials Control
 Production Sales

Verified and checked:

[Signature]
Sales Manager

Date: 5 July, 1982

Changes in forms based on type of sales

Form No.	Title	For sales on a contract basis only	For sales from inventory only	For sales from inventory and on contract
7	Sales order	As is	Revised, see B.1 (a)	Revised, see B.2 (a)
8	Job order	As is	Not needed	As is
9	Delivery receipt	As is	As is	As is
10	Returned goods receipt	As is	As is	As is
11	Sales invoice	As is	As is	As is
12	Summary of daily sales	As is	Revised, see B.1 (c)	Revised, see B.2 (c)
13	Periodic summary of sales	As is	Revised, see B.1 (d)	Replaced by form No. 18
14	Provisional receipt	As is	As is	As is
15	Summary of daily collections	As is	As is	As is
16	Summary of finished goods inventory	As is	May be discontinued	As is
17	Sales forecast	As is	As is	As is

C. Information flows from other units to the sales unit

Feedback to the sales unit helps it to conduct its activities efficiently. Among others, sales needs to know: up-to-date status of production and shipment; periodic reports on the status of sales orders and job orders; current inventory of finished goods; credit status of customers and accounts still collectible; selling costs charged against pending and recently closed job orders; and status of delivery and sales vehicles under repair. Other information, although also important to sales activities, may not require regular reporting or formal documentation and can be communicated by memoranda.

1. Production/shipment status report (form No. 19)

In small-scale industries where the production and sales units are normally within the same building or compound, communication on what has been produced and shipped out is usually not a problem. However, as a company's operations grow larger the sales and production units may not be located in one place, and a system of reporting on the production and shipment status is necessary to monitor whether the items that were produced or delivered met commitments or agreed schedules.

A report on production and shipment status is shown in form No. 19. The report is submitted daily by accounting from feeder reports on production outputs and deliveries. These entries are then compared with the daily/accumulated day-to-day totals for the period. The objective of the production and shipment status report is to pin-point problem areas immediately, from day to day, where schedules are not met, so that remedial action can be taken.

EXPERTISE WOODWORKS CORPORATION
 1747 QUEZON BLVD., QUEZON CITY, METRO MANILA
PRODUCTION / SHIPMENT STATUS REPORT

Job Order No. 82/125

1. Year/Month		2. Date		3. Product/Model/Quantity										
1982				FOLDING TABLE WITH FOLDING STOOLS GS3636						1,000 sets				
PRODUCTION							SHIPMENTS							
4. Scheduled Today	5. Actual Today	6. Cumulative		7. + STATUS	8. Scheduled Today	9. Actual Today	10. Cumulative		11. + STATUS					
		(A) Scheduled	(B) Actual				(A) Scheduled	(B) Actual						
Brought forward from Previous Month														
MAY	1	S	U	N	D	A	Y							
	2	50	40	50	40	-	10							
	3	50	50	100	90	-	10							
	4	50	50	150	140	-	10							
	5	50	60	200	200	0								
	6	50	50	250	250	0								
	7	50	50	300	300	0								
	8	S	U	N	D	A	Y							
	9	50	60	350	360	+	10							
	10	50	60	400	420	+	20							
	11	50	50	450	470	+	20							
	12	50	50	500	520	+	20							
	13	50	40	550	560	+	10							
	14	50	50	600	610	+	10	500		500				
	15	S	U	N	D	A	Y							
	16	50		650										
	17	50		700										
	18	50		750										
	19	50		800										
	20	50		850										
	21	50		900										
	22	S	U	N	D	A	Y							
	23	50		950										
	24	50		1,000										
	25													
	26							500		1,000				
	27													
	28													
	29	S	U	N	D	A	Y							
	30													
	31													
Carried forward to next month														
REMARKS: First 500 sets to be delivered week-ending 21 May 1982.														
Copy Distribution						Verified and checked.								
<input type="checkbox"/> Sales		<input type="checkbox"/> Production		<input type="checkbox"/> Materials Control		<i>[Signature]</i>								
<input checked="" type="checkbox"/> Accounting						Date: 14 May 1982								

The entries in form No. 19 refer to job order 82/135, corresponding to sales order 82/075, for 1,000 sets of folding tables with folding stools. A production lead time of approximately three months has been provided to allow the production and service departments to prepare or order materials, supplies and tools. The last unit in the production line department (the packing/crating unit, in this case) normally prepares the basic data for the production portion of the report, while the finished goods warehouse prepares the shipment data for goods delivered to customers. However, in more advanced firms the production control or similar units prepare the product/shipment reports based on transfer (billing) tickets (form No. 30, chapter IV) and delivery receipts (form No. 9).

A production schedule for job order 82/135 has been prepared for the month of May for the last processing units: finishing, assembling and packaging. The total number of working days (except Sundays) is 26; the required production is 50 sets daily for 20 days (= 1,000 sets); and the delivery (ex-factory) is planned for 500 sets on 14 May and 500 sets on 26 May. Form No. 19 shows the situation as of the end of work on 14 May:

- (a) Block 1. Year and month;
- (b) Block 2. Dates of the month should be pre-printed on the form;
- (c) Block 3. The name of the product, model and quantity;
- (d) Block 4. Enter the daily production target on all work days (50 sets per day in the example);
- (e) Block 5. The actual production for the day only;
- (f) Block 6(A). Cumulative scheduled is the running total, computed daily from the start of the schedule. This is the result or sum of the "scheduled today" figures up to the last production day;
- (g) Block 6(B). Cumulative actual is the sum of actually produced units from the start. Add the day-to-day actual production to get the running or accumulated total;
- (h) Block 7. Indicates whether production is ahead or behind schedule;
 - (i) The minus (-) sign denotes production is behind by a certain quantity, which is the difference between the scheduled (block 6(A)) and actual accumulated (block 6(B)) totals for the particular day;
 - (ii) The plus (+) sign denotes production is ahead by a certain quantity, which is the difference between actual accumulated (block 6(B)) and scheduled accumulated (block 6(A)) totals for the particular day;
- (i) Blocks 8 through 11 are filled in the same way as blocks 1 through 7 for shipments or deliveries outside the company.

2. Consolidated finished goods inventory (form No. 20)

A consolidated report on finished goods inventory is more useful for firms that sell from inventory. Firms that sell only on a contract basis would need to prepare this report much less frequently (once or twice a year) than firms that sell from inventory (usually monthly). The report covers the total inventory of finished goods in all stores or warehouses of the firm.

The basic information required in this report are: the period covered by the report; the quantity, unit and product description of the finished goods in stock grouped according to product types and their locations; and unit and total values as required in some firms.

Form No. 20 is presented as a sample format for the consolidated report and is completed as follows:

(a) The period covered by the inventory is indicated by crossing out the periods not applicable to the report and entering the ending date of the period;

(b) Products are grouped according to the needs of the firm;

(c) The entries in the column "total stock" are the respective sums of the inventories of each particular product in all the stores or warehouses of the firm;

(d) Entries in the "unit value" and "amount" columns are furnished by the accounting unit. The amount in stock of each product is found by multiplying the "total stock" entry by the corresponding "unit value" entry;

(e) The "total value of inventory", the last line in form No. 20, is obtained by taking the sum of all entries under the "amount" column.

Three copies of the report are prepared and given to accounting, sales and materials control. The company official who checked and verified the entries in the report signs on the space provided for the purpose to indicate approval of the entries in the report.

3. Schedule and aging of accounts receivable (form No. 21)

The collection of receivables is facilitated by a periodic report on the arrears of customers. The common practice is to summarize this information as a schedule and aging of accounts receivable; form No. 21 is an example of such a report, showing the mid-year status of the accounts receivable in a hypothetical furniture manufacturing firm. The names of customers with arrears are listed in the first column. The next five columns refer to the amounts receivable from each customer over different periods of time; the total of these amounts is entered in the seventh column. The "remarks" column is for indicating what action has been taken, any recommended action and other information relevant to the customer's account.

4. Credit standing of customers (form No. 22.A and 22.B)

Another tool that is useful in formulating credit policies and managing the company's cash transactions is a more detailed report on the credit

EXPERTISE WOODWORKS CORPORATION
 CONSOLIDATED FINISHED GOODS INVENTORY

FORM No. 20

For the ^(Month) ~~Quarter~~ ~~Year~~ Ending: 30 June, 19 82

Product Number, Description and Unit	Quantity in Stock					Total Stock	Unit Value	Total Amount	
	Main Stores	Branch 1 Stores	Branch 2 Stores	Branch 3 Stores	Branch 4 Stores				
A. HOME FURNISHINGS									
BR-012, Bedroom Set	10	4	6	4	1	25	\$ 500	\$ 12,500	
BR-015, Bedroom Set	8	3	2	1	2	16	800	12,800	
BR-025, Bedroom Set	5	2	4	2	1	14	1,000	14,000	
DR-066, Dining Set	12	5	1	2	5	25	750	18,750	
DR-072, Dining Set	4	2	1	2	2	11	900	9,900	
LR-006, Living Room Set	15	3	4	2	3	27	800	21,600	
LR-008, Living Room Set	6	3	2	2	1	14	1,000	14,000	
Sub-Total									\$103,550
B. OFFICE FURNISHINGS									
EX-025, Exec. Desk, pc.	15	5	5	3	2	30	\$ 350	\$ 10,500	
EX-027, Exec. Chair, pc.	15	5	5	3	2	30	200	6,000	
EX-029, Executive Guest Chair, pc.	30	10	10	6	4	60	150	9,000	
CL-031, Clerical Desk, pc.	20	5	5	5	5	40	160	6,400	
CL-033, Clerical Desk, pc.	10	3	3	3	3	22	120	2,640	
CL-035, Clerical Chair, pc.	10	5	5	3	3	26	80	2,080	
CL-037, Clerical Chair, pc.	40	20	20	12	12	104	75	7,800	
Sub-Total									\$ 44,420
TOTAL VALUE of INVENTORY								\$147,970	

Copy Distribution:
 Accounting Sales
 Materials Control

Verified and checked:

Date: 5 July, 19 82

FORM No. 22.A

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

CREDIT STANDING of CUSTOMERS, QUARTERLY
as of 30 June, 1982

Customer	Invoice		Amount				Payment Due Date	Payment			Balance	Remarks
	No.	Date	Gross	Discount	Return	NET		Date Paid	O.R. No.	Amount		
ROXANNE TRADING CORP.	82/006	1-5-82	\$25,000	\$1,250	---	\$23,750	2-5-82	5-1-82	82/018	\$10,000	\$13,750	
								30-1-82	82/098	10,000	3,750	
								5-2-82	82/111	3,750	-----	
ROXANNE TRADING CORP.	82/021	2-10-82	60,000	3,000	\$100	56,900	3-12-82	2-10-82	82/122	30,000	26,900	
								3-12-82	82/133	25,900	1,000	2nd Notice Sent
								4-6-82	82/166	1,000	-----	
ROXANNE TRADING CORP.	82/060	4-6-82	25,000	1,250	---	23,750	5-6-82	4-6-82	82/166	9,000	14,750	\$1,000 applied to Invoice 82/021
								4-25-82	82/172	8,750	6,000	1st Notice Sent
								6-5-82	82/192	6,000	-----	
ROXANNE TRADING CORP.	82/111	6-5-82	20,000	-----	---	20,000	6-5-82	6-5-82	82/192	4,000	16,000	\$6,000 applied to Invoice 82/060

Copy Distribution:

General Manager Sales Accounting

Verified and checked:

Date: 5 July, 1982

FORM No. 22.B

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA
CREDIT STANDING of CUSTOMERS, WEEKLY
as of 5 June, 19 82

Name and Address CLIENT	Balance Due, End Last Week	Purchases This Week	Payments This Week	Balance Due, End This Week	Total Purchases, This Calendar Year
Roxanne Trading Corporation Broadway Centrum, Q. C.	\$6,000.00	\$20,000.00	\$10,000.00	\$16,000.00	\$130,000.00

Distribution: Gen. Manager Sales Accounting

Verified and Checked: [Signature]
Date: 7 June, 19 82

standing of customers. Such a report also serves as a guide to the sales unit in dealing with previous customers who wish to buy more goods on credit from the company.

Form No. 22.A is a sample format for a report on the credit standing of customers. Normal practice requires that a report be prepared quarterly by the accounting unit, unless otherwise required by management. Cash purchases are not included in the report. The form is filled out as follows:

- (a) Customer;
- (b) Invoice. Number and date of each sale on credit terms to the customer;
- (c) Amount. Details of the payment transactions are entered in the first three columns. Discounts and the value of goods returned to the firm are subtracted from the gross amount of sale to get the net amount of sale;
- (d) Payment due date;
- (e) Payment. Date of payment, the official receipt number (O.R. No.) covering the payment and the amount paid;
- (f) Balance. The amount still receivable from the customer as of the date indicated at the top of the report.
- (g) Verified and checked. Usually by the chief accountant or the comptroller.

Copies are given to top management and sales.

Form No. 22.B is a variation of form No. 22.A. It is more desirable in cases where the management is more interested in the overall picture of a customer's credit standing than in the details given in form No. 22.A. Form No. 22.B is filled out weekly, as follows:

- (a) Name and address;
- (b) Balance due, end last week. Taken from the last entry in the fifth column of the report from the previous week;
- (c) Purchases this week;
- (d) Payments this week;
- (e) Balance due, end this week. This entry is computed as follows: balance due, end last week, plus purchases this week minus payments this week;
- (f) Total purchases, this calendar year. The sum of the entry under "purchases this week" plus the corresponding entry from the "total purchases, this calendar year" column of the preceding week's report;
- (g) Verified and checked. By the officer who verified and checked the entries;

(h) Date;

(i) Distribution. Three copies of the Report are prepared and distributed as indicated in the bottom left area of the form.

5. Summary of departmental costs (form No. 23)

In many small and medium-sized firms that do not operate on a budget system, it is important to keep track of costs charged to each department for its operations. The sales unit is made aware of its expenses through a periodic report on departmental costs, segregated by the job order (in the case of sales on a contract basis) or by the product line (in the case of sales from inventory).

Form No. 23 is a sample format for the summary of departmental costs. The data needed for the report are:

(a) Sales order number. The control number of the sales order;

(b) Job order number. The control number of the job order, corresponding to the order;

(c) Description. The complete description of the product or item as indicated in the original job order;

(d) Departments. The various operating units in the organization;

(e) Date started. The date a department started working on the order;

(f) Cost item. Classification of cost items based on three major cost items - materials, labour and overhead;

(g) Total accumulated cost, to date. The total cost accumulated from the start of processing the order up to the present month, as indicated. This is actual cost obtained from summarized material requisition and issuance slips, labour tickets and departmental payrolls;

(h) Total estimated cost. The total estimated cost of raw materials, labour or overhead for each department as originally estimated and used as the basis for pricing the product;

(i) Percentage complete. The amount of work on the project that has been completed in the department as of the date of the report. Ideally, this percentage should be almost equal to the ratio to the total accumulated cost to the total estimated cost;

(j) Estimated completion date. As estimated by the department. It should be within the delivery schedule as confirmed by production to sales;

(k) Remarks. Comments on meeting the schedule and action being taken to meet deadlines.

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BVLVD., QUEZON CITY, METRO MANILA

FORM No. 23

SUMMARY of JOB ORDER COSTS - by DEPARTMENT

For the month of May, 19 82

S O No.	J.O. No.	Description	Department	Date Started	Cost Item	Total Accumulated Cost, To-Date	Total Estimated Cost	% Complete	Estimated Completion Date	Remarks
82/075	82/135	GS-3636 Folding Table with Folding Stools, 1,000 sets	Machining	2 May 1982	Materials	\$4,850.00	\$5,000.00	100%	24 May 1982	Completely delivered 26 May 1982
					Labour	950.00	1,000.00			
					Overhead	620.00	700.00			
			Assembling and Sanding	5 May 1982	Materials	1,000.00	1,000.00			
					Labour	850.00	800.00			
					Overhead	580.00	600.00			
			Finishing and Packing		Materials	2,670.00	3,000.00			
					Labour	420.00	600.00			
					Overhead	390.00	400.00			
			Sales	20 Mar. 1982	Representation	230.00	250.00			
82/076	82/136	GS-5016, Card Table, 1,500 units	Machining	10 May 1982	Materials	7,200.00	9,500.00		25 June 1982	
					Labour	1,900.00	2,700.00			
					Overhead	2,950.00	3,800.00			
			Assembling and Sanding		Materials	1,300.00	3,300.00			
					Labour	450.00	1,150.00			
					Overhead	880.00	2,200.00			
			Finishing and Packing		Materials	1,260.00	6,300.00			
					Labour	200.00	1,100.00			
					Overhead	360.00	1,900.00			
			Sales	5 April 1982	Representation	450.00	500.00			

Verified and checked:

Copy Distribution:

- | | |
|--|--|
| <input type="checkbox"/> Sales | <input type="checkbox"/> Engineering |
| <input type="checkbox"/> Production - Machining | <input type="checkbox"/> Production - Upholstering |
| <input type="checkbox"/> Production - {Sanding & Assembling} | <input type="checkbox"/> Packing /Crating |
| <input type="checkbox"/> Production - Finishing | <input checked="" type="checkbox"/> Accounting |

Date: 2 June, 19 82

6. Monthly report on sales order and job order status (form No. 24)

The sales unit of furniture and joinery firms that sell on a contract basis need to know the status of the various sales orders confirmed for processing by the production unit. The normal practice is to have such information presented in a monthly report on the status of job orders that were opened on the basis of sales orders. This report is usually prepared by the production unit of the firm.

Form No. 24 is a sample format for the monthly report. The data shown, as summarized by accounting, are:

(a) Sales order number. The control number of the sales order, confirmed by the production unit;

(b) Description. The model, and complete description of the product or item ordered and the quantity, as indicated on the sales order;

(c) Job order number. The job order control number confirmed and assigned corresponding to the sales order;

(d) Date started. The date the first department in the production line started processing the order;

(e) Percentage of completion at department. In percentages the portion of the total order that has been completed by each department. Data is obtained from the transfer ticket (form 30, chapter IV) billed by each department;

(f) Estimated completion date. The estimated completion date of the whole order, as stated in the job order;

(g) Remarks. Comments on what is being done by the departments about any shortcomings in the production order.

7. Vehicle repair status

The sales unit depends on the mobility of its personnel to sell goods and collect payments. When the sales unit is responsible for delivering finished goods to the customers, it depends on the running condition of its delivery vehicles to attain its sales targets. Thus, the sales unit is greatly interested to know the state of repair of vehicles assigned to it. A report is prepared by the engineering unit and is furnished to all company units that have vehicles under repair. A sample format for the report is presented and discussed in chapter VII.

D. Documentation in firms manufacturing and selling standard and non-standard product lines

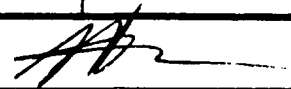
The nature of the product lines carried by a furniture and joinery firm will influence the formats and contents of reports to the sales unit. Firms can be classified as those that manufacture and sell standard lines of furniture or joinery products and those that do not.

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

FORM No. 24

MONTHLY REPORT on SALES ORDER and JOB ORDER STATUS

For the month of: May, 1982

Sales Order No.	Description	Job Order No.	Date Started	% Completion of Department			Estimated Completion Date	Remarks
				Machining	Assembling & Sanding	Finishing & Packing		
82/075	GS-3636 Folding Table with Folding Stools, 1,000 sets	82/135	2 May '82	100%	100%	100%	24 May '82	Delivered to Customer
82/076	GS-5016 Card Table, 500 units	82/136	10 May '82	80%	40%	20%	25 Jun '82	
82/077	BR-1066 Dresser, 100 units	82/137	18 May '82	50%	20%	15%	5 Jun '82	
82/078	GS-4202 Children's Tables 500 units	82/138	23 May '82	30%	15%	5%	15 Jun '82	
82/079	LR-1026 Coffee Table 100 units	82/139	30 May '82	10%	----	---	25 Jun '82	
82/080	DR-2011 Buffet Cabinets, 100 units	82/140	8 Jun '82	---	----	---	15 Jul '82	Revised working drawings for approval.
Copy Distribution:				Verified and checked: 				
<input type="checkbox"/> Sales	<input type="checkbox"/> Materials Control				Date: <u>3 June</u> , 19 <u>82</u>			
<input type="checkbox"/> Production	<input checked="" type="checkbox"/> Accounting							

Firms that manufacture and sell standard lines of furniture or joinery products generally deal with a smaller number of product types than those that have not adopted certain product types as their standard line of products. Furthermore, firms dealing with standard product lines are in a better position to standardize the design and dimensions of some component parts common to two or more of the products. In a report, it takes less words and effort to describe and specify products in the standard product line.

Furniture or joinery firms that have not adopted specific product lines are usually forced to manufacture and sell a great variety (in design and dimensions) of one product, according to the tastes and desires of each customer. In this case, therefore, sales information needs to be more detailed and may vary from one sales order to another, even for the same product type. The usual practice in this type of operation is for the sales unit to submit presentation drawings and specifications of the product, have them approved by the customer and attach the approved drawings and specifications as supporting documents to the sales contract and the sales order.

Other differences in the information and documentation needs between the two groups of firms relate to the frequency of transmission of information between sales and other operating units of the firm. This is influenced by the fact that firms that manufacture standard product lines usually sell them from inventory, while firms that manufacture non-standardized product lines usually sell them on a contract basis. Thus, the changes in information and documentation needs between firms selling from inventory and those selling on a contract basis (see section B, above) also apply to firms selling standard product lines and those that do not.

The differences in information and documentation needs between the two manufacturing and selling systems discussed in the preceding paragraphs appear to be too minor to affect a decision as to whether to computerize or not. However, when the volume of manufacturing and selling operations expands to levels that make the manual handling of information and documentation rather impractical, the implications of the differences in information and documentation needs become more readily apparent.

Designing computerized systems for firms with standard product lines is easier than for firms with non-standard product lines. This is primarily because, in the former, products, product components, sequences of manufacturing operations and even packaging and costing are easily identified and coded. Variations from the norm are likewise more visible, thus facilitating the definition and implementation of (computerized) control measures and procedures. On the other hand, the computerization of firms with non-standard product lines, though more difficult, would nevertheless be useful, primarily in pin-pointing areas of similarity in product lines and providing other information that is valuable in streamlining operations and other manual procedures. For example, in spite of differences in product components, sequences of manufacturing operations and packaging, there are costing factors or procedures common to various product lines; computerization of these routine activities frees personnel to devote more time to determining cost factors unique for each product line, as well as to much-needed analysing and evaluating of costing practices.

Computerization is dependent on a number of factors (discussed further in chapter X), but the foremost concern is, and must always be, how much benefit (both tangible and otherwise) the firm will derive from computerization.

IV. PURCHASING AND INVENTORY CONTROL

A. Information needs in purchasing and inventory control

One of the major service functions that help production and other service departments is materials control, which further branches out into smaller units such as purchasing, inventory control and warehousing. The major function of purchasing, whether it be in small-, medium- or large-scale furniture and joinery firms is to make available the materials or service requirements of all units in the firm at the desired time and to ensure that the items requested are delivered in accordance with specifications and in the required quantity, at the best possible price and payment conditions.

In small-scale furniture or joinery shops where the operating functions are concentrated in a very few persons procurement is done on a buy-as-needed basis. Bulk stock is not maintained for future requirements; rather, materials and services - barely enough to complete an order - are purchased on an order-by-order basis. As an organization expands and such functions as purchasing, inventory control and warehousing are spread out among various staff, a system has to be set up to facilitate smoother operations.

After a sales order has been confirmed and a job order is issued, other service units or departments automatically start to provide production with its requirements. On the basis of information on material and supplies requirements, the operation sequence, machine set-ups, labour and time standards or estimates and finishing and packing requirements, production issues a purchase request (form No. 25) for purchasing or procuring the needed materials or services. At this point, in order for materials control to issue a purchase order (form No. 26), the amount of the items on stock has to be checked to determine whether an order should be placed or whether deliveries are expected. Prices of the items should be obtained from prospective suppliers in order to be able to buy materials at reasonable prices (in most manufacturing firms, it is company policy to obtain a number of price quotations for any one item for comparison before a purchase order is issued). When the level of stock has been confirmed and pricing has been established and approved, a purchase order is issued to the supplier.

All items delivered are inspected for quantity and quality and documented on a receiving report (form No. 27). Items are forwarded to the stockroom or warehouse for storage.

Withdrawals of materials or supplies from the stockroom or warehouse by the production or other department are covered by a materials requisition and issuance slip (form No. 32). All receipts and withdrawals are entered on the material control card (form No. 28). Where the organizational set-up permits, warehouse personnel may also use a bin card (form No. 29) to keep track of current levels of stock in the warehouse. In medium-scale industries, the bin card may be used in place of the materials control card to monitor and control stock movements and transactions. All materials requisition and issuance slips (pre-numbered) that are issued and all returned materials reports that are acknowledged during the day are submitted by the storekeeper or warehouse-keeper to the materials ledger clerk on the following working day.

When parts move from one department to another, a transfer ticket (form No. 30) is completed. The ticket is used by the accounting unit to bill parts within each organizational unit. This is also used for billing finished goods or products from the production departments to the finished goods warehouse.

B. Documentation in purchasing and inventory control

1. Purchase request (form No. 25)

The purchase request form is used by all departments to request the purchase of materials or services required for a job order or a production order for products for inventory. Information to be included in the form includes:

(a) Materials and service block. A check mark in the proper square indicates whether the request is for materials or services;

(b) Control number. Each department is designated an organizational department code number by the accounting unit for control purposes. The number may be pre-printed, stamped or handwritten, whatever is most convenient and economical;

(c) Description of item(s). The complete description of the item(s) to be purchased, including dimensions, model number etc.;

(d) Unit. The unit of measure - pieces, cubic metre, kilograms, metres etc.;

(e) Quantity;

(f) Stock status. Materials control (purchasing) may request materials control (warehouse) to indicate stock on hand and on order to determine whether present quantities are within established minimum-maximum levels;

(g) Job order. For debiting the appropriate job;

(h) Ordered by. The signature of the supervisor of the requesting department. Purchasing returns and acknowledges receipt of purchase request;

(i) For canvassing. Purchasing obtains price quotations from suppliers upon instruction from the supervisor;

(j) For purchase order. The approving authority approves the pricing quotation obtained for the preparation of the purchase order;

(k) Purchase order number and date issued. Entered after the purchase order has been issued.




2. Purchase order (form No. 26)

The purchase order formally documents the item to be purchased under terms and prices agreed upon in the quotations. The basic information required is:

(a) Control number. To ensure continuity and as a safety check, the control number of the purchase order must be pre-numbered (i.e., printed, stamped or handwritten). The accounting unit assigns the control numbers;

(b) Deliver to. The complete name and address for delivery (in the example, to the factory);

FORM No. 25

EXPERTISE WOODWORKS CORPORATION 1747 Quezon Blvd., Quezon City, Metro Manila							
PURCHASE REQUEST					Materials <input checked="" type="checkbox"/> Services <input type="checkbox"/>	Control No. RP-82/115	
Description of Item(s)	Item Requested		Stock Status		Purchase Order		Remarks
	Unit	Quantity	On Hand	On Order	No.	Date	
Outer Box - Drawing No. CN-GS-507 <u>For Folding Table Set :</u> Corrugated Fibrerboard, Regular slotted container, Single Wall, "A" Flute, All flaps same length, Outer flaps meet, 1895 KPa test, diagonal stitched joint <u>Inside Dimensions :</u> Length - 915 mm Width - 610 mm Depth - 205 mm	pcs.	1,005	none	none	PO- 82/225	2 April 1982	For Job Order No. 82/135 <u>Required:</u> On or before 30 April 1982.
Copy Distribution: <input type="checkbox"/> Purchasing <input checked="" type="checkbox"/> Department File		Ordered by:  Date: <u>30 March, 19 82</u>		For Convassing:  Date: <u>31 March, 19 82</u>		For Purchase Order:  Date: <u>2 April, 19 82</u>	

FORM No. 26

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA
PURCHASE ORDER

Control No.: PO-82/225

Please deliver to: EXPERTISE WOODWORKS CORPORATION
Factory: 5th & Luan Sts., Canlubang
Industrial Estate, Calamba, Laguna

Terms of Payment:
30 days from
payment

Quantity	Unit	Description	Unit Price	Total Amount
1,005	pieces	Outer Box - Drawing No. CN-GS-507 <u>For Folding Table Set :</u> Corrugated Fiberboard, Regular Slotted Container Single Wall, "A" Flute All flaps same length, Outer flaps meet, 1895 KPa test diagonal stitched joints. <u>Inside Dimensions :</u> Length - 915 mm Width - 610 mm Depth - 205 mm	\$1.50	\$1,507.50

Total Amount in words: ONE THOUSAND FIVE HUNDRED SEVEN U.S. DOLLARS & FIFTY CENTS

For Job Order No. : No. 82/135

Delivery Schedule/Remarks :

DELIVER ON OR BEFORE 30 APRIL 1982.

- Partial Delivery Allowed
- Only FULL Delivery Accepted
- Items to be Delivered
- Items to be picked up

- Copy Distribution:
- Supplier
 - Purchasing
 - Accounting
 - Inventory Control
 - Receiving

Order Confirmed by:
STENNER CONTAINER CORP.
380 J. Lupa St., Binondo, Manila

Signature of Supplier or
Authorized Representative

Date: 3 April, 19 82

P.O. Approved by:

[Signature]
COMPTROLLER

Date: 2 April, 19 82

- (c) Terms of payment. As agreed with the supplier;
- (d) Quantity. Total quantity ordered;
- (e) Unit. The standard unit of measure to be used;
- (f) Description. The description of the material(s) ordered and complete specifications. The receiving personnel will use this information to check the materials when they are delivered;
- (g) Unit price. Obtained from the quotation of supplier;
- (h) Total amount. The quantity multiplied by the unit price, in figures;
- (i) Total amount in words. To cross check total amount in figures;
- (j) For job order number. Job order number for which the requested items will be used;
- (k) Delivery schedule/remarks. Delivery date and other relevant information;
- (l) Order confirmed by. The order has to be confirmed by the supplier (or an authorized representative). The supplier must return the copy of the purchase order confirming the order;
- (m) Approved by. Signature of approving officer for the purchase order.

3. Receiving report (form No. 27)

The receiving report documents all receipts of items into the firm. The form is completed by the receiving personnel, normally from quality control, who inspect the items delivered against the specifications in the purchase order:

- (a) Control number (RR). Pre-numbered (printed, stamped or handwritten);
- (b) Received from. The name of the supplier;
- (c) Date. The date received;
- (d) Purchase order number;
- (e) Quantity. The quantity received in good condition, in figures and words;
- (f) Unit;
- (g) Description of items/products received. The complete description as per specifications. Inspection of the items, whether 100% or by random sampling, should be in conformity to the specifications in the purchase order;
- (h) Reference delivery receipt number. The delivery receipt number of the supplier;

FORM No. 27

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

RECEIVING REPORT

RR - 82/1165

RECEIVED From: PARKWAY LUMBER PRODUCERS, INC.
1999 Quezon Blvd., Quezon City, M.M.

Date: 20 April 1982
Purchase Order No.: 82/3901

Quantity	Unit	Description of Items/Products Received
50 (fifty)	cubic meters	Philippine Mahogany, rough lumber, 8-12% moisture content, 25 mm. thick; 76-152 mm. (mixed) widths; and 914 mm. lengths. (PARTIAL DELIVERY)

Copy Distribution: <input type="checkbox"/> Accounting <input type="checkbox"/> Warehouse, Materials Control <input type="checkbox"/> Purchasing, Materials Control <input checked="" type="checkbox"/> File Copy	Reference Delivery Receipt No.: R-390145	Inspected by: <u>Edo Reyes</u> Q.C. Inspector	Received by: <u>Uano Bautista</u> Warehouseman
--	--	--	---

(i) Inspected by. The quality control receiver signs as having inspected the delivery and confirmed its conformance to specifications;

(j) Received by. The warehousekeeper signs to indicate receipt of the goods inspected and turned over by the quality control inspector.

4. Materials control card (form No. 28)

The materials control card is used in inventory control to monitor movements of stock items and update entries as soon as purchase orders, receipts and issues are confirmed. Data on the card are:

(a) Card number. Assigned to each item on stock to facilitate listing and reference;

(b) Part number and description. The part number assigned and complete description of the item;

(c) Usage. The average consumption of the item over a regular period such as pieces per month, pieces per set etc.;

(d) Minimum stock. Approved and established minimum levels at any given time;

(e) Maximum stock. Approved and established maximum stock levels at any given time;

(f) Unit. The standard unit of measure, such as square metres, cubic metres, kilograms etc.;

(g) Date. The date the transaction (receipt or issue) is made;

(h) Reference. The appropriate purchase order, delivery receipt or issue slip number;

(i) On order. The quantity on order. The quantity should not be used in computing the on hand balance but is used only as information on what is still to be delivered by the supplier;

(j) Stock status. "Receipt" is the quantity received, "issue" is the quantity issued and "on hand" is the quantity remaining on stock after the transaction. The "on hand" figure is obtained by adding (if a receipt) to the previous on hand balance or by subtracting (if an issue) to the previous on hand balance;

(k) Remarks. On partial or total delivery against purchase order or to note outstanding balance to purchase order etc.

5. Bin card (form No. 29)

Warehouse and stockroom operations involving a sizeable number of stock items are facilitated with the use of a bin card. The bin card provides up-to-date stock levels and also serves to locate stock items. A card is maintained for each stock item.

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

FORM No. 28

MATERIALS CONTROL CARD

Card No.: M-1060

Part No. and Description:

25 mm. x 75-150 mm x 4.0 m., "Lauan" Lumber
Kiln-dried : 8-10%, No. 2C/Btr

Usage:
125 cu.m./mo.

MINIMUM Stock: 250 cu.m.

MAXIMUM Stock: 500 cu.m.

Units: cubic meter

Date	Reference	On Order	STOCK STATUS			Remarks
			Receipt	Issue	On Hand	
2 April 82	Rheymal Inventory, 3 rd Dec 1981	150	—	—	205	
3	RR - 82/1116	—	150	—	355	Complete delivery on PO - 82/3711
3	MRIS - 82/136	—	—	10	345	
6	MRIS - 82/158	—	—	10	335	
10	MRIS - 82/176	—	—	20	315	
14	MRIS - 82/192	—	—	45	270	
18	MRIS - 82/205	250	—	25	245	RP - 82/082
20	RR - 82/1165	200	50	—	295	PO - 82/3901
22	MRIS - 82/228	—	—	10	285	
25	MRIS - 82/241	—	—	10	275	
26	RR - 82/1185	—	200	—	475	PO - 82/3901
30	MRIS - 82/271	—	—	15	460	
2 May 82	MRIS - 82/25	—	—	10	450	
4	MRIS - 82/2	—	—	20	430	
7	MRIS - 82/287	—	—	10	420	
10	MRIS - 82/292	—	—	5	415	
13	MRIS - 82/306	—	—	5	410	
25	MRIS - 82/325	—	—	10	400	
30	MRIS - 82/342	—	—	10	390	
1 June 82	MRIS - 82/343	—	—	5	385	
8	MRIS - 82/368	—	—	15	370	
15	MRIS - 82/381	—	—	25	345	
22	MRIS - 82/411	—	—	10	335	
24	MRIS - 82/426	—	—	25	310	

The sample bin card shows the current amount in stock of a butterfly hinge. The card is a continuous record of receipts, issues and balances of the item. Entries on the card are made as follows:

- (a) Part number. The code number assigned to the stock item;
- (b) Locator. The row and bin numbers;
- (c) Description. A short, accurate description of the stock item, including the standard unit of measure;
- (d) Date. The date of each transaction (receipt or issue);
- (e) Reference. The control number of the receiving report (RR) for items received and stocked and materials requisition and issuance slip (MRIS) for items that are issued;
- (f) Received. The quantity of the stock item actually received;
- (g) Issued. The quantity of the stock item issued;
- (h) Balance. The current stock balance, determined by subtracting the day's issue from the last stock balance entry.

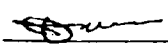
6. Transfer ticket (form No. 30)

The transfer ticket documents the transfer of a part, product or item from one department to another. Information on the form includes:

- (a) Control number. Printed, stamped or handwritten for reference purposes. Control and issue of blank forms is monitored by accounting;
- (b) Quantity. The total quantity being transferred to another department;
- (c) Unit. The standard unit of measure (pieces, sets etc.);
- (d) Description. The name or description of the item together with the part or product number if available;
- (e) From department. The department (or department code) from which the product is coming. The department quality control inspector initials in the block as having inspected the item billed;
- (f) To department. The department (or department code) that receives the item. The receiver signs to acknowledge receipt of the item;
- (g) Date. The department making the transfer indicates the date of transfer;
- (h) Remarks. Remarks on the transferred item.

Form No. 30 is normally printed in three copies, with different coloured sheets. Upon transfer of the part or product, the forwarding department gives the receiving department and accounting a copy and keeps one copy for the file.

FORM No. 30

EXPERTISE WOODWORKS CORP. 1747 Quezon Blvd., Quezon City, Metro Manila	
TRANSFER TICKET Control No. <i>TT-82/116</i>	
Quantity <i>40</i>	Unit <i>SETS</i>
Description: <i>GS-3636 Folding Tables with Folding Stools</i>	
FROM Department: <i>F</i>	TO Department: <i>N.F.G. Warehouse</i>
<i>Packing/Creating</i>	 Received by
Date:	
Remarks: <i>Lab Order - 82/178</i> <i>Index Order - 82/078</i>	

Entries are simultaneously made on the three copies using carbon paper. However, the following points should be considered when making entries with carbon paper:

(a) Over-use of carbon paper sheets leads to illegible entries on the second and third copies;

(b) To facilitate future inventory activities, the copy of form No. 30 intended for the department receiving the goods is usually attached or stapled to the goods or the pallett carts containing the goods. The lighter weight paper normally used to obtain carbon paper copies may not be strong enough for this type of rough handling and, thus, requires extra care.

In developing countries where carbon paper is not available or is very expensive but where perforating services are available, the three copies of form No. 30 may be printed (or mimeographed) on one sheet, with perforations separating each copy of the form. It is important to note, however, that the success of this method is greatly dependent on the ability of the personnel completing the form to avoid errors when entering the same data three times on the three parts of the form.

7. Supplier's performance report (form No. 31)

The supplier's performance report evaluates the performance of each supplier for a specific period with respect to delivery schedules, quality, conformance to specifications and quantities ordered. Information on the report includes:

(a) Date. The date of the purchase order, obtained from the purchase order file;

(b) Order. The amount ordered and the purchase order number, also obtained from the purchase order file;

(c) Description of item(s). The description used in the purchase order;

(d) Unit. The standard unit of measure (cubic metre, kilogram etc.);

(e) Delivery schedule. Delivery date and quantities indicated in the delivery schedule/remarks block of the purchase order;

(f) Net actual delivery. The actual delivery date and the quantity of items accepted by the quality control inspector as conforming to the required specifications;

(g) Remarks. Any shortage in quantities delivered, conformance of delivery to quality specifications, reasons for incomplete delivery, claims against deliveries (if any), or any other data pertinent to the delivery. The supplier's ranking according to the criteria established by the company may also be noted under the "remarks" column.

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

FORM No. 31

SUPPLIER'S PERFORMANCE REPORT

Name of SUPPLIER: PARKWAY LUMBER PRODUCERS, INC., Quezon City

Date	Order	Description of Item(s)	Unit	Delivery Schedule		NET Actual Delivery		Remarks
				Date	Quantity	Date	Quantity	
26 Mar. '82	300 cu. m.	25 mm. x 75-100 mm x 4.0 m. "Lauan"		26 Mar	150	29 Mar.	150	Partial Delivery
	PO-82/1142	Lumber, K.D. 8-10%, 7/8. 2 C/Bh - cu. m.		2 April	150	2 April	150	Complete PO-82/1142
13 April '82	250 cu. m.	25 mm. x 75-100 mm x 4.0 m., "Lauan"						Truck breakdown in
	PO-82/3901	Lumber, K.D. 8-10%, 7/8. 2 C/Bh. - cu. m.		26 April	100	2 April	50	warrant to Factory
				28 April	100	26 April	200	Complete P.O. - 82/3901.
7 April '82	15 cu. m.	25 mm x 25 mm x 3.0 m. "Lauan"		5 May	15	5 May	15	Complete P.O. -
	PO-82/3918	Lumber, K.D. 8-10%, S2S - cu. m.						82/3918
15 May '82	500 cu. m.	75 mm x 100 mm x 4.0 m. "Lauan"		15 May	100	24 May	100	Partial Delivery
	PO-82/3925	Lumber, K.D. 8-10%, S2S - cu. m.		31 May	100	29 May	100	Partial Delivery
				5 June	100	5 June	100	Partial Delivery
				11 June	100			
				18 June	100			

V. INFORMATION NEEDS AND DOCUMENTATION
IN PRODUCTION OPERATIONS

Among the various operating units of furniture and joinery manufacturing firms, the production unit is the largest source of data. The data are related mainly to the use of labour (direct and indirect), materials and supplies (direct and indirect) and power (electric, steam and compressed air) and to such fixed overhead cost items as depreciation of factory buildings, machinery and equipment, supervision costs, payroll expenses and amortization costs of special tools and equipment.

A. Materials usage

The basic documents used for monitoring the usage of materials and supplies are the materials requisition and issuance slip (form No. 32) and the returned materials report (form No. 33). These are prepared by a production clerk.

1. The materials requisition and issuance slip (form No. 32)

A sample of the MRIS, filled out to cover the issuance of raw materials to be used in the manufacture of products under job order 82/135, is presented in form No. 32. A copy of the materials requisition goes to the storekeeper who gathers and issues the materials called for on the MRIS. The materials requisition bears the job order number (for the job order costing) or product number (for standard costing) and specifies the type and quantity of materials required. The unit costs and the total costs of the materials are entered later on the requisition by the materials ledger clerk in the cost department.

The basic entries in the MRIS are as follows:

(a) Department from. The source of the material, normally the stockroom or warehouse. However, certain occasions arise when the stockroom or warehouse does not have enough in stock but the material is available in another department. The transfer of material to cover this transaction is also documented by the MRIS. For example, the engineering department (machine shop section) urgently needs paint that is not available in the stockroom but is available in the finishing department. Rather than delay completion of the project, arrangements were made between the heads of the engineering and finishing departments for the transfer of the paint to the engineering department. The entry in the block would therefore be "finishing" to cover the transfer in the MRIS;

(b) Department charged. The department that will be charged for the use of the materials. Normally, this is the department that prepared the MRIS;

(c) Type of material. Indicated by putting a check mark in the proper block;

(d) Job order number. The number of the job order for which the material is going to be used. If the material is to be used to manufacture a standard product, the name and code number of the product is written in this block instead;

(e) Quantity and unit. The quantity of the material being requested and the unit of measure (e.g., kilogram, cubic metre, litre etc.);

FORM No. 32

MATERIAL REQUISITION and ISSUANCE SLIP									
Dept. From:	Dept. Charged: <i>Machining NO.1</i>	<input checked="" type="checkbox"/> Check One	<input checked="" type="checkbox"/> Lumber Plywood	<input type="checkbox"/> Finishing	<input type="checkbox"/> Hardware	<input type="checkbox"/> Upholstery	<input type="checkbox"/> Supplies	<input type="checkbox"/> Others	Job Order No.: <i>LR-011</i>
Quantity	Unit	Description				Unit Cost	Amount		
<i>15</i>	<i>pcs.</i>	<i>Plywood, NARRA, 4MM x 1270 x 2440</i>				<i>\$ 8-</i>	<i>\$ 120-</i>		
Remarks:									
Ordered By: <i>[Signature]</i>	Issued By: <i>[Signature]</i>	Posted By: <i>[Signature]</i>	Received By: <i>[Signature]</i>						
Date: <i>25 Jan. 1983</i>	Date: <i>26 Jan. 1983</i>	Date: <i>5 Feb. '83</i>	I.D./Clock No. - <i>29</i> - Signature of Employee						

XWDCOR Form No. Jan. 1983 Control Number:

- (f) Description. The description and code number, if any;
- (g) Unit cost and amount. Filled in by the cost clerk upon receipt of the MRIS from the stockroom or warehouse;
- (h) Remarks;
- (i) Ordered by, issued by and posted by. The department supervisor requesting issuance of the material, the stock clerk who issued the requested items and the accounting clerk who posted the MRIS in the book of accounts sign and enter the date;
- (j) Received by. The signature and identification card number (where such a system is in use) of the person receiving the material;
- (k) Control number. Some firms consider materials requisition slips "accountable forms"; in order to account for MRIS issued and used, a control number is given on the lower right hand corner of the MRIS.

Figure 5 is a flow chart for the MRIS.

2. Returned materials report (form No. 33)

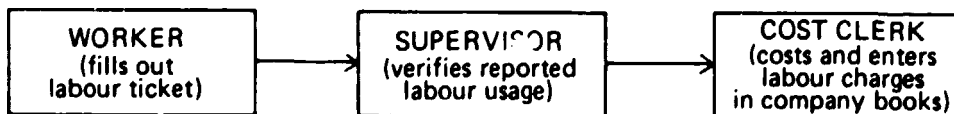
This report is filled out in the same manner as the MRIS, except that the block "reason for return" replaces "remarks" in the MRIS.

B. Labour usage

The direct labour ticket (form No. 34) is the basic document used to monitor direct labour usage; indirect labour usage is monitored through the indirect labour ticket (form No. 35), while labour not used for production activities is reported on the direct labour loss ticket (form No. 36). Many small and some medium-sized furniture and joinery shops in developing countries employ illiterate workers, but the form can be filled in by a production clerk, or in many instances the section supervisor, and be signed in some convenient manner by the worker.

Production and other workers are required to complete labour tickets, with the assistance of the supervisor, if necessary. Production (direct) workers normally complete a direct labour ticket (DLT) (form No. 34) to report on labour directly used to produce the product. However, if the production worker performs any indirect labour during the day, this labour is reported on the indirect labour ticket (ILT) (form No. 35). Workers who, for one reason or another, did not work the full number of working hours during the day or who were required to perform work that is not classified as direct or indirect labour report such labour on a direct labour loss ticket (DLL) (form No. 36). The total number of hours reported on all labour tickets (DLT, ILT, DLL) submitted daily by each worker should equal the number of required working hours per day.

The flow of the labour ticket is as follows:



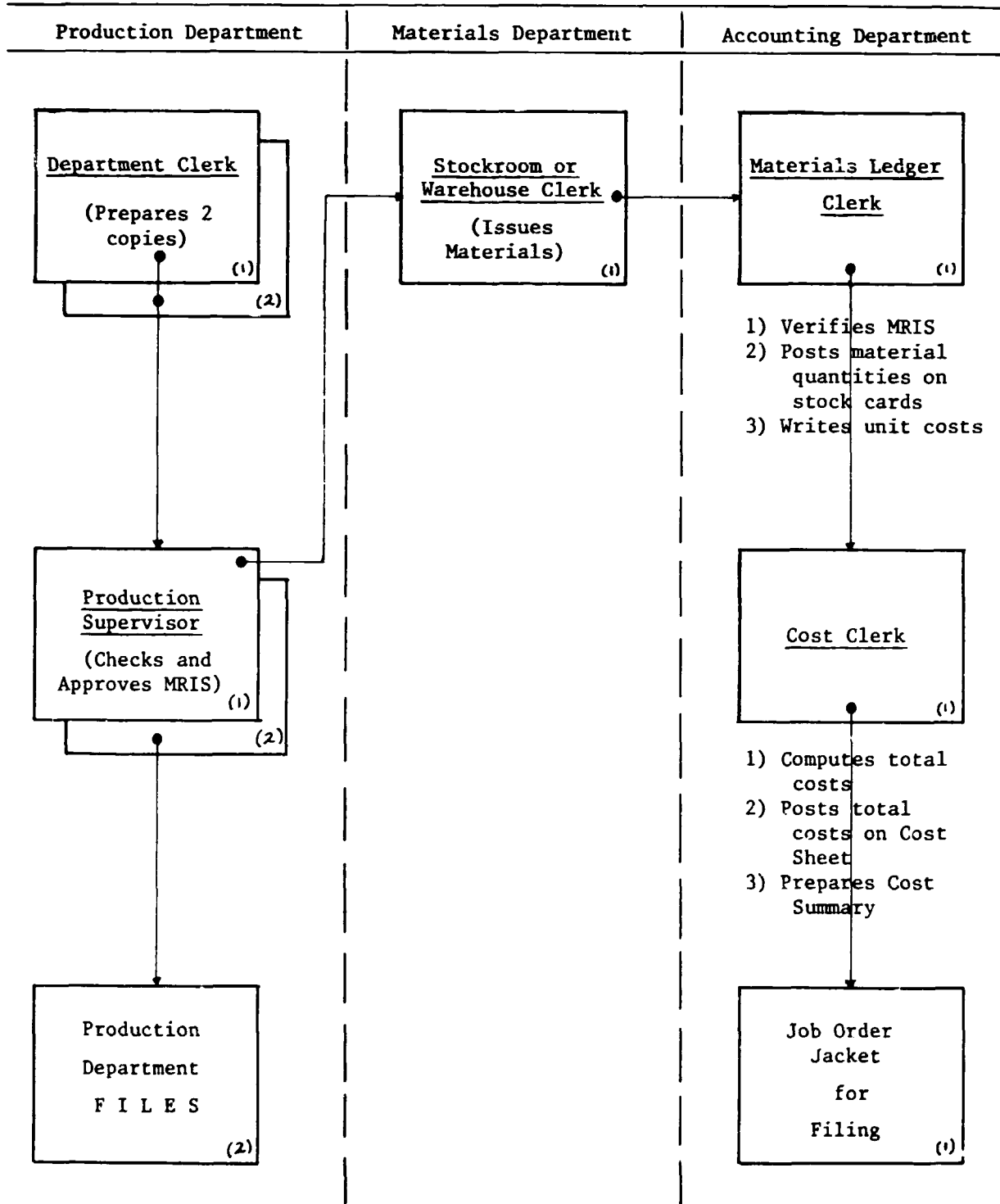


Figure 11. Flow chart for materials requisition and issuance slip (MRIS)

FORM No. 33

RETURNED MATERIALS REPORT									
Dept From: <i>Machining</i>	Dept Charged: <i>stock</i>	<input checked="" type="checkbox"/> Check One	<input checked="" type="checkbox"/> Lumber Plywood	<input type="checkbox"/> Finishing	<input type="checkbox"/> Hardware	<input type="checkbox"/> Upholstery	<input type="checkbox"/> Supplies	<input type="checkbox"/> Others	Job Order No.: <i>LR-018</i>
Quantity	Unit	Description					Unit Cost	Amount	
<i>6</i>	<i>pcs.</i>	<i>Lumber, LAUAN, kiln-dried, 25 x 150 x 4000 mm</i>							
Reason For Return: <i>Lumber not properly dried.</i>									
Ordered By: <i>[Signature]</i>			Date: <i>Feb. 2, 1983</i>			Received By: <i>38 [Signature]</i> I.D./Clock No. - Signature of Employee			

XWDCOR Form No. Jan 1983

Control Number:

Labour tickets should be printed on heavy paper and in different colours. A recommended colour scheme would be: DLT (form No. 34) - white paper; ILT (form No. 35) - light green paper; and DLL (form No. 36) - pink paper. If different coloured papers are not available three different colours of ink could be used.

1. Direct labour ticket (form No. 34)

There are only six entries on the direct labour ticket to be filled out by the worker:

(a) Department number original assignment. The department to which the worker belongs. The sample form also shows the code number assigned to the department;

(b) Job order reference. The job order number authorizing the manufacture of the product the labourer is working on;

(c) Description of work performed. The name of the operation performed by the worker. If the job order covers more than one product type, the name of the product being worked on by the labourer is also indicated in this block;

(d) Total hours worked. The total time spent by the worker on the product or product part, normally calculated to the nearest half hour. In some firms the hours worked are calculated to the nearest 15 minutes;

(e) ID number and signature of employee. The identification card number (if the firm uses cards) and the signature of the worker;

(f) Date.

The last entry, signature of supervisor, indicates that the entries filled in by the worker have been verified and checked.

2. Indirect labour ticket (form No. 35)

This form is filled out to document labour spent on activities other than those directly connected to the manufacture of the product. Some of the more common activities that should be reported on the indirect labour ticket are given in figure 15, chapter VIII. The indirect labour ticket is filled out in the same manner as the direct labour ticket, except that the job order number is not required and the name of the product or product part is not indicated in the description of work performed, as the work being reported on is not connected to the manufacture of a product or any of its parts.

3. Direct labour loss ticket (form No. 36)

This form is filled out to document the time spent by a worker on any activity that is not classified as direct or indirect labour. The worker signs the ticket and indicates the identification card number (if there is one). The supervisor attests to the reason for and number of hours spent on the activity by signing the ticket on the indicated space.

FORM NO. 34

DIRECT LABOUR TICKET			
Dept. No. Original Assignment	Job Order Reference	Description of Work Performed	Total Hours Worked
1 Machinery Dept.	LR-011	Operate Big Planer	8
16 <u>Pedro Reyes</u> I. O. No. and Signature of Employee		Date: 26 Jan. 1963	<u>[Signature]</u> Signature of Supervisor

XWDCOR
Form No.
Jan 1963

FORM NO. 35

INDIRECT LABOUR TICKET		
Dept. No. Original Assignment	Description of Work Performed	Total Hours Worked
4 Finishing Dept.	Belt Sander Helper, cleaned machine and work area, J.O. 11	1 1/2
32 I.D. No. and Signature of Employee	Juan de la Cruz	Date: Jan. 28, 1983
		Signature of Supervisor

KWDCOR
Form No.
Jan. 1983

FORM No. 36

DIRECT LABOUR LOSS TICKET			
I.D. No. and Signature of Employee	Indicate hour(s) loss opposite reason:	Hour(s)	Total Hours Worked
26 <i>Atkinson</i>	Power Failure	3	2 1/2
Date: Jan. 26, 1983	Machine breakdown; check-up; repairs	-	
<i>[Signature]</i>	Union/Company business meeting	2 1/2	
	Area cleaning	-	
Signature of Supervisor	Others (specify):	-	

XWDCOR
Form No.
Jan. 1983

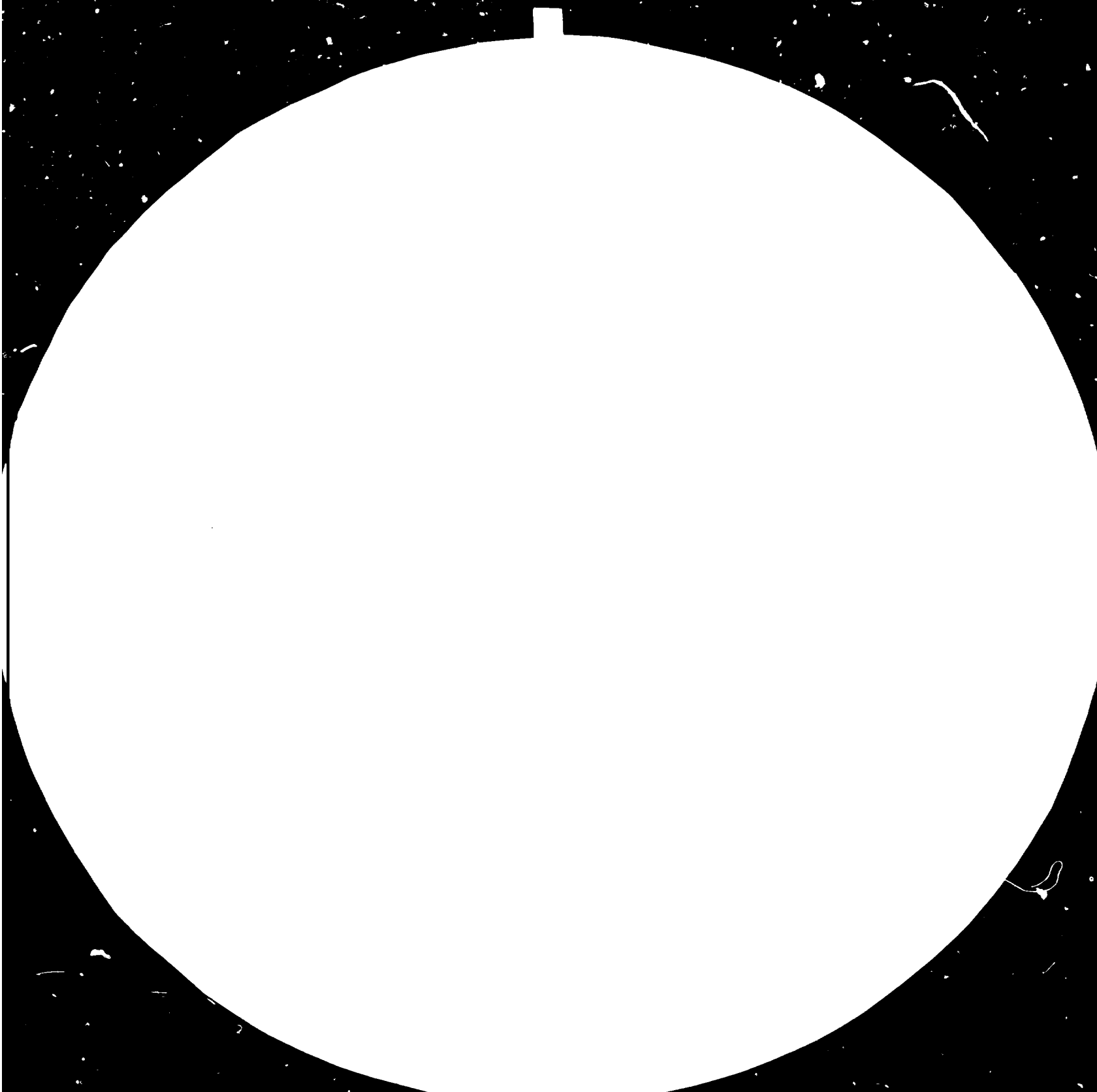
Note: The reasons for lost hour(s) may be revised to suit local conditions.



85.01.16

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II I E TIC





32

36

4



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-
1963-A STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

C. Machine use and status of repair

Even in small furniture shops with only a few pieces of machinery and equipment, it is not easy to keep track of the number of hours a piece of machinery or equipment is used each day without keeping a written record. It is even harder to recall how many hours and how often a machine or piece of equipment was not in operating condition without keeping a record of the down time of the machine or equipment. The need for keeping a continuous record of machine utilization and down time is essential for keeping production schedules; the need is even more urgent in medium- and large-scale furniture and joinery factories, which usually have large machinery and equipment complements. Normal factory practice requires that a record is maintained to indicate the number of hours a machine is used each day and indicating the down time, with the reason for it.

1. The machine/equipment log (form No. 37)

A machine and equipment log is usually maintained to keep track of the number of hours a piece of machinery or equipment is used in a day, week or other period of time. The record is kept by the machine operator and is hung or attached to some visible and accessible part of the machine or piece of equipment. The completed log is collected at regular intervals by the engineering unit, which collates and analyses the data in the log. Form No. 37 is a suggested format for a machine and equipment log.

The machine number, description, department where the machine is assigned and the period covered by the machine log are filled in by the engineering unit before the log is attached to the machine or piece of equipment. The machine operator or worker responsible for the operation of the equipment is required to make the proper entries as indicated in the form. The form is filled out in the following manner:

(a) Date;

(b) Machine operator. The signature and ID card number (if any) of the worker making the entries;

(c) Time columns. The time a machine is started is indicated with a check (✓) under the proper column; a cross (x) indicates the time it stopped. The sample form indicates that on the first working day of the week, 2 May 1982, the machine was started between 7 and 8 a.m. and stopped between 9 and 10 a.m. (presumably during the morning break period). The machine was started again between 9 and 10 a.m. and was used until about 12 noon. After the lunch break period (12 noon to 1 p.m.), the machine was used until 5 p.m., with a break between 3 and 4 p.m. Thus, the total time the machine was used during the day is indicated as 7 1/2 hours, allowing 15 minutes for each break period and reckoning time used on the basis of the nearest 30 minutes. The location of the (✓) and (x) marks in the column can indicate more accurately the time started or stopped. On 2 May, for example, the machine was started at about 7 a.m., the check (✓) being at the top of the column. The 15-minute morning break took place sometime between 9:30 and 10:00 a.m., as indicated by the location of the cross (x) and check (✓) in the 9 to 10 column;

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

FORM No. 37

MACHINE / EQUIPMENT LOG

Machine No.: P-026

Department Assigned: No.1, Machining

Machine Description: Heavy Duty Router, WADKIN "LS", 18,000 to 25,000 RPM,
Tilting Router Head, with Frequency Changer

For the week ending: 7 May, 19 82 Note: Mark with a ✓ TIME STARTED and X for TIME STOPPED.

Date	Machine Operator	A. M.						P. M.						A. M.						No. of Hours		Remarks						
		7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2		3	4	5	6	IN USE	IDLE
		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		↓	↓	↓	↓		
2 May	P. Cruz	✓		x			✓				x															7.5	0.5	
3	P. Cruz	✓		x			✓			x																11.5	0.5	3 Hours Overtime
4	P. Cruz	✓																								1.0	7.5	Router Head Motor Overheating.
5		x																								-	8.0	Machine under Repair
6	P. Cruz S. Paz	✓		x			✓			x																11.5	0.5	3 Hours Overtime
7	P. Cruz S. Paz	✓		x			✓			x																11.5	0.5	3 Hours Overtime
8																										-	-	Sunday - No Work
TOTAL HOURS THIS WEEK -----												43	17.5	Plant Operations only 8 Hours a day.														

WARNING :- DO NOT REMOVE this record from this machine!

Verified and checked:

S. C. Lopez

Foreman

Date: 7 May, 19 82

(d) Number of hours. The total time the machine was in use during the day is determined from the time columns by adding the hours between the (✓) and (x) marks. Short rest periods (in this case, 15 minutes each in the morning and afternoon) are indicated by (.) and (x) marks in the same slot. The working day has 8 hours. Deducting a total of 30 minutes for the two rest periods, the machine in the sample form was in use for 7 1/2 hours and idle for 1/2 hour on 2 May 1982;

(e) Remarks. Reasons for down time etc. needed to analyse the data;

(f) Verified and checked. The supervisor or foreman of the department or section to which the machine is assigned certifies the correctness of the entries in the log by signing and filling in the date when the log is completed.

There is only one copy of the form for each machine or piece of equipment in the factory. This copy is usually kept in a clipboard with transparent sheet cover and hardboard backing and attached to a visible and accessible part of the machine or piece of equipment.

Most large and some of the more advanced medium-sized furniture and joinery firms use more sophisticated machine logs which include types and quantities of product parts processed on the machine. A sample of such a machine log is presented and discussed in chapter VI (form No. 43).

2. Status of repair of machines and equipment

Up-to-date knowledge about the status of repair of machines that have broken down is essential to scheduling production. In larger firms, a report is prepared and distributed monthly by the engineering department (see chapter VII). However, in small shops where the production unit is usually responsible for maintenance, the need for a formal report on the status of machine repair is not necessary.

D. Periodic production report

Top management, finance and accounting, materials control and sales are dependent to a great extent upon reports on the progress of production operations to formulate or update their schedules of activities. Thus, the production unit is expected to provide up-to-date reports on the progress of its activities through daily and periodic production reports. In almost all small and some medium-sized furniture and joinery firms, the progress of production activities is posted on blackboards that are in easily visible and accessible places. Most medium- and large-sized plants use formal documentation to monitor production performance. Nevertheless, the data in both systems of reporting production performance are essentially the same.

1. Daily production report (form No. 38)

One of the simplest designs of a production report is presented as form No. 38, which covers the daily performance of a production department or section in a furniture firm that sells on a contract basis.

Form No. 38 is filled out as follows:

(a) Department/section. The department or section reporting;

- (b) Date. The working day covered by the report;
- (c) Job order number;
- (d) Product. The product number, if any, and a brief description of the product being manufactured under the job order number;
- (e) Part (unit). The product part and unit of measure. In more advanced companies, the part number is entered before the part name;
- (f) Scheduled. The quantity of parts scheduled to be produced during the day covered by the report;
- (g) Actual. The actual quantity of parts produced during the day;
- (h) Status. This column indicates whether actual production is ahead of (+), on (xxx) or behind (-) schedule and is calculated by subtracting the scheduled from the actual production for the day;
- (i) Remarks. For example, reasons for a shortfall in production;
- (j) Certified correct. The supervisor of the department or section signs to attest to the correctness of the entries in the report.

Three copies of the form are prepared and distributed as follows: one copy to production control, which uses the department or section report as the basis for a consolidated periodic production report; one copy to materials control; and one copy for the department or section files.

2. Consolidated weekly production report (form No. 39)

Based on the daily production reports submitted by the department or section heads, production control prepares a consolidated weekly production report on the performance of all production units. Similar reports covering monthly, quarterly, biannual or annual production performance may be prepared on the basis of the weekly and daily reports. These reports are also usually prepared by production control and copies are given to sales, accounting and materials control. Some small and medium-sized firms use this type of reporting. In large-scale operations, the use of computers (as discussed in chapter X), helps expedite the preparation and transmission of the larger volume of data in periodic production reports. No matter what system is used, the basic elements of information are still the same as those presented in form No. 39.

Form No. 39 is prepared as follows:

- (a) For the week ending. The last day of the week covered by the production report;
- (b) Job order number;
- (c) Product/part (unit). The product number, if any, brief description and unit of measurement;
- (d) Department/section. The performance of each department or section during the week. The entries are taken from the daily production report;

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

CONSOLIDATED WEEKLY PRODUCTION REPORT

For the Week ending : 9 May, 19 82

J. O. No.	Product/Part (unit)	Department / Section											
		Machining			Sanding and Assembling			Upholstering			Finishing and Packaging		
		Scheduled	Actual	Status	Scheduled	Actual	Status	Scheduled	Actual	Status	Scheduled	Actual	Status
82/135	GS-3636 Folding Table with stools, sets	325	325	xxx	300	300	xxx	---	---	---	300	300	xxx
82/138	SF-1002, Pupil's Desk for two, sets	610	612	+2	600	598	-2	---	---	---	---	---	---
82/132	LR-011, Living Room Set, "De Luxe", sets	---	---	---	---	---	---	5	5	xxx	5	4	-1
82/130	BR-028, Bedroom Set, "Premier", sets	---	---	---	---	---	---	---	---	---	3	3	xxx

- Copy Distribution:
- Sales
 - Production Control
 - Accounting
 - Materials Control

Verified and checked: *Juan delos Reyes*

Date: 11 May, 1982

(e) Verified and checked. The head of the production control unit (or the officer who prepared or verified the report) signs to attest to the correctness of the entries;

(f) Copy distribution. Normally, the sales, accounting and materials control units are given copies of the report; one copy is for the production files. However, depending on the needs of the monitoring and control system in use, copies of the report may be given to other units of the organization.

VI. INFORMATION AND DOCUMENTATION NEEDS IN INDUSTRIAL ENGINEERING ACTIVITIES

A. The role and scope of industrial engineering activities in manufacturing operations

Although it has a service rather than a production function, industrial engineering serves almost all units of the factory. It does not assume any line authority in the performance of its services.

The three major responsibilities of industrial engineering relate to the development, installation and maintenance of "work measurement"; wage incentives; and job evaluation.

"Work measurement" means labour standards - a labour measuring stick that determines the time it should take to perform a certain operation. Engineering techniques used to establish these standards may either be by time study (stop-watch method), method time measurement (MTM), standard data or a combination of these techniques. The data that is gathered is also used in the preparation of budgets and payroll, standard costs, production planning and control functions.

A system of wage incentives is expected to help increase production output by offering extra wages for production over and above set standards. The full support of management at all stages is required to develop, implement and maintain this system in a plant.

Job evaluation is a basic need for personnel administration in determining the interrelation of the various jobs within the manufacturing plant; it also helps determine the salary scale to be applied to different jobs in accordance with the required skills, effort, responsibility and working conditions.

Other services performed by industrial engineering include methods and operations analysis, production planning, plant and office layout, tool and gauge design, equipment evaluation, cost reduction techniques, setting up training programmes and other special projects that arise in manufacturing operations.

In small shops, the functions of industrial engineering are usually exercised by the owner or entrepreneur or by a deputy. Although not industrial engineering in its broadest sense, functions such as labour and material estimates, job evaluation and salary administration, production planning, layouts etc. are carried out even in small firms by a few employees.

As operations become more complex and manufacturing operations expand, as in medium- and large-scale industries, the functions of industrial engineering become wider in scope and are delegated to specialized groups. The bulk of the work, however, lies in the study of the various manufacturing operations, setting up time standards and rigid maintenance and control of these standards through continued work methods analysis and work simplification.

**B. Documentation of information and data
for scheduled activities**

1. Sequence of operations (form No. 40)

The sequence of operations form is a major reference tool for both production and service departments in making studies and analyses of each operation in the manufacturing line. The data make up a detailed list of operations in the order they are actually performed in the factory. Each production department is provided with a copy of the sequence of operations form indicating operations and relevant data for that department only. The data to be included are:

- (a) Department. Where the product part is being worked;
- (b) Product model number. The model, of which the workpiece is a part;
- (c) Part number and description;
- (d) Quantity/set. The quantity per set or the number of the particular part in each complete assembly of the product;
- (e) Operation number. A number is assigned to each operation performed in the processing departments by engineering. (A complete list of these operations, as identified in a plant in a developing country, is given in the annex.);
- (f) Description of operation. A concise but accurate description;
- (g) Crew. The number of workers normally required to perform the operation;
- (h) Standard. Output per hour is the required production per hour for the whole crew. Minutes per 100 pieces is the total minutes required to work 100 pieces (100 pieces is used to facilitate computation);
- (i) Machinery and equipment used. The identification number of the machine to be used, the brand and complete machine nomenclature, as identified by the manufacturer, and the total kilowatt energy rating of the electric motors installed in the machine. These data will be needed to compute in detail the energy requirements for the operation, which will be taken into consideration in cost estimates for new products;
- (j) Dimensions. The dimensions of the workpiece at each stage of machining;
- (k) Jig/fixture used. The code number of the jig or fixture;
- (l) Verified and checked. The name of the person who verified and checked the entries and the date.

The entries in form No. 40 are for a sequence of operations in the machining department. Sequences of operations are also set up for the other production departments that contribute to the complete production of the item of furniture, in this case a table leg. Thus, form No. 40 is the first page of the set, the second page would be for operations in the finishing department and the third page for operations in the assembling department.

2. Operations list (form No. 41)

The operations list is a summary of the operations performed on each part as it is processed through the various manufacturing departments. Form No. 41 is not distributed but is used primarily for costing purposes and is kept by the accounting department. The information on this form includes:

- (a) Part number and description;
- (b) Department. The department code number;
- (c) Operation number;
- (d) Number of men in crew. The number of workers required to perform the operation;
- (e) Hourly outputs. The required production output per hour, in pieces;
- (f) Minutes per 100 pieces. The total time (minutes) it should take to produce 100 pieces;
- (g) Total minutes per department per 100 pieces. The sum total of the standard minutes per 100 pieces for the department only. (Note: this is done to facilitate computation of time and the number of workers required in the particular department.)

3. Time study observation sheet (form No. 42)

The time study observation sheet (form No. 42) is the basic reference for present and future studies of an operation. It is, therefore, of prime importance that all information pertinent to the operation be noted down. The required data on the sheet are:

- (a) Element. The number and description of the element, which is a group of movements performed by the worker during one operation that is easily identified from other groups of movements;
- (b) Actual time. The observed time, in 10 cases, necessary for every element during the cycle;
- (c) Selected time. The selected time is normally the average of the 10 observed times. Unusually high or low readings, for example in element 2, observation 10 of the sample, where a clamp was defective, should not be included in the average;
- (d) Rating factor (RF) %. The performance rating of the operator as observed by the time study engineer. (100% is normal, less than 100% is slightly slower and above 100% is faster than normal);
- (e) Normal time. The selected time multiplied by the rating factor (also called levelling factor);
- (f) Occurrence. This is the frequency that element occurs during the cycle, expressed as 1/1 - once every cycle; 1/2 - once every 2 cycles; 2/1 - twice every cycle etc.);

OPERATIONS LIST			Part No. and Description: FT - 8, Table Leg			
Dept.	Operation No.	Description of Operation	S T A N D A R D			TOTAL Minutes per Department per 100 pieces
			No. of Men in Crew	Hourly Outputs (pieces)	Minutes per 100 pieces	
1	101	Cutting to rough length	2	150	40	
	104	Ripping to rough width	2	120	50	
	106	Surfacing four(4) sides	2	100	60	
	108a	Cant Sawing one end	1	80	75	
	108b	Cant sawing other end	1	100	60	
	123	Tenoning one end	1	150	40	
	111	Drilling holes for Woodscrews	1	100	60	
	137	Hand sanding	1	100	60	
					<u>445</u> vvvvv	
4	402	Spraying stain	1	120	50	
	403	Spraying wash coat	1	120	50	
	404	Sanding wash coat	1	200	30	
	405	Applying woodfiller	4	100	60	
	406	Spray sealer coat	1	80	75	
	408	Sanding sealer coat	1	120	50	
	410	Spraying first top coat	1	120	50	
	412	Spraying second top coat	1	120	50	
					<u>415</u> vvvvv	
6	601	Wrapping	1	200	30	

Distribution:

Accounting

Industrial Engineering

TIMESTUDY OBSERVATION SHEET

Element		Actual Time... Hundredths of a Minute										Sel Time	RF %	Normal Time	Occ.	Standard Time with 15% Allowance
No.	Description	1	2	3	4	5	6	7	8	9	10					
1	Pick up 10 pcs. of panels, to work table	15										0.15	0.95	0.1425	1/10	0.0164
2	Position panel to slot saw	7	8	6	7	6	6	6	7	7	7	0.0667	100	0.0667	1/1	0.0767
3	Machine slot	3	3	3	4	4	3	4	4	3	4	0.035	100	0.035	1/1	0.0402
4	Panel aside to Flap saw Table	6	7	7	7	8	7	8	8	7	8	0.073	100	0.073	1/1	0.0839
5	Flap cutting 2 side & Front	12	12	12	11	11	12	11	11	11	12	0.115	100	0.115	1/1	0.1323
6	Panel Aside	5	5	5	4	4	5	4	4	4	5	0.045	100	0.045	1/1	0.0513

Part No.	Description of Part	Operation No.	Description of Operation	Standard Time Minutes per Piece	0.4013
10547	Platform with Flap	6.37	Combined operations: slot sawing & Flap Cutting	Standard Time Minutes per 100 Pieces	40.13
Department: Machining, #1		Name(s) of Employee(s) Observed: Pedro de los Reyes		OUTPUT Pieces per Hour	149
Remarks: $\text{Output/hr.} = \frac{60 \text{ mins.}}{0.4013 \text{ min/pc.}} = 149 \text{ pcs./hr.}$				Observed by:	L. M. M.
				Date:	8 May 1982

TIMESTUDY OBSERVATION SHEET.....Continued

Material used on Part	Size (Dimensions of Part)	Weight per Part
5-ply, lumber core, veneered construction	9mm x 386mm x 358mm	1.62 kg.

Machinery / Equipment		Set-up Time (Minutes)	Frequency of Set-up	No. of Men in Crew	Labour Grade
Machine No.	Description				
402	Slot Saw, 1720 rpm	30 mins.	1/1800	} 1 Man	9
406	Flap Saw, 3450 rpm	15 mins.	1/1800		

No of Tools	Description of Tools	Material	No. of Teeth, Flutes Cutters	Bore	Spindle Speed, RPM	Tool Diameter	Feed Speed	Length of cut; Depth of cut.
CS-3/01	Circular saw, 12mm thick	HSS, TCT Teeth	150T	25mm	1720	152mm	Manual	{ 25 mm length 12 mm width 3mm thickness { 150 mm length 3mm thickness
CS-3/02	Hollow Ground Circular Saw	HSS, TCT Teeth	200T	25mm	3450	305mm	Manual	

Gauge No.	Description of Gauge	Gauging Frequency	Fixture No.	Description of Fixture
MPG-037	Width & Length of Slot	1/300	MPF-117	Panel Spitting Hold down fixture.

Sketch of Work Area:	Notes:

(g) Standard time with 15% allowance. Normally a 15% allowance is added to the basic operation time for personal rest and delay allowance (owing to rest or coffee breaks, use of safety devices, working position, monotony, working conditions etc.). The standard time is obtained by adding 15% to the product of normal time multiplied by occurrence:

$$\begin{aligned} \text{Normal time} \times \text{occurrence} &= \text{basic time} \\ \text{Basic time} + \text{allowance} &= \text{standard time} \end{aligned}$$

(h) Part number and description of part. The product part that was being worked on the machine during the time study observation;

(i) Operation number and description of operation. The operation being performed on the product part;

(j) Department. The department under which the operation is being performed;

(k) Name(s) of employee(s) observed;

(l) Standard time, minutes per piece. The total of the standard times for all elements in the cycle;

(m) Standard time, minutes per 100 pieces. The standard time per piece multiplied by 100;

(n) Output, pieces per hour. Calculated as:

$$\frac{60 \text{ minutes}}{\text{standard time, minutes per piece}}$$

In the sample, the calculation was noted in the "remarks" column;

(o) Observed by. Name of time study engineer or analyst making the observation;

(p) Date.

The second sheet of form No. 42 is a continuation of the first page and is normally printed on the back of it. The second page is filled out as follows:

(a) Material used on part. A brief description of the material used in making the part being processed during the time study observation;

(b) Size (dimensions of part). The finished dimension of the part;

(c) Weight per part. An approximate weight of the part being processed, usually expressed in kilograms;

(d) Machine/y/equipment. The machine number and a brief, accurate description of the machine(s) under observation;

(e) Set-up time. The time it takes to prepare the machine for processing the part;

(f) Frequency of set-up. The number of pieces that could be run before another set-up is required on the machine. Thus, the entry 1/1800 indicates one set-up for every 1,800 parts processed;

(g) Number of men in crew. The number of workers normally required to perform the operation;

(h) Labour grade. The rating or grade of the worker normally required to perform the operation;

(i) Number of tools. The code number(s) of the cutting tool(s) used in the operation;

(j) Description of tools;

(k) Material;

(l) Number of teeth, flutes, cutters. The number of cutting edges or cutterheads used on the machine during the operation;

(m) Bore. Size of bore;

(n) Spindle speed, RPM. The rotational speed of the cutting tool, normally expressed in revolutions per minute (RPM);

(o) Tool diameter. The diameter of the cutting tool, usually expressed in millimetres for circular saws and drill and router bits. For cutterheads (as in moulders and shapers and tenoners) the cutterhead diameter is entered in this block;

(p) Feed speed. The rate of feeding the workpiece into the cutting tool. In the sample the workpiece is pushed manually into the saws. Where the machine is equipped with a self-feeding device, the feed speed setting for the operation being observed is entered in this block. The feed speed is usually expressed in metres per second (mps);

(q) Length of cut; depth of cut. The dimensions of the cut made by the tool on the workpiece;

(r) Gauge number. The code number of the control gauge used to check the location and dimensions of the cut(s) made by the tool(s);

(s) Description of gauge. A short, accurate description of the gauge;

(t) Gauging frequency. The number of times the workpieces are gauge checked during the operations being observed. The sample indicates a gauging frequency of once every 300 workpieces machined;

(u) Fixture number. The code number assigned to the fixture used in the operation;

(v) Description of fixture. A short, accurate description of the fixture;

(w) Sketch of work area. A simple sketch (not to scale), indicating the relative positions of the machine, work table and worker. Important distances are also indicated;

(x) Notes. Other pertinent observations and comments that are deemed useful in evaluating the time study data.

C. Documentation in other industrial engineering activities

Among the various specific but non-scheduled activities of the industrial engineering unit are limited studies to improve costs and production performance and generate information that helps management with policy formulation and decision-making activities. Although the results of these studies are not distributed extensively among the firm's operating units, they are usually presented in formal documents that could be of use in future studies on similar topics. The scheme for the presentation of basic calculations in the following case studies can be helpful in the presentation of similar calculations used in reports, the quantification of benefits to the company arising from proposals to revise or totally replace certain operations in the production line, justification for the acquisition of additional assets, improvements in product design and construction etc.

1. Waste allowance factors in estimates of requirements

In most if not all furniture and joinery plants, operational waste on lumber, veneer or other wooden production materials, which are available only in standard commercial sizes, cannot be avoided. Waste is also generated in cutting fabrics, other types of covering materials, foam rubber sheets and other cushioning materials, which come in standard commercial sizes, in upholstery operations. Among the largest contributors to operational wastes are profiled product parts, whether of wood or some type of cushioning material. Although efforts can be made to choose the material size nearest to the requirements of the workpiece or product part to be processed, waste such as sawdust, trimming and edging offals and wastes that are due to the shape or profile of the product part are still generated.

Material wastage is part of the unit cost of the product, so waste generation should be kept at the lowest possible level. Establishing standard waste allowance factors by designing the most economical cutting patterns for lumber, veneer or plywood is one of the most effective ways of attaining this goal. The point is illustrated in the following case study.

CASE STUDY 1: CALCULATION OF WASTE FACTORS

Situation

A job order was opened for 5,000 pieces of table tops, 19 mm x 584 mm x 1,194 mm, 5-ply, lumber core, with high-grade face veneer and rotary-cut cross and back veneers. Operational waste factors were requested by the accounting unit in order to arrive at standard material costs for the job order.

Procedure

Calculations for gross dimensions

Operational requirements call for at least 12-mm allowances on the surface dimensions. Thus, the gross dimensions required for face veneer, core and back veneer are:

Width - 584 mm + 12 mm operational allowance = 596 mm
Length - 1,194 mm + 12 mm operational allowance = 1,206 mm

The dimensions of the cross veneer, whose grain should be oriented 90° from those of the other laminates, are:

Width - 1,194 mm + 12 mm operational allowance = 1,206 mm
Length - 584 mm + 12 mm operational allowance = 596 mm

Calculations for core lumber waste factor

Reports from purchasing indicated that the unit price for "shorts" (boards of less than 2.5 metres or 8 feet length) is about 60 to 65% of that for commercial size lumber. There are enough 25 mm x 75 mm x 1,220 mm kiln-dried shorts available to meet the requirements of the job order. Boards 19-mm thick would be preferable, but they are not available.

The furniture manufacturer builds 5-ply table tops from a solid wood core and four veneer laminates. The veneer components have thicknesses as follows:

Face veneer - 1 piece x 1.25 mm = 1.25 mm
Cross veneer - 2 pieces x 2.50 mm = 5.00 mm
Back veneer - 1 piece x 1.25 mm = 1.25 mm

Total veneer thickness 7.50 mm

A sanding allowance of 2 mm is made for the overall panel thickness. Thus, the solid wood core net thickness (after finish planing) is:

$(19 + 2) \text{ mm} - 7.5 \text{ mm} = 13.50 \text{ mm}$

There are two ways to cut slats from the 25 mm x 75 mm boards and get the desired thickness of laths (sticks) for edge-glueing (composing);

(a) The 25-mm boards are ripped on two edges to produce straight-edged boards required for edge-glueing operations, then planed down to 16.0-mm thickness. The 16.0 mm x 65 mm slats thus produced are then edge-glued to produce 596-mm wide panels. The composed core panel is then finish planed to get 13.5-mm thick panels. This method requires $\frac{596}{65}$, or 9-1/3 boards, and 9 glue

lines for each table top core panel;

(b) The 25 mm x 75 mm boards are planed down to 23-mm thickness, then ripped to 16-mm wide laths. Allowing for a 3-mm saw kerf, 3 pieces of 16 mm x 23 mm laths can be produced from each 25 mm x 75 mm board. The 16 mm x 23 mm laths are then edge-glued to produce 16 mm x 596 mm core panels, which are then finish planed to 13.5-mm thickness. This method requires $\frac{596}{23 \times 3}$, or 8-2/3 boards, and 26 glue lines for each table top core panel.

The choice between the two methods will depend on the cost of adhesives as compared to the cost of lumber. The second method will require more adhesive than the first. The furniture manufacturer in this case opted to use the first method in view of very high adhesive costs.

The core lumber waste factor is computed as:

$$\% \text{ waste} = \frac{\text{volume wasted}}{\text{total volume input}} \times 100\%$$

$$\frac{(25 \times 75 \times 1,219) - (13.5 \times 65 \times 1,206)}{(25 \times 75 \times 1,219)} \times 100\% = 53.7\%$$

The case problem would be simpler if 19-mm lumber shorts were available: The 19 mm x 75 mm boards are planed down to 16-mm thickness, then edge-ripped to about 70-mm wide laths to produce straight glueing faces. The 16 mm x 70 mm laths are then edge-glued to produce 16 mm x 596 mm core panels. These panels are further planed down to 13.5-mm thickness preparatory to veneer laying. This method requires $\frac{596}{10} = 8.5$ pieces of 19 mm x 75 mm boards and 8 glue lines for each 13.5 mm x 596 mm core panel.

Calculations for face veneer waste factor

In previous veneering operations in the firm, a bundle of face veneer flitches was scaled (number of sheets x average width x average length) and reported to contain a total surface area of 300 square metres. During the processing stages of previous face veneer preparation for another similar product (i.e., cutting to length, trimming irregular edges, jointing edges, splicing and final sizing to desired sizes) the following results were reported:

Total surface area of veneer flitches scaled and billed to production	298 sq m
<u>Production output at final sizing:</u>	
200 pieces, each 0.43 m x 0.87 m	= 78.82 sq m
315 pieces, each 0.38 m x 0.55 m	= 65.84 sq m
425 pieces, each 0.39 m x 0.56 m	= <u>92.82 sq m</u>
Total production output (good parts)	233.48 sq m

Waste (generated through production operations):

$$298 \text{ sq m} - 233.48 \text{ sq m} = 64.52 \text{ sq m}$$

$$\% \text{ waste} = \frac{\text{waste}}{\text{input}} \times 100\% = \frac{64.52}{298} = 21.65\%$$

Other job orders were checked for face veneer waste factors and the results did not vary significantly from 21.65%. Thus, this waste factor was recommended to be used for the job order for the table tops.

Calculations for cross veneer waste factor

The cross veneer that is available comes in 2,438 mm x 1,219 mm sheets.* The recommended scheme for cutting the available sheets into the required 1,206 mm x 596 mm size is shown in figure 6. The area of the cross veneer sheet is:

$$1,219 \text{ mm} \times 2,438 \text{ mm} = 2.972 \text{ sq m}$$

The area of the good parts produced per sheet is:

$$4 \text{ pieces} \times 0.596 \text{ m} \times 1.206 \text{ m} = 2.875 \text{ sq m}$$

Thus, the veneer waste is calculated as:

$$2.972 \text{ sq m} - 2.875 \text{ sq m} = 0.097 \text{ sq m}$$

To express the veneer waste, as a percentage, the following calculation is used:

$$\% \text{ waste} = \frac{\text{veneer waste}}{\text{original veneer sheet area}} \times 100\%$$

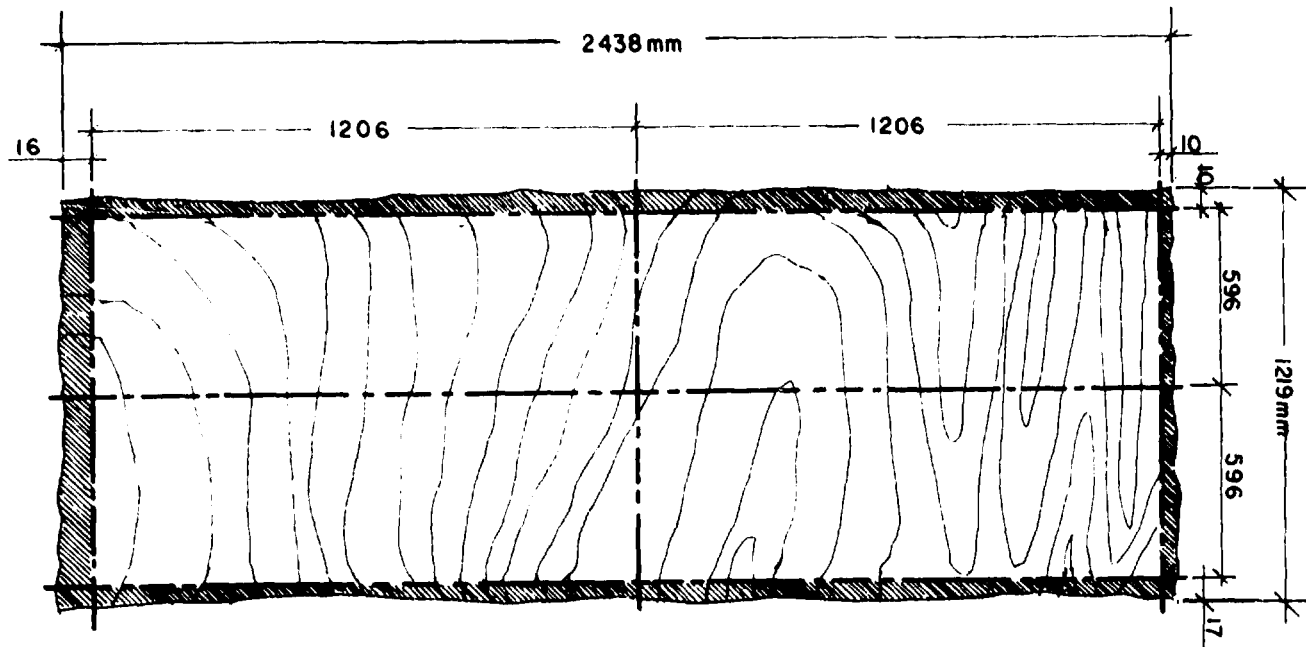
$$\frac{0.097}{2.972} \times 100\% = 3.26\%$$

Calculations for back veneer waste factor

The back veneer that is available comes in 1,219 mm x 2,438 mm sheets (in this case, the veneer grain is now along the 2,438-mm side of the sheet). The recommended scheme for cutting the sheets into the required 596 mm x 1,206 mm size is shown in figure 7. The area available per sheet of cross veneer is:

$$1,219 \text{ mm} \times 2,438 \text{ mm} = 2.972 \text{ sq m}$$

* In the veneer industry, the practice is to indicate the grain direction as the last dimension of the veneer sheet. Thus, in this case, the grains of the veneer sheet run parallel to the 1,219-mm edge of the sheet.



LEGEND :



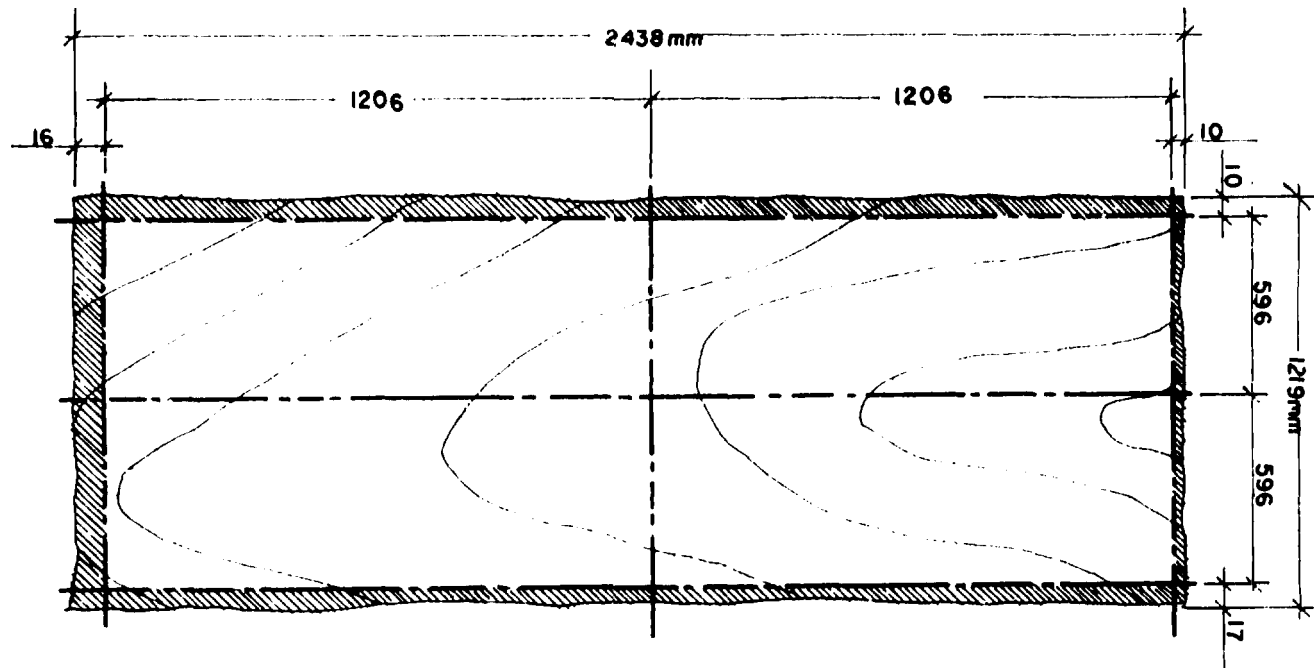
-  - Waste portion
-  - Clipping Lines

Figure 6. Cutting scheme for cross (blind) veneer



LEGEND :

-  - Waste portion
-  - Clipping Lines

Figure 7. Cutting scheme for bottom veneer

The area of the good parts produced per sheet is:

$$4 \text{ pieces} \times 0.596 \text{ m} \times 1,206 \text{ m} = 2.875 \text{ sq m}$$

Thus, the veneer waste is:

$$2.972 \text{ sq m} - 2.875 \text{ sq m} = 0.097 \text{ sq m}$$

Or, as a percentage:

$$\frac{0.097}{2.972} \times 100\% = 3.26\%$$

2. Machine utilization factor

Factory managers, particularly those operating on a job order basis, are always interested in knowing whether a piece of installed machinery or equipment is paying for itself. Since it is a very difficult and tedious task to evaluate all the work done by each piece of machinery or equipment in the factory, plant managers make use of the next best available data, the machine utilization factor, as an indication of whether the machine is paying for itself or not. The following case study calculates the machine utilization factor for a heavy duty, variable speed router in a furniture factory that sells from inventory and produces a standard line of furniture products on a serial basis, working one shift per day and six days per week.

CASE STUDY 2: CALCULATION OF THE MACHINE UTILIZATION FACTOR

Situation

Management desires to know if the newly acquired machine No. 455, a heavy duty, variable speed router, is paying for itself based on the established company minimum of 65% machine utilization for single-shift factory operations.

Calculations

The machine utilization report for the router for the week ending 7 May 1982 (form No. 43) was chosen as a representative weekly work load for the machine, which had been purchased three months earlier.

On the basis of an eight-hour work day, the total available machine hours is $8 \times 6 = 48$ hours. Form No. 43 shows that the router was used for a total of 40.5 hours during the week. Thus

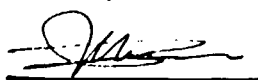
$$\text{Machine utilization factor} = \frac{\text{total hours machine was used}}{\text{total available machine hours}} \times 100\%$$

$$\frac{40.50}{48} \times 100\% = 84.38\%$$

The router, therefore, was considered to be paying for itself.

GENERAL WOODWORKS CO., INC.
1119 Broadway St., Manila

FORM No. 43

MACHINE UTILIZATION REPORT		Description of Machinery/Equipment: Heavy Duty Router, M/C No. 455			For the Week Ending: <u>7 May</u> , 19 <u>82</u>		
Date	Part (s) Worked on	Operations Performed	TIME		Quantity Produced	Signature of Operator	
			From To	Total Hours			
May	2	Table	Routing Cut-out	8:00	4.00	300	P. Cruz
				12:00			
	2	Table	Grooving rear slot	1:00	4.00	300	P. Cruz
				5:00			
	3	Machine Platform	Routing Cut-out	8:00	3.00	350	S. Pazy
				11:00			
					Routing lock keeper	11:00	1.00
			12:00				
			Routing slot	1:00	3.00	350	S. Pazy
				2:00			
			Grooving rear edge	3:00	2.50	350	S. Pazy
				4:30			
	4	Leaf Cover	Routing lock slot	4:00	2.00	300	P. Cruz
			Routing Lock Keeper	10:00	2.00	300	P. Cruz
				12:00			
	5	Table	Routing cut-out	8:00	2.00	250	P. Cruz
			Grooving rear slot	11:00	1.00	100	P. Cruz
				12:00			
			Grooving rear slot	11:00	2.00	150	P. Cruz
				2:00			
	6	Machine Platform	Routing cut-out	9:00	4.00	450	S. Pazy
					Routing Lock Keeper	1:00	2.00
			2:00				
			Routing Slot	2:00	2.00	350	S. Pazy
				5:00			
	7	Machine Platform	Routing slot	8:00	1.00	100	S. Pazy
		Leaf Cover	Routing lock slot	9:00	2.00	350	S. Pazy
			Routing lock Keeper	11:00	1.00	150	S. Pazy
				12:00			
			Routing lock Keeper	1:00	2.00	200	P. Cruz
				2:00			
Total Machine Hours Used -----					40.50	Noted by:	
Machine Utilization Factor :					 Supervisor Date: <u>7 May</u> , 19 <u>82</u>		
$\frac{\text{Total Machine Hours Used}}{\text{Total Machine Hours Available}} \times 100\% = \frac{40.50}{48.00} \times 100\% = 84.38\%$							

3. Amortization of cost of special tools, jigs and fixtures for a job order

Some features of furniture or joinery products require special tooling (profiled shaper or moulder knives, router bits) that usually cannot be used for the production of any other product. Similarly, the need for special jigs and fixtures arise. The cost of these production items, therefore, are charged to the job order requiring them by spreading the cost of the special items over the total number of products in the job order, as shown in case study 3.

CASE STUDY 3: AMORTIZING COSTS OF SPECIAL TOOLS,
JIGS AND FIXTURES

Situation

An order for 5,000 folding chairs requires the use of profiled router bits and specially designed assembling jigs. Management wishes to know how much should be added to the normal unit cost estimates to take care of the cost of special tools and assembling fixtures.

Calculations

Considering that the specially profiled router bits and assembling fixture cannot be used for any other job order, their full costs are charged to the 5,000 folding chairs as follows:

Two router bits, carbide-tipped, with special profile	\$100.00
Assembling fixture	<u>\$175.00</u>
Total	\$275.00

$$\text{Unit Cost} = \frac{\$275}{5,000 \text{ pieces}} = \$0.055 \text{ per folding chair}$$

4. Justification for the procurement of additional machinery and equipment

The procurement of additional machinery or equipment is usually due to:

(a) Obsolescence. Replacement of an existing machine when it is no longer economically possible to maintain because spare parts are no longer available and the use of locally fabricated spare parts prove more dangerous and expensive than the spare parts formerly supplied by the machine manufacturer;

(b) Deterioration of machine quality performance. Replacement because the existing machine has deteriorated to the extent that required machining precision could no longer be obtained from the machine;

(c) Increased work load requirements. The increase in work load could not be handled by the existing machine(s);

(d) Changes in design. Such changes occur at times and call for new machines to produce the product (i.e. copying lathes for turned parts);

(e) Changes in product design and production technology. For example, changing designs from use of tenons to dowels, the use of veneered particle board instead of solid wood etc.;

(f) Improvements in precision. Called for when introducing serial production.

Calculating the benefits to be derived from the acquisition of additional machines to replace machines that are obsolete or have deteriorated as regards machine performance is not extremely necessary because there is no other recourse but to buy replacements in order for the factory to stay in business. However, the purchase of additional machinery or equipment owing to an increase in the work load normally requires calculations to determine the number of new units to be acquired and, if required by management, conformity to standing policies on acquisition of new machinery or equipment.

The following case study is an example of justification for the purchase of additional machinery.

CASE STUDY 4: JUSTIFICATION OF PURCHASE OF NEW MACHINERY OR EQUIPMENT

Situation

A furniture factory with confirmed orders for the next 12 months is operating at a factor of about 90% machine utilization based on three shifts per day, six work days per week. Management would like to decide whether it is justified to purchase additional machinery under a company policy requiring a machine utilization factor of at least 50% for three shifts per day factory operations to produce 300 folding chairs per day.

Calculations

Reports from industrial engineering indicated that routing operations at the final machining section could be the critical point. The existing three router units are being used 90% of the time.

The available routing hours are:

$$3 \times (100\% - 90\%) \times 24 \text{ hours} = 7.2 \text{ hours per day}$$

The router time required to produce 300 folding chairs, based on 0.15 hours per chair, is:

$$300 \times 0.15 = 45 \text{ hours per day}$$

The router time deficit is:

Routing hours required by additional order	45.0 hours/day
Available routing hours	- <u>7.2 hours/day</u>
Routing time deficit	37.8 hours/day

The total number of additional router units required, based on a 24-hour working day, is therefore:

$$\frac{37.8 \text{ hours/day}}{24 \text{ hours/day/unit}} = 1.575 \text{ units or 2 units}$$

Two new router units are expected to have a machine utilization factor of:

$$\frac{37.8}{2 \times 24} \times 100\% = 78.75\%$$

This justifies the acquisition of two new router units under company policy on acquisition of new machines or equipment.

VII. INFORMATION AND DOCUMENTATION NEEDS IN
PLANT ENGINEERING ACTIVITIES

A. The role and scope of plant engineering activities
in manufacturing operations

One of the multi-functioned service units in most manufacturing organizations is plant engineering. Its functions cover regular and preventive maintenance of production or utility machinery and equipment; the provision of toolroom services such as saw-doctoring, knife and bit grinding; the fabrication of gauges and fixtures; and the maintenance of safety equipment. Where the volume of work does not require it to be a separate unit, industrial engineering is a part of plant engineering.

Maintenance operations require the co-ordination of maintenance crews to constantly check machines and carry out regular lubrication. Preventive maintenance, done in co-ordination with production authorities, provides for general check-up and servicing of machines according to a predetermined schedule, without waiting for a machine to break down. Sudden machine breakdowns are attended to and repaired within the shortest possible time.

In woodworking plants, a high degree of precision in the design, profiling and grinding of tool cutters is necessary. Jigs and fixtures must be properly designed and fabricated for smooth and convenient use by production, thus helping increase productivity.*

The maintenance of utility machines (air compressors, stand-by electric generators etc.) that provide the necessary energy for the production line, as well as the whole factory, must not be overlooked.

The overall safety of the plant is also one of the main responsibilities of plant engineering; fire-fighting equipment and machine safety fixtures must be kept in good operating condition, and adequate security from pilferage and trespassers must be ensured. The maintenance of buildings and grounds is also a responsibility of plant engineering.

B. Documentation needs of plant engineering

The variety of functions assigned to plant engineering together with the fluctuations in its work-load (particularly those involving maintenance and repair activities) make it difficult to operate without the aid of documentation and a workable information system. Plant engineering usually generates the second largest volume of basic information (after production).

*For details on the design of jigs, refer to the UNIDO "Manual on jigs for the furniture industry" (ID/265).

1. Repair work order (form No. 44)

The repair work order is a basic form for recording repair work and check-up services provided by plant engineering for sales, production or other service departments. The form may be used to request repair or maintenance services for production machinery and equipment, utility equipment, motor vehicles and, in some cases, office equipment and appliances.

The data required on the form are:

- (a) Control number. To be filled in by the receiving clerk of maintenance, according to a predetermined numbering system;
- (b) Machine number;
- (c) Description of machine/equipment/vehicle. Include the licence plate number of motor vehicles;
- (d) Department. The department to which the machine, piece of equipment or vehicle is assigned;
- (e) Observations/work required. The abnormal condition or problem. The nature of work required, if known to the requesting officer, is also written in this block;
- (f) Priority. Routine, for regular check-up only; urgent, if immediate attention is required; and emergency, if the repair service is needed to avoid or prevent loss of life or huge economic loss for the company;
- (g) Date. The date the machine, equipment or vehicle was turned over to plant engineering;
- (h) Approved by. The department supervisor requesting the repair service;
- (i) Assigned to. The maintenance personnel to whom the job was assigned;
- (j) Time received. The time of day the work order was received;
- (k) Date received;
- (l) Received and approved by. The maintenance engineer or supervisor on duty acknowledges receipt of the work order;
- (m) Description of work performed. Maintenance personnel assigned to the job indicate specific work done, the hours of labour, spare parts installed etc.;
- (n) Date and time completed. To be filled out by maintenance personnel;
- (o) Date and time started. To be filled out by maintenance personnel;
- (p) Total down time. To be filled out by the maintenance supervisor;
- (q) Repairs checked/approved by. Signature of the plant engineer;

(r) Noted by. Signature of the supervisor of the requesting Department upon receipt of the repaired vehicle or machine.

2. Vehicle repair status (form No. 45)

No matter how small a furniture or joinery firm is, its conduct of business is dependent upon the availability of vehicles for delivering finished goods to customers, visiting potential customers and collecting from customers whose orders have been delivered, transporting company officials on business errands for the company etc. Effective planning of the day-to-day activities of company personnel and executives, therefore, is facilitated if knowledge of the status of vehicles under repair is available. Formal documentation may not be necessary in small and some medium-sized furniture or joinery firms. However, in large and more advanced medium-sized furniture and joinery plants, documentation is usually required.

A sample format for a report on vehicle repair status is presented as form No. 45. The report is prepared by the vehicle maintenance section of the plant engineering unit, and copies are furnished to all company units that have vehicles under repair or for servicing.

The entries in form No. 45 are the following:

- (a) Vehicle number. The vehicle plate number;
- (b) Description. The manufacturer's name and description of the vehicle;
- (c) Repair work order number. The corresponding repair work order control number;
- (d) Defects/complaints. The reason for which the vehicle has been brought for servicing or repair;
- (e) Date started. The date work on the vehicle was started;
- (f) Percentage of completion. The estimated percentage of completion of the work performed, indicated by an (x) in the appropriate block;
- (g) Estimated completion date. The date the vehicle is expected to be back in service;
- (h) Remarks. For example, on additional work to be done on the vehicle, parts to be or being procured and other statements relevant to completion of the repair work on the vehicle;
- (i) Verified and checked. The signature of the head of the maintenance section.

3. Vehicle service card (form No. 46)

A record of maintenance and repair work done on a vehicle is helpful to the maintenance engineer for the same reasons that a dentist or doctor keeps a record of dental or medical services to patients. The vehicle service card is maintained to help the maintenance engineer analyse future problems arising from continued use of a vehicle. The vehicle service card also provides a

EXPERTISE WOODWORKS CORPORATION
 1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

VEHICLE REPAIR STATUS

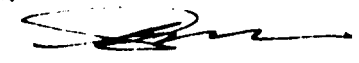
For the Week Ending: 7 May 1982

VEHICLE		Repair Work Order No.	Defects/Complaints	Date Started	% Completion Mark (X) on appropriate block.										Estimated Completion Date	Remarks		
No.	Description				10	20	30	40	50	60	70	80	90	100				
S-009	TOYOTA "Corona" 4-Dr. Sedan, 1600 cc, Blue	S-110	Engine Overhaul	2 May	x												20 May	Waiting for delivery of Overhaul Kit.
S-006	TOYOTA "Corona" 4-Door Sedan, 1600 cc., Red	S-122	Hard Starting, Engine Oil Leak	6 May				x									10 May	Waiting for delivery of Engine Gasket
T-012	ISUZU, "H-120" 3/4 Ton Truck, Diesel	S-123	Defective Brakes	7 May	x												12 May	Brakeshoes for re-lining. Masterbrake cylinder replacement ordered.

COPY DISTRIBUTION:

- Sales Administration Engineering
 Production Materials Control

Verified and checked:


 Date: 4 May, 1982

basis for a decision on the economic advantage of keeping a vehicle or disposing of it. The form is useful for a furniture or joinery manufacturer who maintains vehicles for business, no matter what size the firm may be.

Form No. 46 is a sample format of a vehicle service card. Only one copy of the form is maintained and kept on file in the engineering office. The first portion of the form is the description and is filled out when the vehicle is acquired by the firm, usually when the vehicle is sent to the maintenance section for first inspection and the assignment of a company vehicle number.

The first line of the block - "refer to manufacturer's service manual" - is also filled out when the card is completed for the first time. It is used to record the publication, usually a handbook or owner's manual, used as a reference or guide for all service and repair on the vehicle. The remainder of the block portion is filled out whenever the vehicle is sent to the maintenance shop for repair or servicing. It is filled out as follows:

- (a) Date. The date the maintenance or repair job was completed;
- (b) Odometer reading. The kilometre or mileage reading at the time the vehicle was turned over to the maintenance shop for servicing or repair;
- (c) Service performed. The description of the service or repair job done on the vehicle and the name of the mechanic who did the job;
- (d) Remarks. Usually about materials used in the service job or information that could be used as a guide for future repair or service.

4. Monthly summary - vehicle maintenance/repair service (form No. 47)

In large and some of the more advanced medium-sized furniture and joinery firms, where day-to-day operations are affected by the availability of company vehicles, management usually requires a monthly summary of work done on company vehicles for monitoring and control purposes.

Form No. 47 is a sample of a monthly summary for vehicle maintenance and repair service, which would be prepared by the plant engineering unit and distributed to all company units with vehicles. The document is filled out as follows:

- (a) Month ending. The last day of the month covered by the report;
- (b) Repair work order number. The control number of the request for repairs;
- (c) Vehicle. The number of the vehicle assigned by the company, a short accurate description and the department to which the vehicle is assigned;
- (d) Maintenance/repair service performed. A brief, accurate description of the repair or service job, the costs of the materials and labour directly used for the repair or servicing and the sum of the materials and labour costs charged against the repair job;
- (e) Remarks. Observations that would be useful for future reference.

EXPERTISE WOODWORKS CORPORATION
1747 QUEZON BLVD., QUEZON CITY, METRO MANILA

FORM No. 47

MONTHLY SUMMARY - VEHICLES MAINTENANCE/REPAIR SERVICE
For the MONTH Ending: 31 May, 19 82

Repair Work Order No.	Vehicle			Maintenance/Repair Service Performed			Remarks
	Vehicle No.	Description	Dept. Assigned	Description	Material Cost	Labour Cost	
S-110	S-009	Toyota "Corona" 4-Dr., Blue	Sales	Engine Overhaul	\$242	\$ 85	\$ 327
A-111	M-101	Ford "Grenada" 4-Dr., Blue	VP Admin.	T-B-A Check-up and Service	20	35	55
A-112	S-002	Toyota "Corona" 4-Dr., Brown	Sales	Lubrication and Tune-up	16	12	28
MC-113	W-002	Isuzu, 3-ton Lorry, Diesel	F.G. Warehse.	Change Tie Rod	23	18	41
S-114	S-003	Toyota "Corolla" 4-Dr., Red	Sales	Lubrication and Tune-up	14	10	24
S-115	S-004	Toyota "Corolla" 4-Dr., Blue	Sales	Change Left Front Tire	50	18	68
A-116	M-101	Ford "Grenada" 4-Dr., Blue	Admin.	Lubrication and Tune-up	20	15	35
MC-117	W-006	Isuzu, 3-ton Lorry, Diesel	F.G. Warehse	Lubrication and Tune-up	42	21	63
P-118	P-001	Toyota "Corona" 4-Dr., Grey	Prod.	Lubrication and Tune-up	16	12	28
FA-119	F-001	Toyota "Crown" 4-Dr., Red	VP Finance	Change Battery	37	4	41
S-120	S-010	Toyota "Land Cruiser", Diesel	Sales	Lubrication and Tune-up	18	12	30
E-121	E-001	Toyota "Corona" 4-Dr., Red/White	VP Eng'g	Lubrication and Tune-up	16	12	28
S-122	S-006	Toyota "Corona" 4-Dr., Red	Sales	Replace Engine Gasket, tune-up	112	42	154
S-123	T-012	Isuzu, "H-120" 3-ton truck, Diesel	Sales	Replace Brakeshoe, all wheel & brakemastery	231	65	296
S-124	S-001	Toyota "Crown" 4-Dr., White	VP Sales	Lubrication and Tune-up	20	15	35

COPY DISTRIBUTION:
 Sales Materials Control Accounting
 Administration Production

TOTALS ----- \$877 \$376 \$1,253

Verified & checked: _____

Date: 3 June, 19 82

5. Machine/equipment service card (form No. 48)

The machine and equipment service card is kept and maintained by the engineering unit (maintenance section) for the same reason as a vehicle service card. Each piece of machinery and equipment is covered by a service card.

As in form No. 47, the first portion of the card is for the description and specifications of a machine or piece of equipment. This portion is filled out by the engineering unit upon receipt and installation of the machinery or equipment. The title of the manufacturer's service manual is also entered at that time. The remainder of the block portion is filled out each time the machine or piece of equipment is serviced or repaired. The entries in the sample are for maintenance and repair jobs on a four-side planer, as follows:

(a) Date. The date of service or repair;

(b) Service performed. A short but accurate description of the service or repair, the department for which the service or repair was performed and the name of the mechanics or maintenance personnel who performed the service or repair;

(c) Remarks.

6. Monthly summary - machinery and equipment maintenance/service (form No. 49)

This document is prepared and distributed for the same reasons as form 47 for vehicles. The form is filled out as follows:

(a) For the month of. The month and year covered by the report;

(b) Machine/equipment. The number of the machine or piece of equipment assigned by the firm, a brief, accurate description and the department to which the machine or piece of equipment belongs;

(c) Maintenance/repair service performed. A brief, accurate description of the service or repair, the costs of materials and labour directly used in the repair or service and the sum of the cost of materials and labour;

(d) Remarks. Observations that would be useful for future repair or service on the machine or equipment.

EXPERTISE WOODWORKS CORPORATION
MACHINE/EQUIPMENT SERVICE CARD

FORM No. 48

Machine No.: P - 038

Page: 6

Machine Description: 4-Side Planer, "Iida 100"

Major Components:

Electric Motors:-
1 x 1.4kw, 440V, 60H, 3Ø

Electronics:-
Power Pack, 0.11 kw
6VDC

Pneumatics:-
5/3DSA Controlled,
3 mm.

Hydraulics:-

2 x 11.2 kw, 440V, 60H, 3Ø

Micro-sensor, Model

3/2 PBA-SR Control
Valve, 3mm

2 x 3.7kw, 440V, 60H, 3Ø

D/A-C, 125mm x 30cm
Air cylinder

Refer to Manufacturer's Service Manual

"Iida 100", 4-Sid Planer Service Handbook.

Date	Service Performed			Remarks
	Description	Department	By	
1982 2 April	Lubrication check	Machining	J.C. Reyes	Routine
9	-do-	-do-	J.C. Reyes	-do-
16	-do-	-do-	J.C. Reyes	-do-
23	-do-	-do-	J.C. Reyes	-do-
28	Replaced overload relay	-do-	S.P. Cruz	Contact points worn out
30	Lubrication check	-do-	J.C. Reyes	Routine
7 May	-do-	-do-	J.C. Reyes	-do-
14	-do-	-do-	J.C. Reyes	-do-
21	-do-	-do-	J.C. Reyes	-do-
24	Replaced micro-sensor	-do-	S.P. Cruz	Resistor defective
28	Lubrication check	-do-	J.C. Reyes	Routine

EXPERTISE WOODWORKS CORPORATION

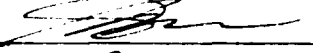
FORM No. 49

MONTHLY SUMMARY - MACHINERY and EQUIPMENT MAINTENANCE/REPAIR SERVICE
For the Month of: May, 1982

Machine / Equipment			Maintenance / Repair Service Performed			Remarks	
No.	Description	Department Assigned	Description	Material Cost	Labour Cost		Total Direct Cost
P-012	Hydraulic Swing Saw, WADKIN	Machinery	Routine Lubrication and check-up	\$ 1	\$ 2	\$ 3.00	
P-013	Straight Line Edger, WADKIN	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-014	Gang Ripsaw, SCM/M-3	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-015	Gang Ripsaw, SCM/M-3	Machinery	Change Feed Drive Fuse	1	1	2.00	
P-016	Vertical Panel Saw, SCM	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-017	Planer, 1-Head, SCM/F-10	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-022	Heavy Duty Router, "SHODA"	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-024	Tilting Arbor Saw, WADKIN	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-050	Multiple Drill, "FELL"	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-026	Tilting Arbor Saw, WADKIN	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-031	Vertical Spindle Moulder, MARTIN	Machinery	Change over-load relay	26	5	31.00	
P-034	Vertical Spindle Moulder, MARTIN	Machinery	Routine Lubrication and check-up	1	2	3.00	
P-036	Single End Tenoner KIKUKAWA	Machinery	Change fuse first cutterhead drive	1	1	2.00	
P-038	Four-Side Planer Iida	Machinery	Regular Lubrication and check-up	1	2	3.00	
P-041	6-Head Moulder, TORWEGGE	Machinery	Regular Lubrication and check-up	1	2	3.00	

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 Production Materials Control Quality Control
 Administration Accounting

TOTALS --- \$40.00 \$31 \$71.00

Verified and checked: 
 Date: 7 June, 1982

VIII. COSTING AND PRICING

In manufacturing operations decisions are based on information on costs provided by accounting reports. Cost accounting, or costing, consists of three basic phases: (a) determination and measurement of costs; (b) cost planning and control through budgets and standards; and (c) cost analysis for decision-making purposes. The present chapter addresses the steps and documentation needed to determine and measure manufacturing costs in small-, medium- and large-scale furniture or joinery manufacturing operations. The costing methods commonly used in manufacturing operations are: (a) job order costing; (b) process costing; and (c) standards costing.

In the job order costing method, the various orders and their costs are kept separate during manufacture. A variation of the job order costing method is costing by lots. For example, a contract for 1,000 folding chairs can be broken down into 10 lots of 100 units each, which can be more conveniently processed in the medium-sized factory. The main handicap with this costing technique, however, is that actual costs are not known until the job or lot is completely manufactured, thus making it difficult to control costs. Furthermore, overhead costs allocated to each job or lot can only be approximate until the end of the fiscal year when all overhead cost components become known.

The process costing method consists of computing an average unit cost for production by dividing the total manufacturing cost by the total number of units produced in the factory over a specified period of time. This method is useful in, for example, flour mills, breweries, chemical plants and textile factories; it is not recommended to manufacturers of furniture and joinery products.

The standard costing method is based on the comparison of actual accumulated costs against predetermined cost estimates of the elements of a product for a chosen accounting period. Variances between actual and standard costs are up-to-date indicators of the production performance even before a product is completely manufactured. This method is highly recommended for more advanced medium-sized and large-scale furniture or joinery manufacturing firms, particularly those that operate on a serial production basis and with some degree of product specialization.

Although the data required for all three costing methods are the same, forms of presenting the data differ according to the costing method and management's requirements. The information system and documentation required under the job order and standard costing systems are discussed below.

A. Cost accounting in furniture and joinery production

The flow of products through the various manufacturing operations determines the type of costing technique. The costing procedures described below refer to the general flow processes involved in the production of joinery and solid wood, upholstered and panel-based furniture products. Figures 8 and 9 show the flow processes for solid wood and panel-based furniture production, respectively, while figure 10 shows the flow process for the production of upholstered furniture products. Joinery products follow an almost identical flow process. The cost elements involved in each step of the flow processes

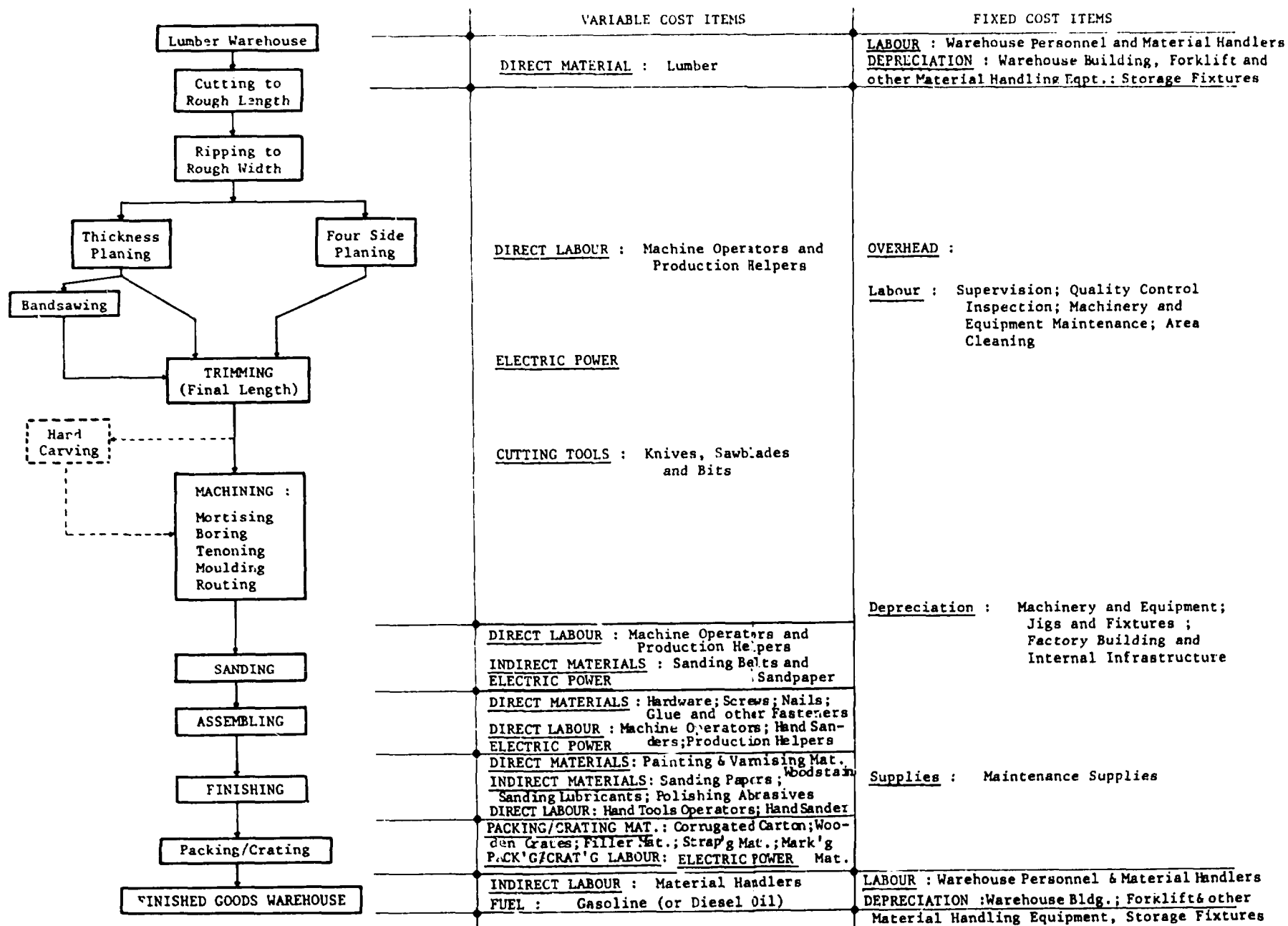


Figure 8. Flow process for solid wood furniture and joinery manufacturing

are also indicated in figures 8, 9 and 10. The general flow of activities to gather and record cost data connected to the manufacture of furniture and joinery products is shown in figure 11, which also indicates that cost accounts are extensions of general accounts. The relationship between general and cost accounts is illustrated in figure 12 using the T-bar presentation of debit and credit entries commonly used in accounting. The arrows indicate the sources of entries in the cost accounts involved in manufacturing operations.

The flow charts for the job order costing method and the standard costing method are shown in figures 13 and 14, respectively.

Cost accounting makes extensive use of control accounts. The following schedule lists the generally used control accounts with their subsidiary ledgers or records:

<u>Cost control accounts</u>	<u>Subsidiary ledgers</u>
Materials	Materials cards - perpetual inventory
Factory overhead	Factory overhead ledger and departmental expense analysis sheets
Work-in-process	{ Costs sheets - job order costing method Production reports - process costing method
Finished goods	Finished goods ledger cards
Machinery and equipment	Plant ledger

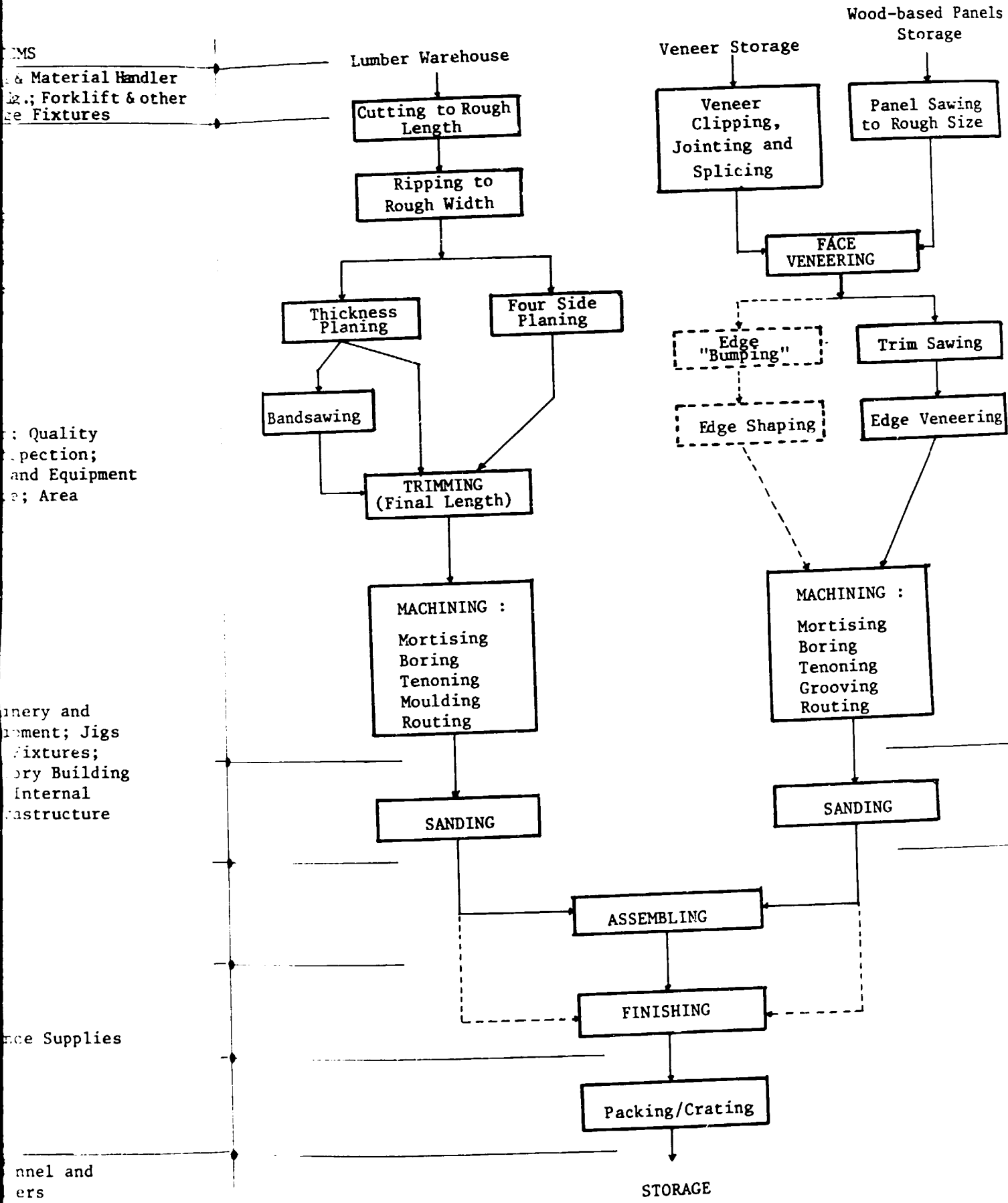
B. The cost accumulation process

At the artisan level of manufacturing industry, particularly in furniture and joinery production, the price of the product does not necessarily reflect its true cost but it usually reflects the value placed by artisans on their talents. In industrial operations, however, it is important and necessary to know the true cost of a furniture or joinery product, especially because the cost is the basis for pricing, budgeting and planning operations. The process of gathering, collating and presenting data into groups and forms useful to managers is known in accounting practice as cost accumulation.

Some costs vary directly in relation to changes in the volume of production output; these are known as variable costs. Other costs, however, remain more or less fixed as they are incurred in relation to time and do not vary as output volume changes; these are known as fixed costs. In most small and some medium-sized furniture and joinery manufacturing firms, cost elements fall into three basic groups: materials, labour and manufacturing overhead. Materials and labour are considered the variable components of the product cost, while manufacturing overhead is treated more or less as fixed cost. Figure 15 lists the cost elements commonly encountered in furniture and joinery manufacturing operations, grouped according to the type of manufacturing cost.

VARIABLE COST ITEMS	FIXED COST ITEMS
<u>DIRECT MATERIAL</u> : Lumber	<u>LABOUR</u> : Warehouse Personnel & Material Handler <u>DEPRECIATION</u> : Warehouse Bldg.; Forklift & other Mat. Handling Eqpt.; Storage Fixtures
<u>DIRECT LABOUR</u> : Machine Operators and Production Helpers	<u>OVERHEAD</u> :
<u>ELECTRIC POWER</u>	<u>Labour</u> : Supervision; Quality Control Inspection; Machinery and Equipment Maintenance; Area Cleaning
<u>CUTTING TOOLS</u> : Knives, Sawblades and Bits	
<u>DIRECT LABOUR</u> : Machine Operators & Production Helpers <u>INDIRECT MATERIALS</u> : Sanding Belts & Sandpapers <u>ELECTRIC POWER</u>	<u>Depreciation</u> : Machinery and Equipment; Jigs and Fixtures; Factory Building and Internal Infrastructure
<u>DIRECT MATERIALS</u> : Hardware; Screws; Nails Glue & Other Fasteners <u>DIRECT LABOUR</u> : Machine Operators; Hand Sanders; Production Helpers <u>ELECTRIC POWER</u>	
<u>DIRECT MAT.</u> : Painting & Varnishing Mat. <u>INDIRECT MAT.</u> : Sanding Papers; Sanding Lubricants; Polishing Abrasives <u>DIRECT LABOUR</u> : Hand Tools Operators; Hand Sanders; Polisher & Production Helpers	
<u>PACKING/CRATING MATERIALS</u> : Corrugated Carton; Wooden Crates; Filler Mat, Strap'g Mat.; Marking Materials <u>PACK'G/CRAT'G LABOUR ; ELECTRIC POWER</u>	<u>Supplies</u> : Maintenance Supplies
<u>INDIRECT LABOUR</u> : Material Handlers <u>FUEL</u> : Gasoline (or Diesel Oil)	<u>LABOUR</u> : Warehouse Personnel and Material Handlers <u>DEPRECIATION</u> : Warehouse Building; Forklift & other Material Handling Eqpt.; Storage Fixtures

Band



MS
 & Material Handler
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: Quality
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 Fixtures;
 ury Building
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ce Supplies

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 ers
 Building; Fork-
 andling Eqpt.;

Figure 9. Flow process for panel-based furniture manufacturing

VARIABLE COST ITEMS

FIXED COST ITEMS

Wood-based Panels Storage

LABOUR: Warehouse Personnel & Material Handlers
DEPRECIATION: Warehouse Bldg.; Forklift & other Material Handling Equipment; Storage Fixtures

DIRECT MATERIAL : Veneer, Plywood

Panel Sawing to Rough Size

DIRECT MATERIAL : Glue

OVERHEAD :

CE
SING

DIRECT LABOUR : Machine Operators and Production Helpers

Labour : Supervision; Quality Control Inspection; Machinery and Equipment Maintenance; Area Cleaning

Trim Sawing

Edge Veneering

ELECTRIC POWER

Depreciation : Machinery and Equipment; Jigs and Fixtures; Factory Building; Internal Infrastructure

ENING :
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CUTTING TOOLS : Knives, Saw-blades and Bits

DIRECT LABOUR: Machine Operators & Production Helpers
INDIRECT MATERIALS: Sanding Belts & Sandpapers
ELECTRIC POWER

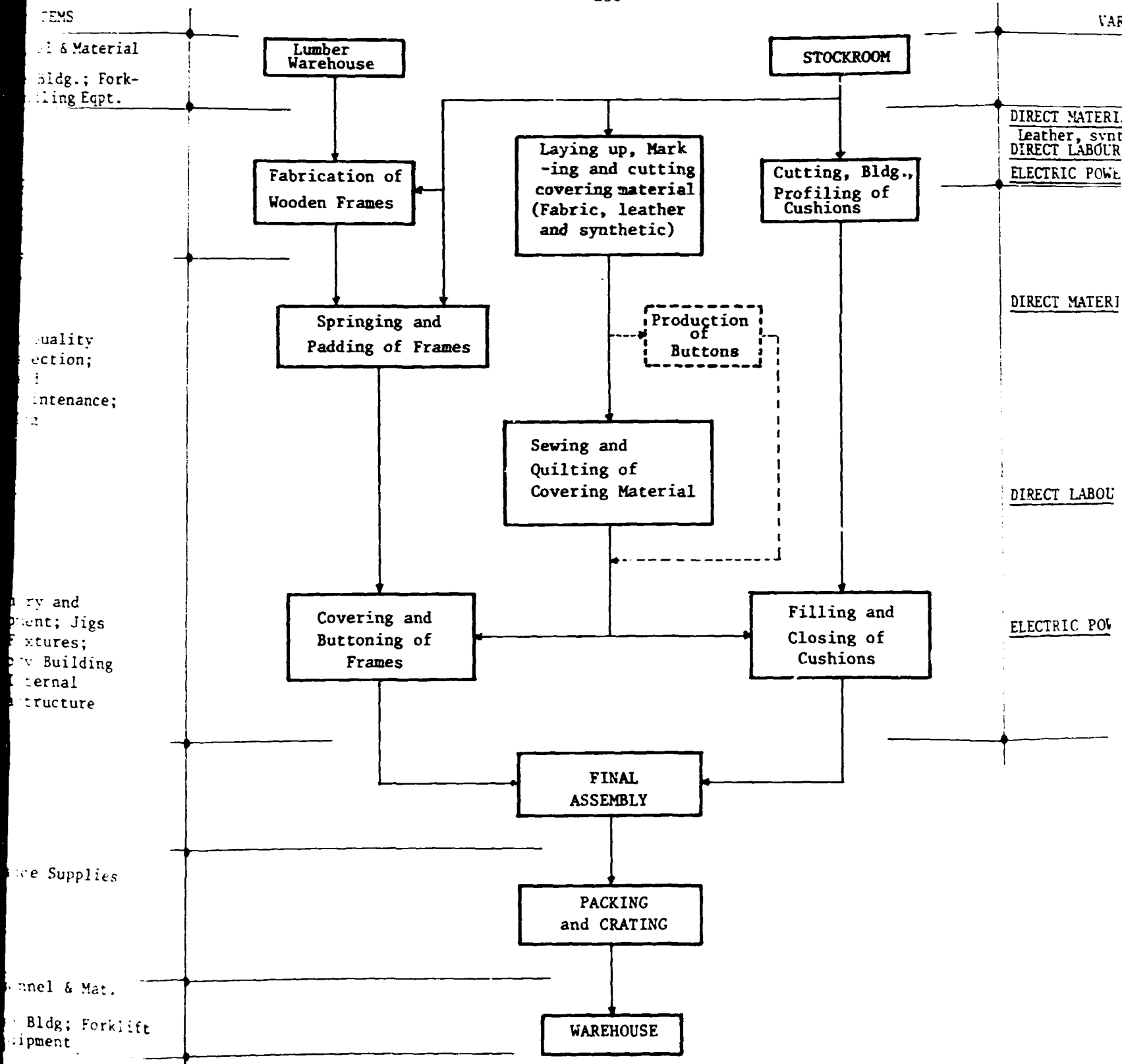
Supplies : Maintenance Supplies

NDING

VARIABLE COST ITEMS	FIXED COST ITEMS	
	<u>LABOUR</u> : Warehouse Personnel & Material Handlers <u>DEPRECIATION</u> : Warehouse Bldg.; Forklift & other Material Handling Eqpt.	<div data-bbox="1628 238 1734 296" style="border: 1px solid black; padding: 2px;">Lumber Warehouse</div>
<u>DIRECT MATERIALS</u> : Lumber, Plywood, Glue, Woodscrews, Nails <u>DIRECT LABOUR</u> : Machine Operators, Assembler, Production Helpers <u>ELECTRIC POWER</u> <u>CUTTING TOOLS</u> : Knives, Sawblades, Bits		<div data-bbox="1628 429 1734 517" style="border: 1px solid black; padding: 2px;">Fabrication Wooden</div>
<u>DIRECT MATERIALS</u> : Springing and Padding Materials, Nails, Other Fasteners, Thread <u>DIRECT LABOUR</u> : Upholsterers, Production Helpers <u>ELECTRIC POWER</u> : (For Pneumatic Tools)	<u>OVERHEAD</u> : <u>Labour</u> : Supervision; Quality Control Inspection; Machinery and Equipment Maintenance; Area Cleaning <u>Depreciation</u> : Machinery and Equipment; Jigs and Fixtures; Factory Building and Internal Infrastructure	<div data-bbox="1656 650 1734 738" style="border: 1px solid black; padding: 2px;">Spacings</div> <div data-bbox="1680 1092 1734 1225" style="border: 1px solid black; padding: 2px;">Cabinets</div>
<u>DIRECT MATERIALS</u> : Thread, Tacks, Tapes <u>DIRECT LABOUR</u> : Assemblers, Production Helpers <u>ELECTRIC POWER</u> : (For Pneumatic Tools)		
<u>DIRECT MATERIALS</u> : Polyethylene Sheets, Corrugated Carton, Wooden Crates, Strapping Materials; Marking Materials <u>DIRECT LABOUR</u> : Packing and Crating Personnel	<u>Supplies</u> : Maintenance Supplies	
<u>INDIRECT LABOUR</u> : Material Handlers <u>FUEL</u> : Gasoline (or Diesel Oil)	<u>LABOUR</u> : Warehouse Personnel & Mat. Handlers <u>DEPRECIATION</u> : Warehouse Bldg; Forklift & other Mat. Handling Equipment	

No frames

Figure



Note Many upholstery shops in developing countries fabricate their own wooden frames. Process follows general flow for solid wood furniture (figure 8).

Some upholstered furniture lines do not use buttons.

Figure 10. Flow process for upholstered furniture with wooden frames

VARIABLE COST ITEMS

FIXED COST ITEMS

ROOM

LABOUR: Stockroom Personnel & Material
Handlers
DEPRECIATION: Stockroom Area; Storage
Fixtures & Material Handling Equipment

Bldg.,
of

DIRECT MATERIALS: Covering Mat. (Fabric,
Leather, synthetic); Cushioning Materials
DIRECT LABOUR: Machine Operators, Uphol-
sters, Production Helpers
ELECTRIC POWER

OVERHEAD :

DIRECT MATERIALS: Button Making
Materials; Sewing
& Quilting Materials
Glue; Thread

Labour: Supervision; Quality Control
Inspection, Machinery and
Equipment Maintenance; Area
Cleaning

DIRECT LABOUR: Pattern Makers, Cutters,
Machine Operators,
Production Helpers

Depreciation: Machinery and Equipment;
Jigs and Fixtures ;
Factory Building and
Internal Infrastructure

and
of
ions

ELECTRIC POWER

Supplies : Maintenance Supplies

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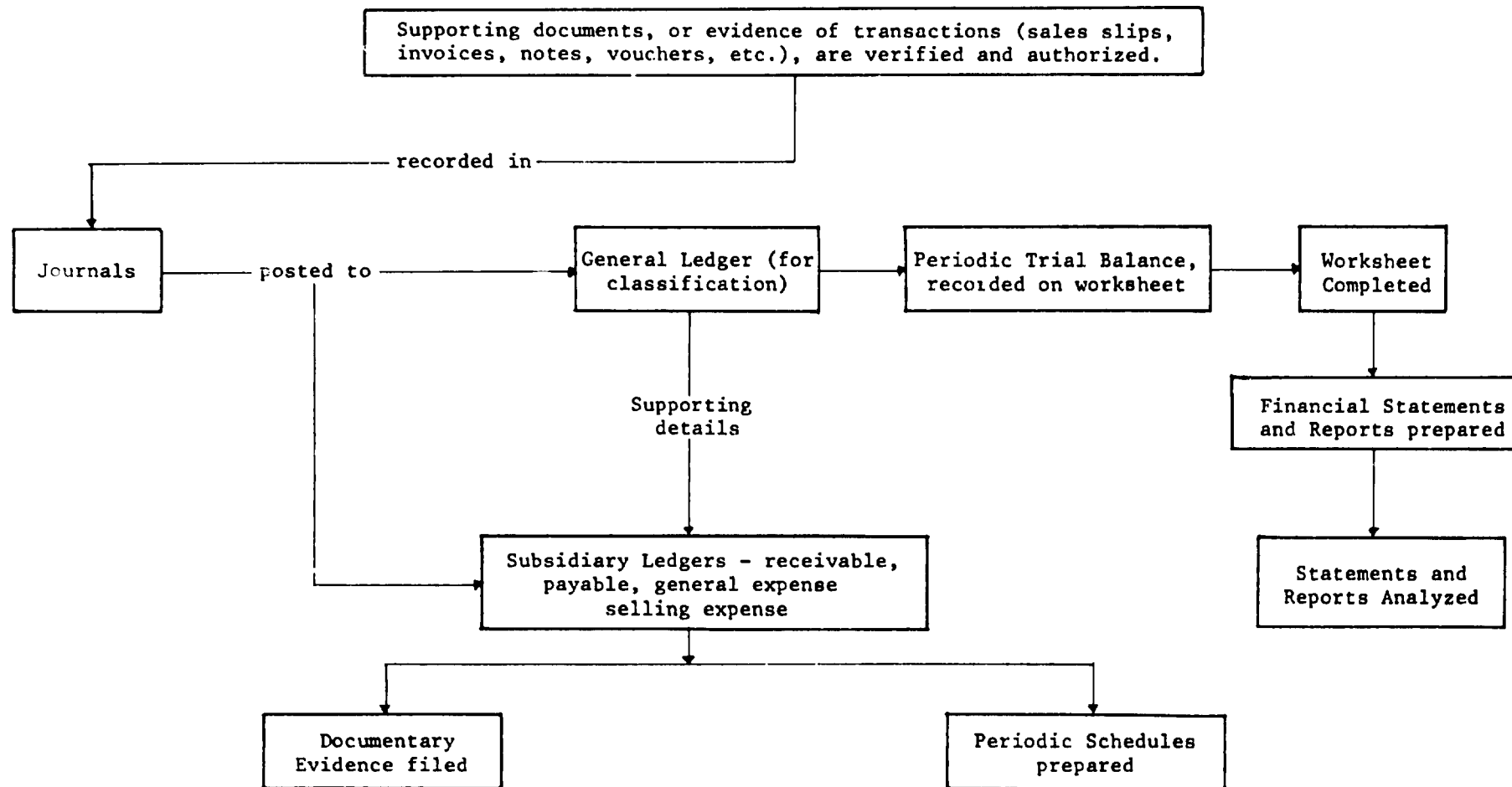


Figure 11. Accounting flow

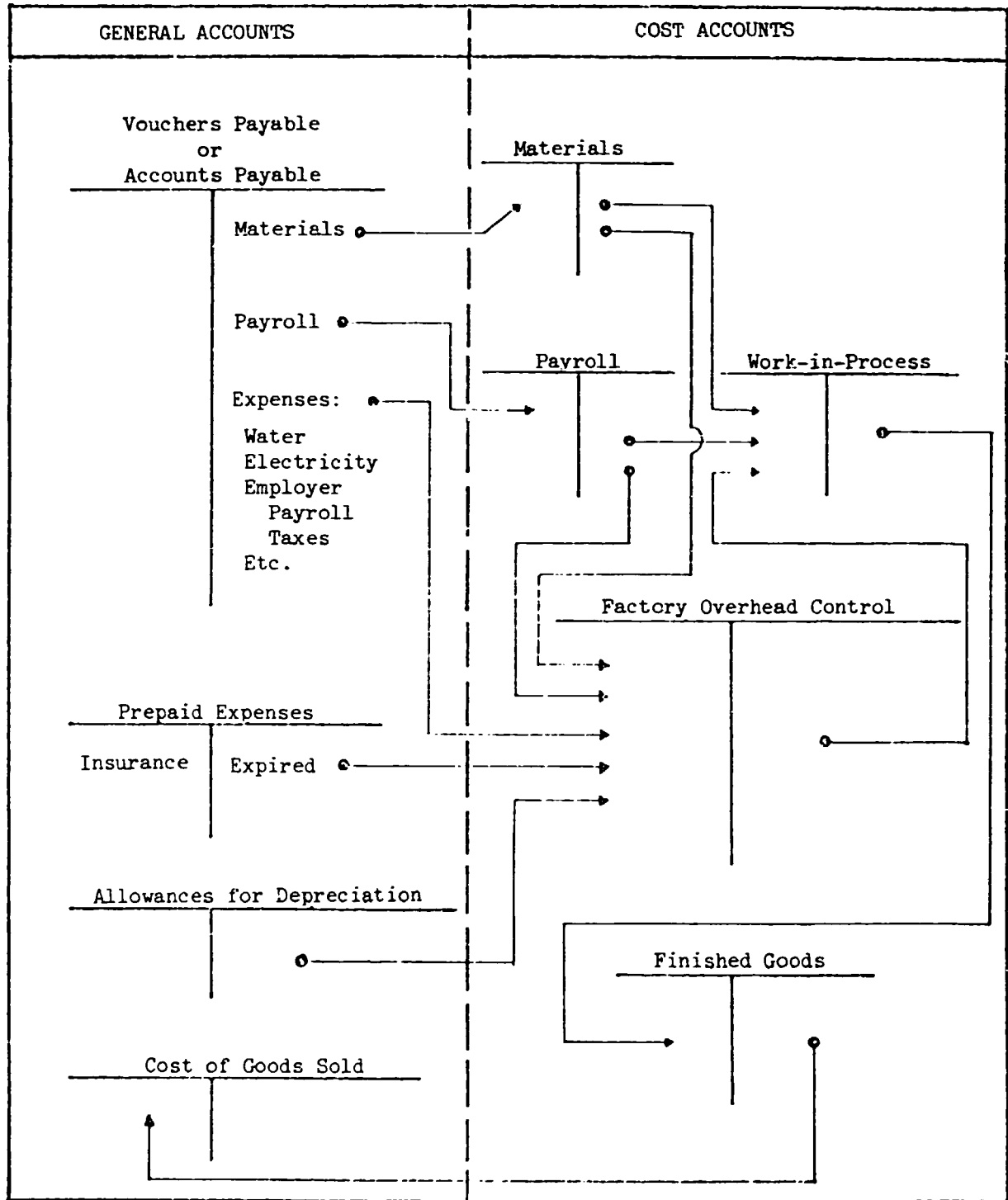


Figure 12. The relationship between general accounts and cost accounts

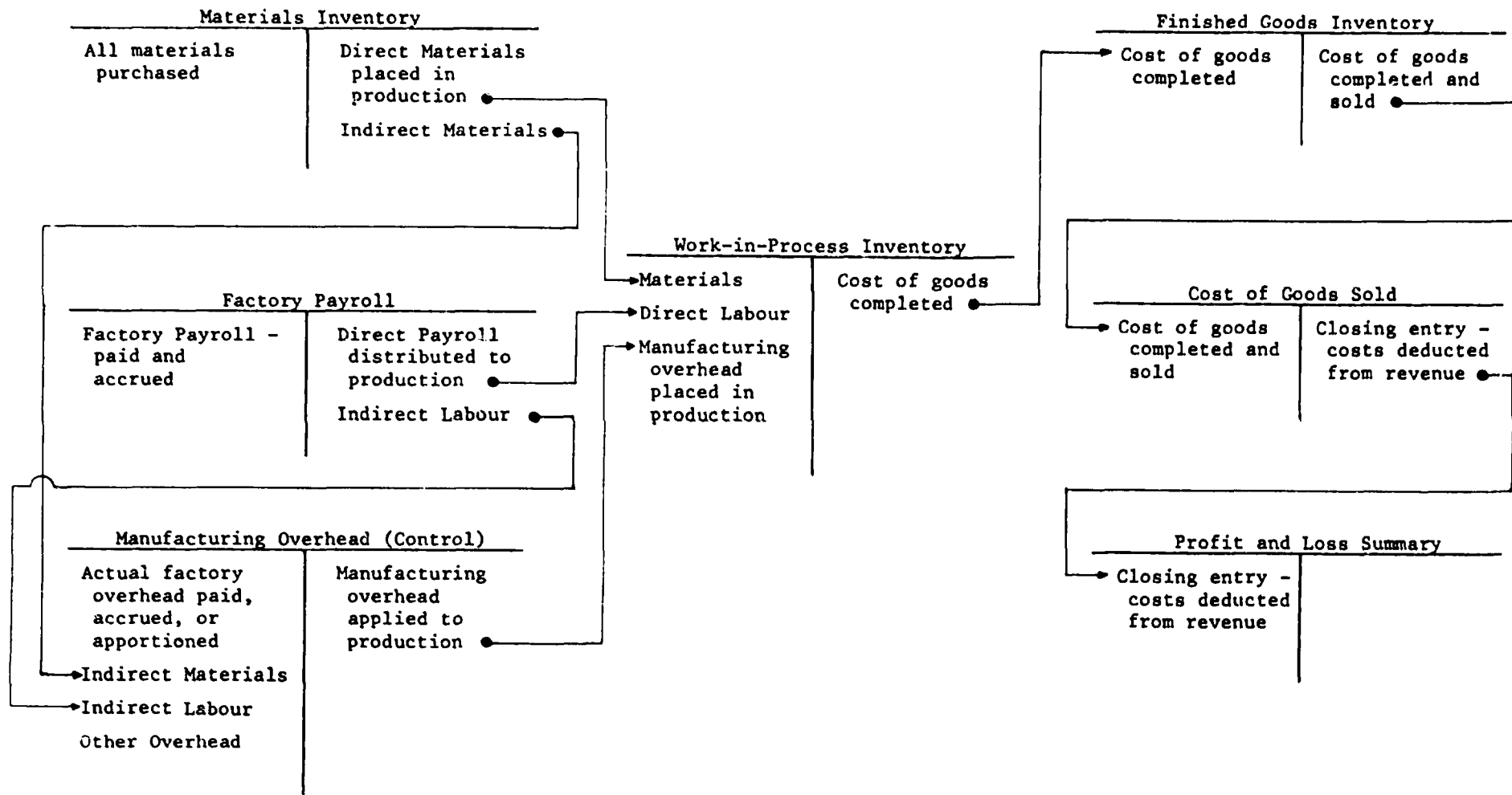


Figure 13. Flow chart for the job order costing method

1. Accumulating cost of materials

In manufacturing enterprises it is common practice to record all materials and supplies in a single control account entitled "materials". Transactions that are reflected in the materials account are: (a) purchases; (b) purchase returns; (c) issues for use in the factory; and (d) returns of unused materials from the factory.

2. Accumulating labour cost

Detailed monitoring of labour usage is achieved by using labour tickets (see chapter V), which record the time spent by each worker in any production department on each job order or product during the day. The total amount of labour used to complete each job is recorded on the job cost sheets. At regular intervals the labour time or labour costs for each job are entered in the space provided on the job order cost sheets.

3. Accumulating factory overhead costs

Factory overhead is composed of expense items that are incurred daily, monthly, quarterly, biannually or annually. In some cases, for example for certain maintenance supplies and machinery spare parts, overhead expense is incurred at irregular and undetermined periods of time. Thus, the daily accumulation of overhead expenses, as in the case of production materials and labour costs, is not possible. An estimated factory overhead cost, based on predetermined ratios to other production cost elements, is thus used to arrive at a preliminary product cost. At the end of the fiscal year, the costs of the various job orders or products processed during the fiscal year are adjusted to take up the difference between the estimated and actual factory overhead costs.

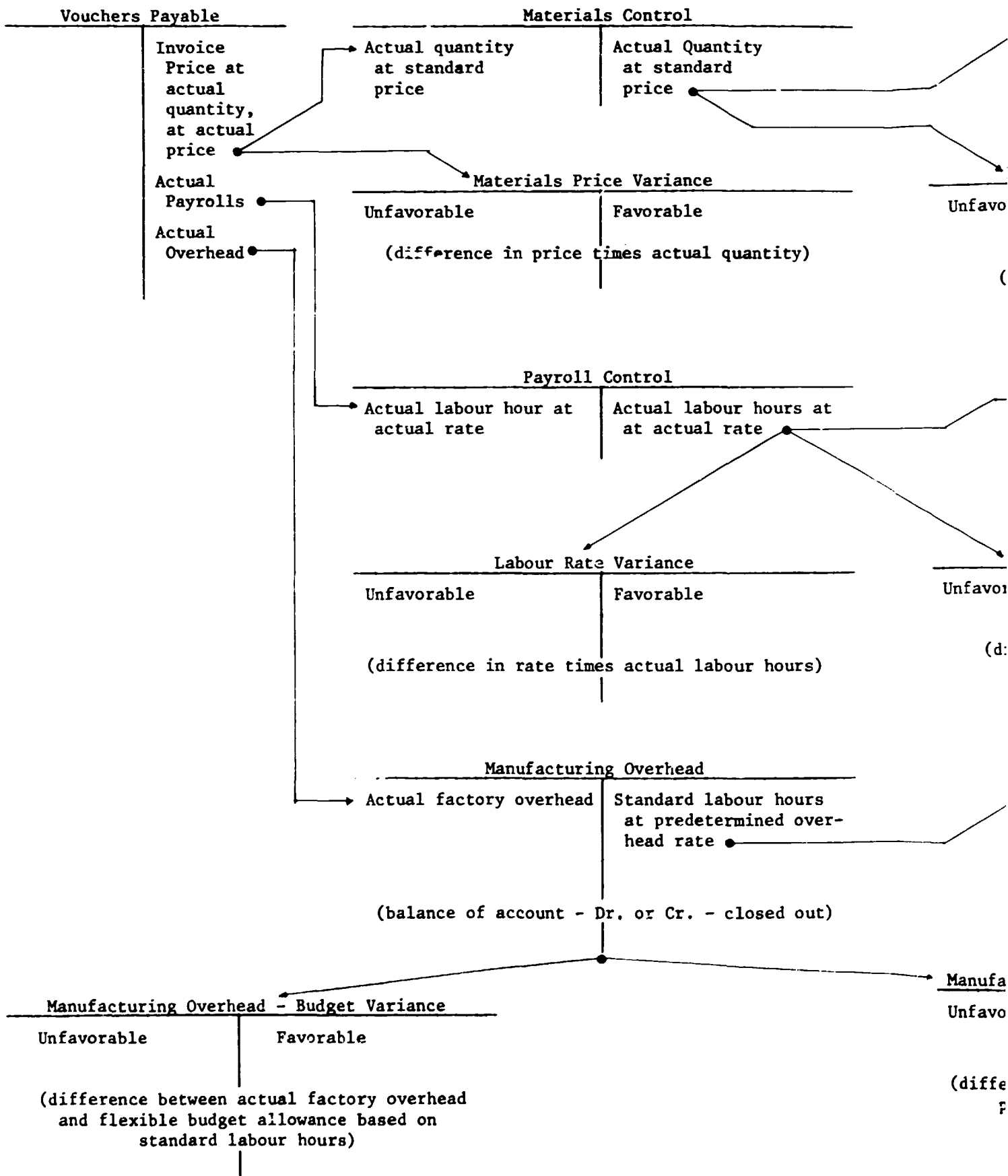
4. Accounting procedures for jobs completed and products sold

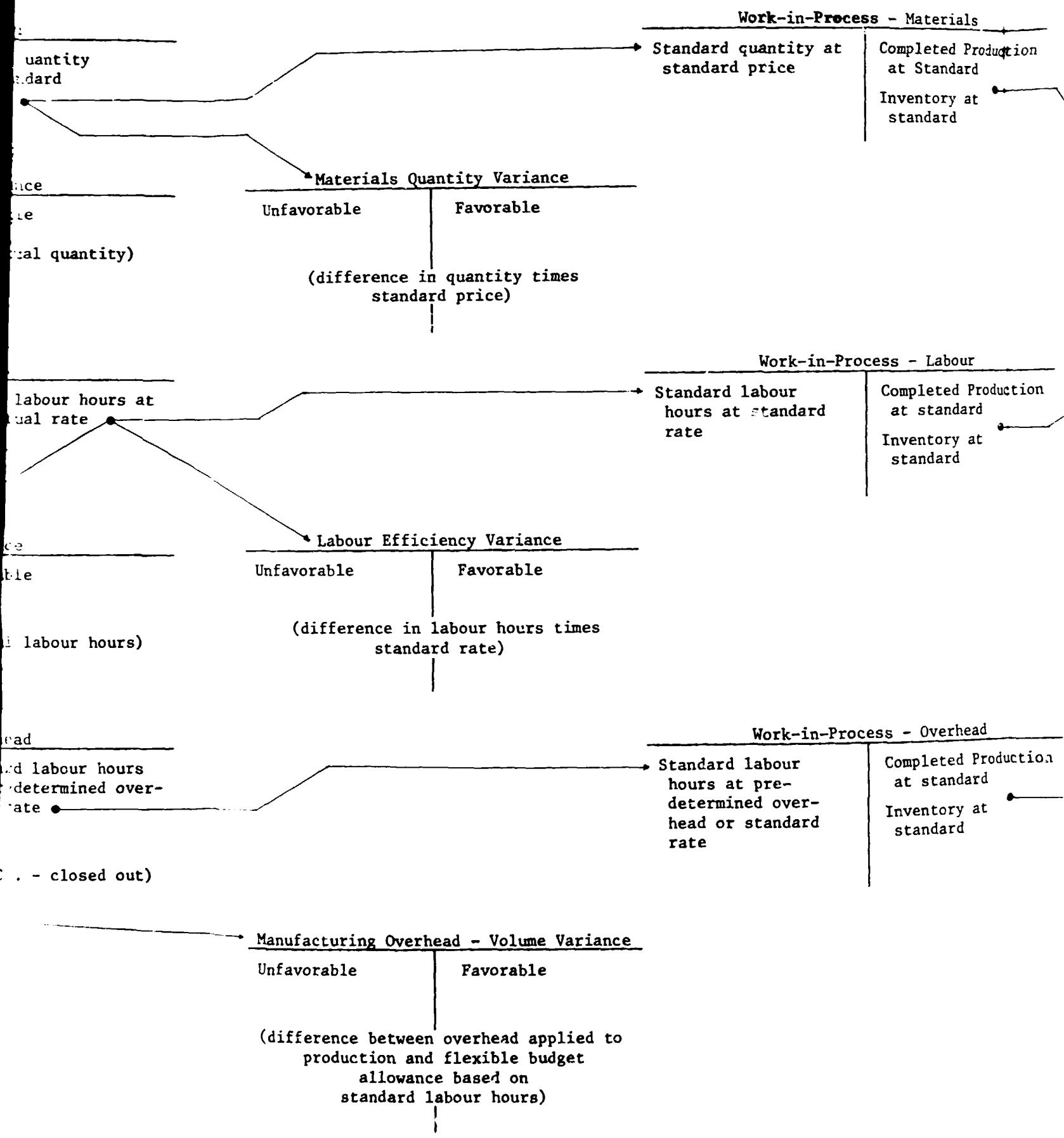
As jobs are completed, cost sheets are moved from the in-process category to a finished-work file. Completion of a job results in a debit to finished goods and a credit to work-in-process. If the completed job is undertaken for the purpose of replenishing stock, the quantity and cost are recorded on finished goods ledger cards, which are the subsidiary record of the finished goods account.

C. Pricing schemes

Pricing, a major management function, requires careful study and planning like any other manufacturing activity; pricing must serve the long-term objectives of the enterprise. On the other hand, it must also be responsive to the needs of customers. The following factors should be considered when setting up price schedules: (a) the company's technical capability compared with its competitors; (b) the company's strength and advantages in the market; (c) the company's ability to compete favourably based on its existing production facilities; and (d) the company's access to steady and economical sources of raw materials.

Prices must be based not only on costs but also on non-financial considerations such as elasticities of demand for the furniture or joinery product, country laws affecting the marketing of the product etc.





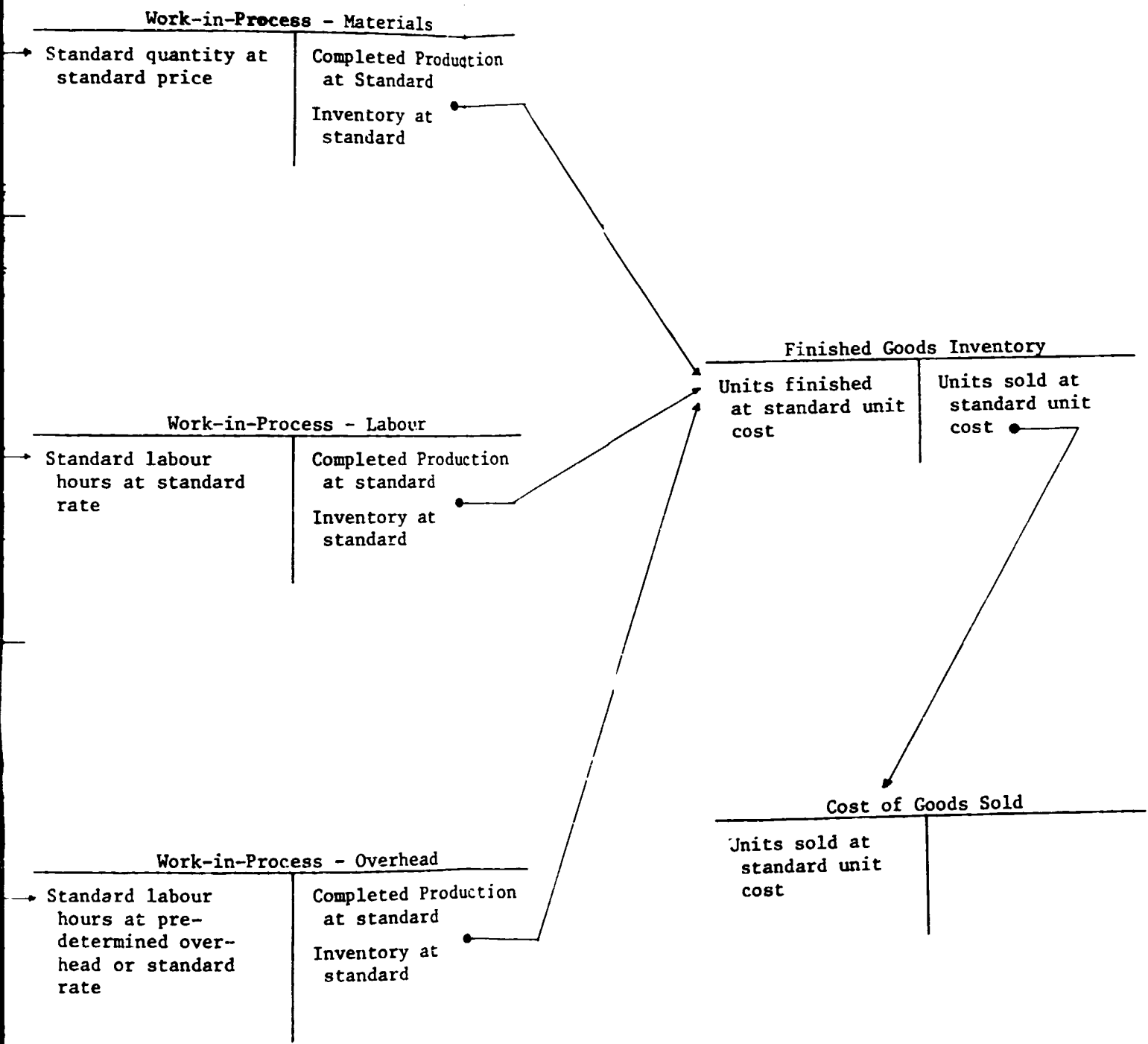


Figure 14. Flow chart for the standard costing method

I. VARIABLE COSTS

These are cost elements that vary with changes in the volume or quantity of products manufacture.

A. Variable Direct Costs

These are variable cost items which can be physically identified on the product or are directly used in the manufacture of the end product.

Examples

1. Raw Materials :

Lumber	Lacquers and Thinners
Plywood Sheets	Paints & Varnishes & Thinners
Veneer	Woodfillers
Synthetic Laminate	Woodstain
Particle Board Sheets	Shellac
Fibreboard Sheets	Decals
Glue	Trimming and Appliques
Locks	Upholstery Springs (coil, "no-sag", etc.)
Hinges	Foam Rubber & other Cushioning Materials
Plastic Dowels	Rubberized Coconut Coir Sheets
Drawer Slides	Fabric Covering
Drawer Pulls	Synthetic Leather
Woodscrews	Upholstery Button Materials
Nails	Leather
Metal Brackets & Braces	Thread and Strings
Glides and Slides & Ferrules	Tacks & other Fasteners & Binders
Other Hardware Items	Other Upholstery Materials

Note: "Plant and machinery maintenance labour" is an indirect labour cost item which are indirect labour cost items that vary according to the volume of production (e.g., quality variable indirect cost).

All costs, whether direct or indirect, that are incurred regardless of the volume of prod "variable costs" incurred depend upon the volume of production and sales.

2. Production Labour :

Machine Operators
Machining and other
Production Helpers
Hand Sanders
Spraymen

B. Variable Indirect Costs

These are variable cost identified on the product manufacture the product, not be produced. In man usage is so small with r being manufactured, mana Fixed Overhead Costs. T (*).

1. Materials and Suppli

Veneer Tapes
*Polishing Compounds
*Polishing Heads (La
*Sanding Lubricants
Abrasives (Sanding
*Cleaning Rags
*Masking Tape
*Cutting Tools (Kni
*Needles and Cutting
Packing/Crating Ma

2. Indirect Labour :

*Quality Inspection
*Machine/Tools Clea
Materials Handling
*Work Area Cleaning

3. Service Utilities :

*Water Consumption
*Steam Consumption

Figure 15. Identification guide for cost el

2. Production Labour :

Machine Operators	Fillers	Cutters
Machining and other	Hand Polishers	Seamsters
Production Helpers	Finishing Helpers	Upholsterers
Hand Sanders	Assemblers	Upholstering
Spraymen	Assembling Helpers	Helpers

II. FIXED COSTS

These are cost volume or quantity shared with other Cost Items.

B. Variable Indirect Costs

These are variable cost elements which are not physically identified on the product or which are not directly used to manufacture the product, but without which the product can not be produced. In many cases, when the unit cost of usage is so small with respect to the value of the products being manufactured, management treats the cost items as Fixed Overhead Costs. These items are marked with an asterisk (*).

A. Fixed Indirect

These are 1 the actual respect to

Plant a
Plant S
Material
Stockro
Warehou
Lumber

1. Materials and Supplies :

- Veneer Tapes
- *Polishing Compounds (Pumice Powder, Jeweler's Rouge, etc.)
- *Polishing Heads (Lamb's Wool Bonnets, Flannel Strips, etc.)
- *Sanding Lubricants (Oils, Mineral Spirits, etc.)
- Abrasives (Sanding Belts, Sandpaper, etc.)
- *Cleaning Rags
- *Masking Tape
- *Cutting Tools (Knives, Bits, Sawblades, etc.)
- *Needles and Cutting Blades
- Packing/Crating Materials

B. Other Fixed

Depreci
Amortiz
Adminis
Propert
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Amortiz

2. Indirect Labour :

- | | |
|-------------------------|---|
| *Quality Inspection | *Knife & Bit Grinding & Dressing |
| *Machine/Tools Cleaning | *Sawfiling and Tensioning |
| Materials Handling | *Bandsaw Blade Splicing |
| *Work Area Cleaning | *Changing Sanding Belts or Sandpaper on Sanding Machine |

3. Service Utilities :

- | | |
|--------------------|-----------------------------|
| *Water Consumption | Electric Power Consumption |
| *Steam Consumption | *Compressed Air Consumption |

renance labour" is an indirect labour cost item which is more specifically classified as fixed indirect cost. There according to the volume of production (e.g., quality inspection) and are thus more specifically classified as

that are incurred regardless of the volume of production and sales are classified as "fixed costs". Hence, volume of production and sales.

Figure 15. Identification guide for cost elements in furniture and joinery manufacturing operations

II. FIXED COSTS

These are cost elements which do not vary with respect to the volume or quantity of products manufactured. They are usually shared with other products and are thus classified as Overhead Cost Items.

A. Fixed Indirect Labour

These are labour costs which are not directly connected to the actual manufacture of the product and are fixed with respect to the volume or quantity of products manufactured.

Examples

Plant and Machinery Maintenance Labour
Plant Supervision
Materials Testing Labour
Stockroom Service Labour
Warehouse Service Labour
Lumber Yard Service Labour

B. Other Fixed Overhead Costs

Depreciation of Buildings and Structures
Amortization of Jigs and Fixtures
Administration Costs
Property Taxes
Manufacturing Licenses
Interests on Loans
Amortization of Special Tools and Equipment

fixed indirect cost. There
rically classified as

"fixed costs". Hence,

ufacturing operations

However, such considerations are beyond the scope of this Manual, and this section will describe only the more common techniques of setting price levels based on actual or estimated manufacturing and marketing costs: (1) full-cost pricing; (2) marginal-cost pricing; (3) return-on-investment pricing; and (4) flexible-cost pricing.

1. Full-cost pricing

In the full-cost pricing method, selling prices are calculated by adding to the factory cost an allowance to cover selling and administrative expenses and profit. The basic assumptions are (a) that the factory overhead costs are directly proportional to labour usage, (b) that selling and administrative expenses amount to a certain percentage of factory costs, and (c) that a desirable but reasonable level of profit based on amount of sales is set.

The full-cost method of pricing is used by almost all small and some medium-sized furniture and joinery enterprises owing to its simplicity. The method assures full cost recovery, which is important in long-run pricing. However, the method has the following limitations:

(a) It does not segregate variable and fixed costs; thus, the effects of elasticity of demand are ignored and the profitability level as affected by price changes is not indicated;

(b) It does not give due consideration to competition;

(c) It fails to recognize the fact that all products may not earn the same profit, since the same percentage of total cost of each product is allowed for profit;

(d) It does not give consideration to the fact that different products require different amounts of capital investment to produce, finance and distribute;

(e) It does not allow orders for which prices do not cover at least the total costs to be accepted because the method does not distinguish between variable and fixed costs. Consideration of these factors becomes highly important when the factory is operating below full capacity.

2. Marginal-cost pricing method

The marginal-cost pricing method is based on the marginal cost, which is the minimum price below which cash loss is sustained. The sum of cost items (i.e., raw materials, direct labour, variable factory overhead and variable selling and administrative expenses) directly chargeable to the product is taken as the marginal cost, while marginal income is the income derived from the sale of goods that are sold at prices based on the marginal cost. Thus, it is possible to set price levels based on marginal costs once a ratio of marginal cost to selling price is established through past experience in the firm.

The marginal-cost pricing method requires more detail in cost data gathering and processing than the full-cost pricing method, as the former distinguishes between fixed and variable costs, and these costs are also segregated as to whether they are directly applicable to the product or product line or not.

The marginal-cost pricing method has the following advantages:

(a) It is easy to trace the effects of price changes and quantities sold on different products or product lines, which is useful in profit planning and short-run pricing decisions;

(b) The method gives the pricing officer more latitude in ascertaining the price and volume that maximize profits so long as the price is above the marginal costs;

(c) It facilitates the preparation of break-even analyses, another useful tool for management.

3. Return-on-investment (ROI) method of pricing

The two pricing methods discussed above do not consider the fact that different products require different amounts of direct capital in the form of the costs to maintain inventories, receivables and facilities. The costs to maintain these direct capital investments required for the production and marketing of the particular product or product line become important in large-scale operations where various products are manufactured in varying quantities and at greatly differing unit costs. The return-on-investment pricing method gives significance to the differences in direct investment capital required in the manufacture and sale of different products.

The following points should be considered when using the return-on-investment method of pricing:

(a) The acceptable level of direct product return on direct capital invested to manufacture and sell the product should be related to the company's overall target for total return on total capital investment;

(b) Capital invested to manufacture and sell a product or product line varies, like costs, according to the level of operations. Fixed assets remain relatively constant regardless of the level of operations, accounts receivable vary directly with sales and cash and inventory requirements are partly fixed and partly variable;

(c) A conclusion based on return-on-sales ratios, particularly when the difference in the working capital and facilities required to produce and sell two different products is significant, may be erroneous as to the actual profitability of the product or product line.

4. Flexible-cost pricing

Each of the pricing methods discussed above has limitations in application. However, the salient features of each of the three techniques may be combined to provide sales management an ample choice of cost and quantitative criteria best suited to the existing market and the company's operating conditions. This gives rise to a more flexible method, which makes use of the following:

(a) When the factory is operating below full capacity, a marginal ratio would be most useful in determining acceptability of price offers for new products to be manufactured in addition to the programmed product lines. Provided that distribution channels are not disrupted, decisions on special price arrangements with selected customers may be effectively formulated by the use of a marginal ratio;

(b) The need for review of current price levels of that particular product or product line is indicated by significant changes in a contribution ratio;

(c) The direct profit ratio and the returns (before taxes) on sales give indications as to the adequacy of the product's price in terms of the total cost recovery and earned profits;

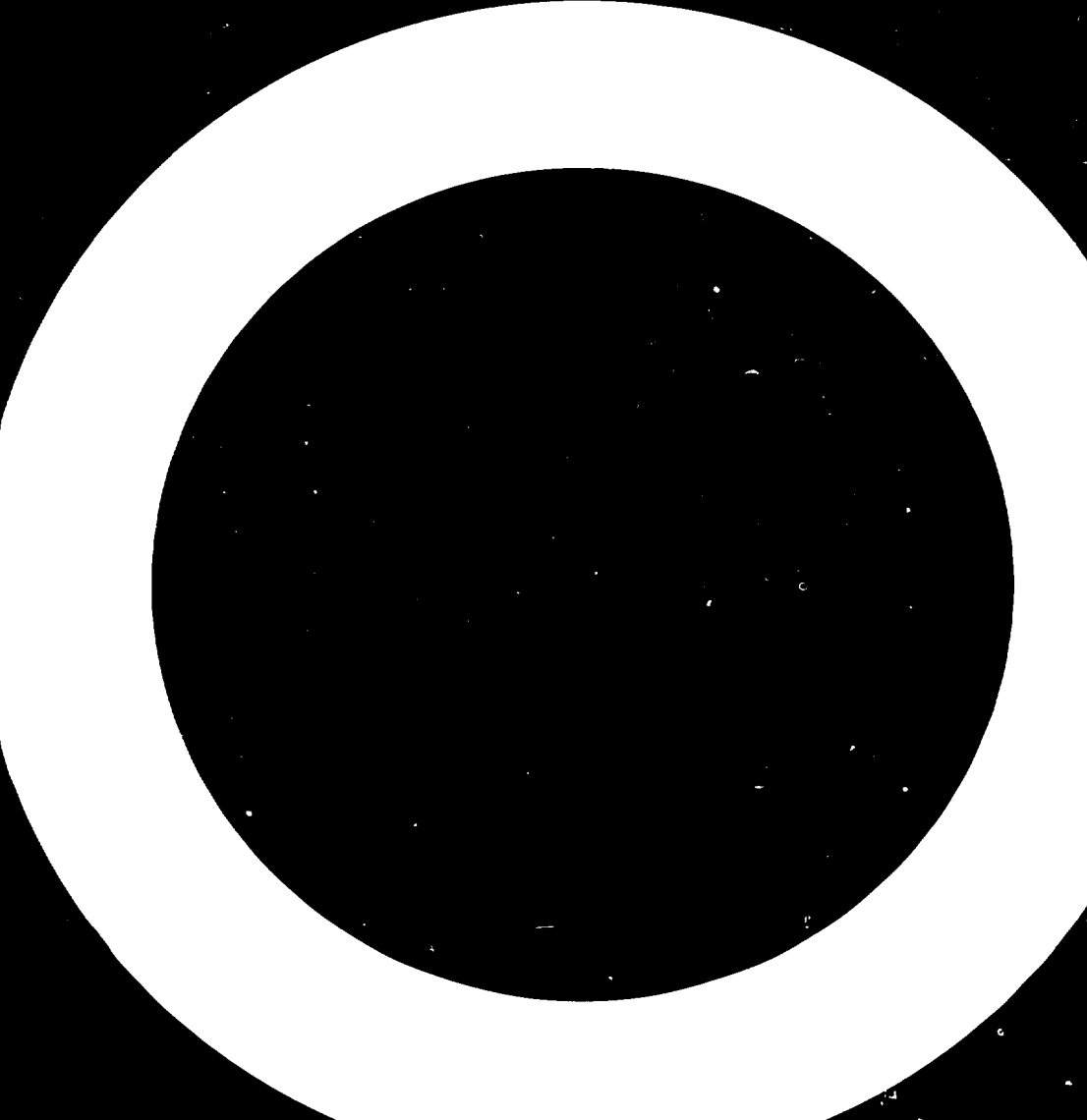
(d) Direct and total returns on capital used for the product or product line indicate the relative profitability of different products or product lines in terms of capital resources utilized to manufacture and sell the product or product line;

(e) A review of current pricing strategy may be indicated by a low capital turnover for the product or product line. High capital intensity or unused production capacity is indicated by a low capital turnover. The capital turnover for a product is also useful in determining the product's performance vis-à-vis other products manufactured by the enterprise, as a tool in make-or-buy decisions or as an indication for investment or divestment.

This method, of course, presumes that the existing information system is sophisticated enough to have provided the company with reliable ratios on past manufacturing and selling performance.

5. Pricing in tenders

The pricing techniques discussed in the previous sections may be applied to the evaluation of prices submitted in tenders for the supply of furniture or joinery products. Form 50 is a suggested format for the analysis of price levels to be used as basis for tenders. The total variable cost is calculated from data submitted by the production and service departments of the factory. A number of bid prices for the project is computed on the basis of different ratio levels of marginal income to sales. Management is provided with ample latitude of choice to suit the conditions of the tender.



PRICING ANALYSIS FOR TENDERS

FORM No. 51

Product : ELEMENTARY SCHOOL DESKS Product Number : RS-125 Quantity : 1,000 Units : Each
 Customer : Romblon Elementary School Address : Barangay St. Peter, Ablacion, Romblon City, Romblon Prov. Tel. No. : 4226
cto Bureau of Public Schools Rail
 Date Start : 11 January, 1983 Completion : 15 April, 1983 Delivery : 20 April, 1983 VIA: Truck/Lorry Sea Air

TENDER NO. G-82-182

I. DIRECT LABOUR ANALYSIS

Production :	Hours	Rate/ Hour	Unit Cost	Total Cost
Machining Department	1.66	\$0.348	\$0.518	\$ 578
Assembling Department	1.75	0.283	0.285	495
Upholstery Department	-	-	-	-
Finishing Department	1.03	0.320	0.330	330
Packing Department	1.00	0.247	0.247	247
.....	-	-	-	-
A. TOTAL PRODUCTION LABOUR				\$1650

II. VARIABLE COST ANALYSIS (PER UNIT)

A. Direct Labour, Production and Engineering	\$ 1815
B. Projected Labour Increase, 13 %	\$ 235
C. TOTAL DIRECT LABOUR	\$ 2050
D. TOTAL VARIABLE OVERHEAD	\$ 412

Variable Production Overhead :	% Direct Labour	Unit Cost	Total Cost
Machining Department	24 %	\$0.139	\$ 139
Assembling Department	20 %	0.099	99
Upholstery Department	- %	-	-
Finishing Department	23 %	0.076	76
Packing Department	20 %	0.049	49
.....	- %	-	-
B. TOTAL VARIABLE PRODUCTION OVERHEAD			\$ 363

Materials Costs :

Lumber	\$ 2530
Plywood	1125
Glue	280
Upholstery Materials	-
Paint/Varnish Materials	845
Hardware, Screws and Nails	375
Packing Materials	460
Sub-Contracted Materials	-
E. TOTAL MATERIALS COSTS	\$ 5625

Engineering Labour :	Variable		Fixed	
	Unit Cost	Total Cost	Unit Cost	Total Cost
Design	\$ -	\$ -	\$0.055	\$ 85
Drafting	-	-	0.045	45
Industrial	0.08	80	0.35	350
Tool	-	-	0.25	250
Jigs and Fixtures Fabrication	-	-	0.45	450
Production Gauges Fabrication	-	-	0.51	510
.....	-	-	-	-
C. TOTAL ENGINEERING LABOUR		\$ 80		\$1690

Other Variable Manufacturing Costs :

Travel, Assembly & Repair Crew	\$ 140
.....	100
F. TOTAL, OTHER VARIABLE MANUFACTURING COSTS	\$ 240
G. ESTIMATED SELLING AND ADMINISTRATION COSTS, 20 %	\$ 1669
H. COMMISSIONS, 7 %	\$ 301
J. FREIGHT COSTS FROM Manila to Romblon	\$ 450

B. TOTAL VARIABLE PRODUCTION OVERHEAD ----- \$ 769
vvvvv

<u>Engineering Labour :</u>	<u>Variable</u>		<u>Fixed</u>	
	<u>Unit Cost</u>	<u>Total Cost</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Design	\$ -	\$ -	\$0.055	\$ 85
Drafting	-	-	0.045	45
Industrial	0.08	80	0.35	350
Tool	-	-	0.25	250
Jigs and Fixtures	-	-	-	-
Fabrication	-	-	0.45	450
Production Gauges	-	-	-	-
Fabrication	-	-	0.51	510
.....	-	-	-	-
.....	-	-	-	-

C. TOTAL ENGINEERING LABOUR ----- \$ 80 ----- \$ 1690

D. Engineering Overhead at $\frac{30\% \text{ Variable}}{70\% \text{ Fixed}}$ % of Total Engineering Labour ----- \$ 24 ----- \$ 169

E. TOTAL ENGINEERING DIRECT COST ----- \$ 104 ----- \$ 1859
vvvvv vvvvv

<u>Other Direct Labour, Specify :</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Assembling & Repair/Touch-up Labour, at site	\$0.040	\$ 40
Repair/Touch-up materials, at site	0.045	45
.....	-	-
.....	-	-
.....	-	-

F: TOTAL, OTHER DIRECT LABOUR ----- \$ 85
vvvvv

G. OTHER VARIABLE OVERHEAD, AT 30 % DIRECT LABOUR ----- \$ 25
vvvvv

H. TOTAL DIRECT LABOUR ----- \$ 1815
vvvvv

K. TOTAL VARIABLE OVERHEAD ----- \$ 412
vvvvv

Prepared by : Bo Argibilar
Date Submitted : 12 DECEMBER 1982

Sub-Contracted Materials -----

E. TOTAL MATERIALS COSTS ----- \$ 5625
vvvvvvvv

Other Variable Manufacturing Costs :

Travel, Assembly & Repair Crew
Subcontract, Assembly & Repair Crew \$ 100
..... 100
.....
.....

F. TOTAL, OTHER VARIABLE MANUFACTURING COSTS ----- \$ 200
vvvvvvvv

G. ESTIMATED SELLING AND ADMINISTRATION COSTS, 20% ----- \$ 1669
vvvvvvvv

H. COMMISSIONS, 3% ----- \$ 701

J. FREIGHT COSTS FROM Mumbai to London ----- \$ 450

K. TOTAL PROJECT VARIABLE COST ----- \$ 11,167
vvvvvvvv

New or Added Fixed Costs :

..... NONE ----- \$ —

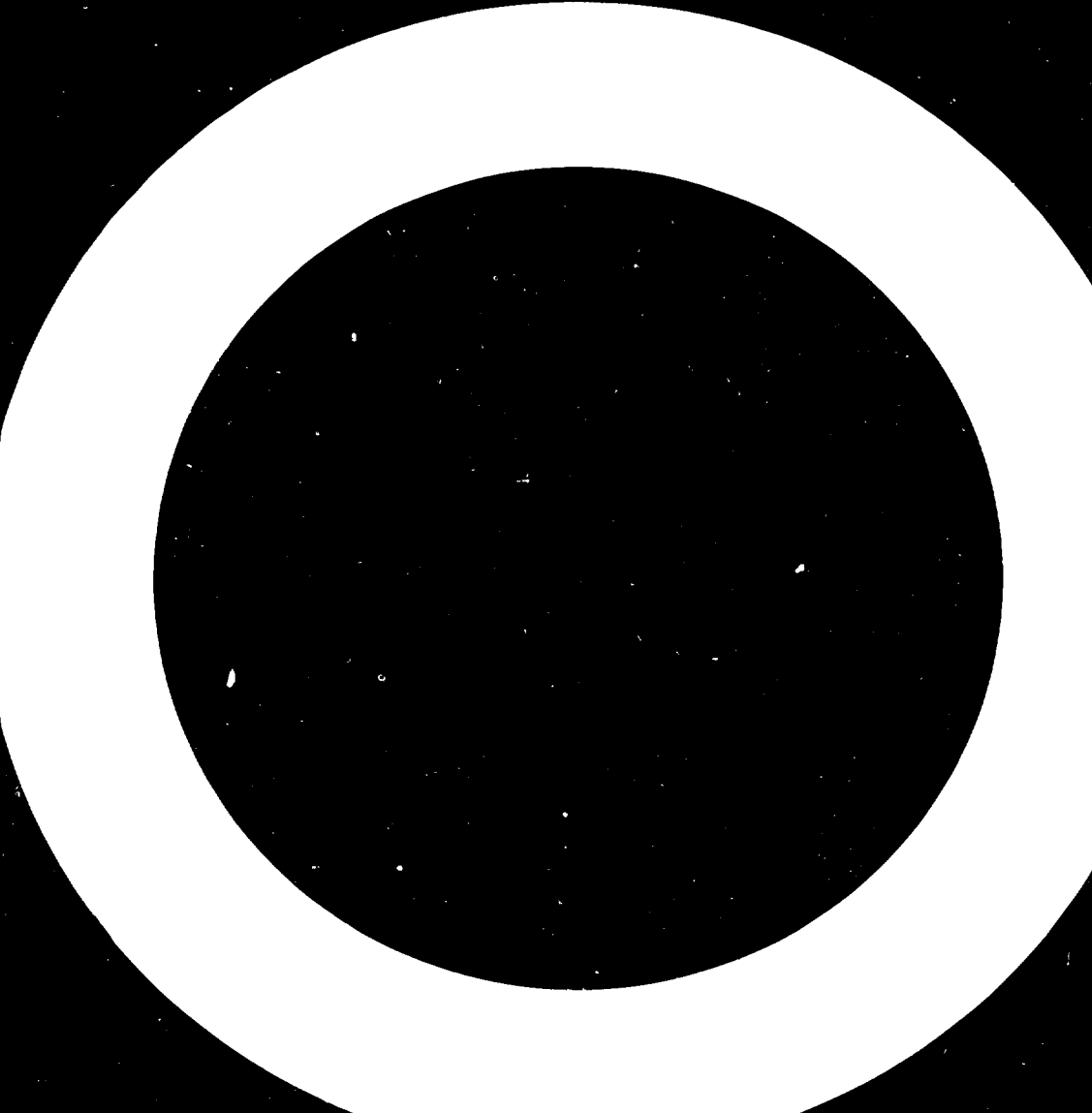
L. TOTAL, NEW OR ADDED FIXED COSTS ----- \$ —
vvvvvvvv

PRICING BASIS :	Unit Price	Approved
At 20% Marginal Income	\$ 55.84	
At 25% Marginal Income	\$ 44.67	
At 30% Marginal Income	\$ 37.22	
At 35% Marginal Income	\$ 31.91	
At 40% Marginal Income	\$ 27.92	
At % Marginal Income	\$ —	
At % Marginal Income	\$ —	

CALCULATED PROJECT VALUE BASED

ON APPROVED % MARGINAL INCOME : \$ 37,220.00
vvvvvvvvvvvvvvvvvvvv

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IX. CONTROL, DESIGN AND ADOPTION OF FORMS

A. The control of forms

One of the most effective tools that management of furniture or joinery manufacturing firms has to monitor and control day-to-day operations is a well-defined and effective reporting system. It cannot be overemphasized that no amount of reporting, no matter how sophisticated or voluminous, will serve the purpose unless data are accurate and up-to-date. There is a tendency for each operating unit to devise its own reporting system and, consequently, its own set of forms to record the results of activities in its area of responsibility. This can result in a proliferation of unnecessary, overlapping or inappropriate forms. Forms also become inadequate and less responsive to the real needs of a growing organization.

Thus, there is a need for a system to control and review forms as a vehicle for information systems in business organizations in general and in furniture and joinery manufacturing firms in particular.

B. The design of forms

The information contained in the forms presented in previous chapters may be classified as principal, secondary and auxiliary, whether the form be a request for action or a report on expense or accomplishment.

Principal information is the type of information that would answer the following questions:

What was accomplished, spent or needed?

How much was accomplished, spent or needed?

Secondary information would answer:

Who needs the item(s), who spent the amount or did the task?

Where is it needed, spent or done?

How was it spent or done?

When is it needed, spent or done?

Auxiliary data answer the following questions:

Who certifies the need, expense or accomplishment?

Who should be informed of the need, expense or accomplishment?

What other pertinent information about the need, expense or accomplishment should be relayed to the recipient of the report or analyst of the data?

How long should the completed forms be kept in the files and how often should the files be reviewed and up-dated, as required by the nature of the firm's operations?*

All these questions should be considered when designing a form, in order to avoid including superfluous or irrelevant data.

1. Composition and layout

In general, forms are designed to give most prominence to principal data, then to secondary data and last to auxiliary data.** This order of priority is illustrated in form No. 32, the materials requisition and issuance slip (MRIS), where data on what and how much is needed are given the most space and are located in the middle of the form. Similar prominence has been given to the principal information in the labour tickets (form Nos. 34, 35 and 36). The secondary and auxiliary information are located according to the relative importance of the data. Modifications may be required in forms and information for computerized systems (see chapter X).

Usual practice is to allow wider spaces for handwritten entries than for typed ones in order for handwriting to be legible. Thus, in developing countries where printing and typing services are not readily available and forms will have to be mostly handwritten, it is suggested that wider spaces be given to the principal and secondary data than those on the forms presented in the Manual.

(a) Dispensing forms

Most of the forms presented in the Manual may be printed and distributed as loose-leaf sheets. However, where a number of copies are to be prepared, whether for typewritten or handwritten entries, it is convenient to use carbon paper in between the sheets. This type of form is usually glued on one edge (usually the top edge) to make a pad of 10 to 50 sets of copies, depending on the number of copies required for each set. This method is widely used for accountable forms (such as purchase orders (form No. 26), official receipts (form Nos. 3 and 14), sales orders (form No. 7) etc.).

* Cost data that were used as the basis for the preparation of annual financial statements are usually kept in the active files as long as prescribed by the country's tax laws. Other operations data are kept on file, reviewed and up-dated as required by the company operations, i.e., annually, biannually etc.

** The placement of data in the forms presented in the preceding chapters follows the practice of reading and writing from left to right and from top to bottom of the form. The sequence of presenting data on the form would be the same in countries where reading and writing are from right to left.

In some cases, as for the transfer ticket (form No. 30), the pre-numbered forms are perforated between sections so that segments to be transmitted to other units of the company can be torn off. In this particular case, the pre-numbered forms are printed with extra space for binding into a pad, such that the portion of the transfer ticket that will remain with the originating unit is left bound together. This technique facilitates audit and filing activities.

Where perforating services are available, forms can be bound into pads of 10 to 50 sets of copies; the last copy of each set is not perforated, while all other copies of the set are perforated. The form is filled out, using carbon paper, and all copies except the last unperforated one are torn off the pad, leaving the unperforated copy as a file copy for the department that has filled out the form.

(b) Colour coding of forms

The practice of printing forms on coloured paper - in a different colour for each copy - is widely used. Each department would have a specific colour, for example all copies for accounting could be on white paper, for engineering on pink paper, for production green paper etc.

Colour coding may also be done using the same colour paper but different colours of printing ink. This technique can be used for labour tickets (see chapter V), where all three forms are printed on white paper but the direct labour ticket (form No. 34) is printed in black ink, the indirect labour ticket (form No. 35) is printed in green ink and the direct labour loss ticket (form No. 36) is printed in red ink.

(c) Features that facilitate sorting

A simple technique to facilitate manual sorting is punching holes on one edge of the form. This is very useful for breaking down labour costs by department or section. The location of holes punched on the upper edge of the labour tickets corresponds to the code number assigned to the production department or section. For example, labour tickets completed by several departments of the production unit would be punched as follows. The machining department (department No. 1) will use labour tickets with a hole punched two centimetres from the left of the upper edge of the ticket; the sanding and assembling department (department No. 2) will use labour tickets with a hole punched 4 centimetres from the left edge; the finishing department (department No. 3) will use tickets with a hole 6 centimetres from the left edge etc. The first step is to sort the tickets by the job order number or by product. This is done visually and by hand. The next step is to sort the labour tickets according to the department or section. This is done by pushing a piece of stiff wire through the proper holes on the upper edges of the bunch of the labour tickets. When the piece of wire is stopped by a labour ticket without a hole on the allocated length of the upper edge, the ticket stopping the wire is pulled out for further sorting.

A variation of this technique uses a number of semicircular notches on the upper edge of the labour ticket to correspond to the department or section number, as shown in figure 16. Sorting is made faster using a sorting fixture, as shown in figure 17. The proper number of wooden pegs are placed

DIRECT LABOUR TICKET			
Dept. No. Original Assignment	Job Order Reference	Description of Work Performed	Total Hours Worked
1	GS-3636	Operate Router	3
021 <i>Juan de los Reyes</i> I.D. No. and Signature of Employee		Date: 16 May '82	<i>Carlos Santos</i> Signature of Supervisor

A - Labour Ticket with one notch on upper edge, corresponding to Department No. 1, Machining Department.

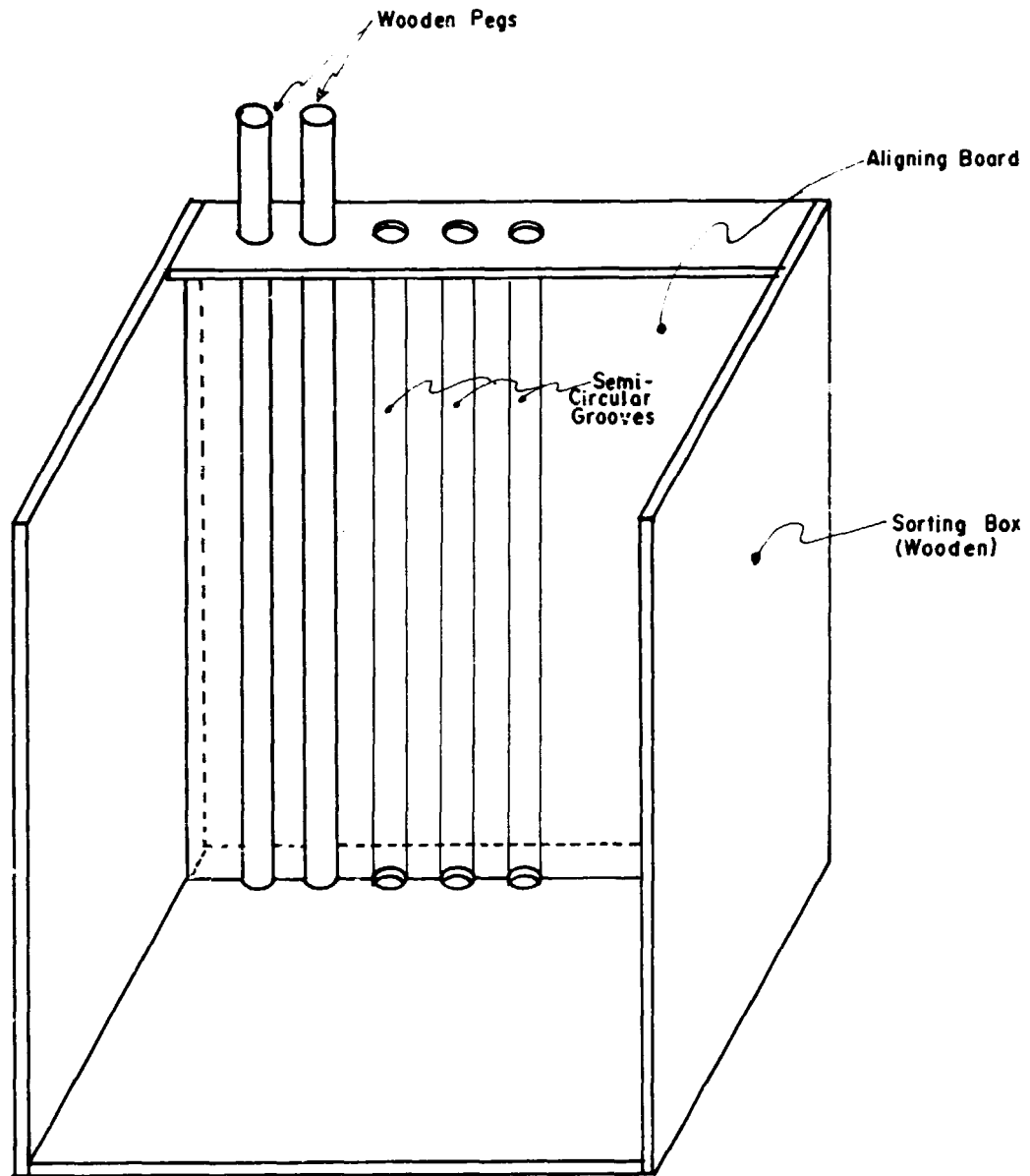
DIRECT LABOUR TICKET			
Dept. No. Original Assignment	Job Order Reference	Description of Work Performed	Total Hours Worked
2	GS-3636	Stroke Sanding Table Tops	1 1/2
070 <i>Romulo Vera</i> I.D. No. and Signature of Employee		Date: 16 May '82	<i>Pedro de la Cruz</i> Signature of Supervisor

B - Labour Ticket with two notches on upper edge, corresponding to Department No. 2, Sanding and Assembling Department.

DIRECT LABOUR TICKET			
Dept. No. Original Assignment	Job Order Reference	Description of Work Performed	Total Hours Worked
3	GS-3636	Spraying lacquer on Table Tops	2 1/2
115 <i>Paulo Domingo</i> I.D. No. and Signature of Employee		Date: 16 May '82	<i>Jorge Cuca</i> Signature of Supervisor

C - Labour Ticket with three notches on upper edge, corresponding to Department No. 3, Finishing Department.

Figure 16. Sorting notches on labour tickets



Note: The fixture as shown above is set for sorting labour tickets for department 2, sanding and assembling.

Figure 17. Sorting fixture for labour tickets

in the slots to sort for labour tickets of a department, starting with the department that requires the most pegs and decreasing the number of pegs after each sorting step.

Labour tickets are piled face up in front of the pegs. Then the fixture is tilted 90° to put the pegs under the labour tickets. The labour tickets that do not belong to the department or section will be higher and are pulled out of the pile for further sorting.

This sorting technique is of course facilitated by when heavy-weight paper is used for the labour tickets. Heavy-weight paper also helps the tickets withstand the severe wear and tear they usually receive at the hands of the workers.

C. Evaluating and adopting new forms

In small furniture or joinery shops where the main operational functions are exercised by the entrepreneur, sometimes with the help of a few assistants who are usually in the same room or building, and where the company files are readily accessible to the entrepreneur or his assistants, the documentation of data and information is not a large problem. In fact, in many of the smaller shops most data and information are collected and transmitted by word of mouth, and a minimal amount of records is kept. Thus, a formal system for evaluating and adopting forms, as presented in the following paragraphs, will hardly be applicable to these shops. Nevertheless, the procedures and guidelines discussed in the following paragraphs will serve as a guide to the small entrepreneur should the need arise to set up a formal reporting system in order to monitor and control expanded operations that go with the growth of business.

Some medium-sized and many large furniture and joinery firms set up ad hoc committees to study and submit recommendations to management on the advisability of adopting a proposed form. In more elaborate organizations the responsibility for approving a form is delegated to a committee composed of department or division heads. Some large firms have published manuals on forms analysis and design which is used by the delegated authority (most usually the division head) as the basis for approving a form.

The sequence of events from the proposal and to the eventual adoption of a form for external or internal use in a furniture or joinery firm is:

(a) The proponent of the new or revised form prepares a preliminary format, indicating the information that is needed to complete the form;

(b) Copies of the preliminary format are distributed to the heads of the units affected for comments;

(c) The preliminary format is revised by the initiating unit to include the comments of the other units;

(d) The revised format is discussed at a meeting of heads of units involved, and recommendations to management are drawn up to justify adoption of the new or revised form.

1. Justification of a new or revised form

The following information is usually included in the justification for adopting a new or revised form:

(a) Objective or purpose. The objective or purpose of the new or revised form, indicating the need for the form;

(b) Scope. The circumstances or situations where the form should be used. For example, the MRIS (form No. 32) should be used to document the receipt of all materials and supplies delivered by suppliers to the company;

(c) Responsibility. The area(s) of responsibility of the monitoring units(s) involved in the completion, distribution and analysis of the information contained in the form. For example, the preparation, completion and distribution of form No. 32 will be the prime responsibility of the materials control unit. Analysis of data contained in the form will be the responsibility of the accounting unit, which in turn will prepare periodic summaries of materials and supplies costs for top management and company units included in the distribution list for the summaries;

(d) General provisions:

(i) A sample of the form is presented;

(ii) Procedures for filling out the form are attached to it;

(iii) The expected costs of maintaining the form, together with anticipated benefits to be derived from the use of the new or revised form, are also attached.

The needs for forms like those presented in this Manual will differ according to the organizational and operating schemes of the furniture or joinery firm. It is thus recommended that forms that are of interest to readers should be subjected to the evaluation procedures discussed above before they are adopted for use by a firm.

D. The control of forms

The accounting unit is usually designated as the overall custodian of forms and is responsible for maintaining an adequate supply of blank forms.

When management approves a new or revised form, the master copy of the approved form is sent to accounting for listing in the master register, which records the following information on approved forms:

Control number, assigned by accounting

Title of form

Classification of the form as to production procedures, engineering, quality control, administration, personnel relations, accounting etc.

Initiating unit

Frequency of distribution

Distribution of copies

X. COMPUTERIZATION OF INFORMATION SYSTEMS

Computerization is to business what automation was to industry. Both are mechanized versions of some repetitive human functions and are able to maintain levels of speed and accuracy that people would be incapable of over a prolonged period of time. In the case of computers, the repetitive human functions that have been copied by machines are, basically, data collation and report generation. Decision-making by the computer is limited to whatever instructions have been entered in its "memory"; given any exceptional case not provided for in the instructions, the computerized results are likely to be invalid or non-existent (i.e., execution of instructions stops).

The bulk of the discussion in the present chapter deals with the feasibility of computerizing the information systems of small-, medium- and large-scale furniture and joinery firms in developing countries. First, however, it is important to discuss the technical feasibility and the practicality of computerization in developing countries. In some advanced developing countries, computerization is already a tried and tested business tool. Thus, technical and service support for computer installations in those countries is assured, and furniture and joinery firms of any size need only concern themselves with the technical feasibility for computerizing their information systems. On the other hand, in less developed countries, the availability of technical and service support for computerization is practically non-existent. What little does exist is very expensive and difficult to come by, particularly in cases where know-how has to be imported. Thus, even the largest furniture and joinery firm in less developed countries may find that computerization is not technically feasible because of the impracticality of installing and maintaining a computer installation under prevailing conditions. However, all discussions in the present chapter assume the practicality of establishing a computer installation and concentrate on determining the technical feasibility of such a venture. Mr. Cruz, owner and manager of Expertise Woodworks Corporation, is used as an example for discussions.

Mr. Cruz started his business as a small store in which some samples of his finished goods were displayed and in which he conducted all his business (sales, accounting etc.). Behind this store, he had a slightly larger shop that housed the entire operations unit, with some seven labourers and skilled craftsmen. All sales and purchases were made on a cash basis, and only one book of accounts was maintained to record these financial transactions.

Mr. Cruz became prosperous and ambitious - he found that he was losing a number of sales opportunities, usually those where large volumes were required over a short period of time. Therefore, he decided to mechanize his manufacturing operations. The end result was an increase in the volume of existing information plus new information on payments on equipment bought on credit, machine maintenance, breakdown and repairs and the like. Mr. Cruz hired a clerk to run the store, take customer orders and do errands while he attended to the other needs of his business.

Over the years, the business continued to expand. Mr. Cruz hired more labourers, promoted senior craftsmen to supervisors and hired a production manager. Sales and accounting departments were formed and staffed, complete with managers and supervisors. Business was so good that credit lines were opened for major customers and raw materials were obtained on credit, which

added new dimensions to the accounting activities. Accounts receivable and payable were no longer a simple matter of down payments on orders and cash payment on deliveries - instead, credit balances, extensions and collections had to be monitored closely, accounts had to be grouped according to the date due and credit status had to be continually updated. In direct proportion to increasing customer orders, production, purchasing and delivery activities grew in number and complexity. Mr. Cruz, as general manager, retained the authority to make decisions on major issues involving any or all of the three departments; thus, department managers had to provide him with regular reports on their departments' activities. He soon found himself burdened with a mass of details which required careful review, consolidation and evaluation by him before critical decisions could be made. Then the department managers complained that they could not continue to do their jobs effectively if they had to produce such lengthy reports, and Mr. Cruz agreed to summarized reports on activities for the week. The reports became so general, however, that he had to seek out the people concerned to get a clear idea of business activities.

In spite of this internal confusion, business continued to prosper, and one day Mr. Cruz was offered the opportunity to export his merchandise and possibly even establish foreign-based marketing branches. At this point, Mr. Cruz decided that, before adding new loads to the already overburdened organization, he should, together with the department managers, take a good, long look at the company. Some of the findings were:

(a) An unexpectedly large number of clerical staff in accounting and sales departments;

(b) An overwhelmingly large volume of reports being produced to enable departments to exchange information. Much of the information being passed around was duplicated in several reports;

(c) Over-emphasized policies for the satisfaction of customer orders and inadequate controls on outstanding customer accounts;

(d) Employee discontent because of late payments of salaries, inaccurately computed salaries and almost non-existent career development schemes.

These and many other problems were uncovered, reviewed and found to have one major common cause (and other less critical causes) which was, basically, an information system that was not adequate to keep up with the company's rate of growth. Faced with all these internal problems, Mr. Cruz was forced to bypass the opportunity for expansion of his operations and, instead, to concentrate on resolving his company's information problems.

A. Why computerize

The story of Mr. Cruz is a typical example of how small furniture and joinery firms grow in developing countries. With growth comes an increasing volume of information flowing throughout the organization. As in Mr. Cruz's case, there comes a time when an organization becomes "bottom-heavy" with the number of clerks and typists needed to perform routine but repetitive calculations, update journals and ledgers and do other paper work. The consolidation of information becomes a problem and report preparation becomes a major bottle-neck in the smooth flow of day-to-day operations. Direct and indirect losses may be sustained and good business opportunities may be lost because not enough information is available when it is needed, or, if available, it is not in a form that facilitates decision-making.

This is where computerization can help - it forces a business to organize or re-organize its information generation activities such that both the obvious and not-so-obvious links between units of the organization are clearly defined. Information needs of different levels of management and staff alike are identified, thus making possible the elimination of redundant and unnecessary data and allowing lower- and middle-level management to deal with details while freeing top management to work on the summaries, comparisons and profiles needed to formulate high-level business policies and plans. Valuable work-hours are also freed for much needed analyses and evaluation of information, activities previously rushed through or even by-passed in the crush of useless paper shuffling. Even the upgrading of clerical staff from mere paper-handlers becomes possible, for they receive some technical training needed to keep computer operations on the move.

Computers can also be used to input, edit, format, print and store text. This function is called word processing, and it is a time-saving utility, particularly where large volumes of text (manuscripts, manuals, form letters and the like) have to be stored, retrieved or edited from time to time.

These are but a few benefits that can result from the proper design and implementation of computerized information systems. The value or usefulness of such systems varies with the size, complexity and diversity of a company's information needs. Furniture and joinery firms, in particular, stand to benefit much from computerization because, in addition to the usual problems inherent in running a business (accounting, payroll etc.), there exist unique problems in areas such as inventory control, production scheduling and machine loading, cost control etc. whose solutions can be hastened through computerization.

B. When to computerize

A major stumbling block of many business firms in developing countries is to decide when the time is right for computerization. Too often, business firms are carried away with the novelty of computers, look on computerization as a symbol of progress and prestige or think it is a quick and easy means of solving business problems. As a result, most initial efforts to computerize end in confusion, frustration and, eventually, failure.

Most experts agree that the decision to computerize or not is a difficult one to make. There are three basic requirements that must be satisfied even before the consideration of computerization becomes feasible.

The first and foremost requirement is the quantification of the company's present status and future goals. Management must be able to quantify its major operations, such as volume of inventory and inventory turnover, number of customers or customer accounts on active status, percentage of orders returned for rework and the like. In addition, the firm's objectives for the next three to five years must be defined in equally measurable terms. Once management can say, with a certain degree of accuracy, how the business stands and where it is going, the firm's problems can be identified and evaluated. If none of the problems involve information processing, computerization will not help; but if some or most of the problems are information-related, then there is a chance that computerization will help.

The second requirement is the existence of standard or well-defined business procedures. If existing manual procedures are dependent on the whims of the incumbent manager or staff or are defined but poorly controlled, then computerization may simply result in the mechanization of errors already inherent in the organization. It is therefore imperative that existing manual procedures be reviewed, re-defined as necessary and standardized wherever possible. Appropriate controls over these manual procedures must likewise be established and enforced. The application of some or most of the procedures and controls recommended in preceding chapters of this Manual will help achieve these ends.

The third requirement is the knowledge of what a computer can and cannot do. Many otherwise cautious entrepreneurs invest in computers purely on the strength of stories they have heard about the usefulness of computers. There are many popular misconceptions about computers in business circles, and only through a conscientious effort at self-education in the computer field can an ordinary entrepreneur hope to be able to understand what computers can do. In some advanced developing countries, local institutions, including universities and management training centres, offer computer orientation courses for the business executive. A good number of foreign-based computer manufacturers have established local marketing firms or branches which also serve as training centres for local computer users and prospective customers. In less developed countries, few, if any, such resources exist. However, there is expertise available in international organizations such as the United Nations and its bodies and agencies.

Entrepreneurs sincerely interested in improving their firms through computerization need not become computer science experts before they can undertake the computerization of their firms. It is sufficient to understand the fundamentals of computers for them to become consumers who, with the help of computer experts, can move on to identifying specific areas in which computers can really be of help in their businesses.

Having satisfied the three basic requirements, management is in a better position to consider the question of computerization. Since computers are mere tools used to solve problems, the first step management must take is the identification of the firm's fundamental problems; only those that are information-related should be considered in the decision to computerize or not. Most information-related problems arise because managers receive only about 30% of the information they actually need. Thus, critical business decisions are based on a combination of formal reports, informal observations (usually obtained second-hand) and simple intuition based on the managers' knowledge in their areas of specialization.

When the business was small, Mr. Cruz had practically all the information he needed at his fingertips. As the business grew, he was forced to rely on, first, information provided by his department managers and, afterwards, on information passed on from supervisors or foremen to the department managers and finally to him. In each instance, he faced the risk of losing valuable information either through mishandling of data (e.g., erroneous transcriptions), through ignorance of the value of information not included in reports prepared for him or through over-zealous preparation of reports in which vital information lay hidden in a mass of unnecessary detail.

The identification of information-related problems is not sufficient to justify computerization. Unfortunately, there are no hard and fast rules to ensure that management will make the right decision in this respect. However, the presence of all or most of the following conditions in a furniture or joinery company is a good indicator that accurate and timely information can be obtained manually only with great difficulty and that computerization is therefore feasible:

- (a) A high volume of straightforward, repetitive computations are done in the normal conduct of business;
- (b) Service is rendered to a large number of customer accounts with active credit status;
- (c) Extensive raw materials or finished goods inventories are maintained;
- (d) A sizeable number of people (six or more) are employed to handle general processing services such as payroll and accounts receivable;
- (e) More than two or three selling or manufacturing locations exist;
- (f) Information-related problems not common to most business firms exist (e.g., complicated lead or delivery times, diversity of product lines or heavy volume of communication with external entities).

Finally, management must consider the cost factors involved. Since computerization is an expensive and time-consuming proposition, it is right that management demands certain measurable results from this activity to justify its existence. Three possible areas to explore when considering the cost effectiveness of computers are:

- (a) Labour. The belief that computers automatically reduce a company's work force is more of myth than reality in today's businesses, especially in understaffed smaller companies. In fact, computerization requires additional staff specially trained to manage, design, implement and run computer systems (qualified staff previously engaged in jobs that are taken over by the computer can be retrained);
- (b) Customer service. Improved customer service results from the facility and speed with which information on pending orders (from ordering point to scheduled deliveries) can be obtained and provided to customers. Also, delivery of merchandise can be hastened by the decrease in the amount of time needed to process and prepare supporting documentation;
- (c) Cost of money. Effective monitoring of customer credit balances and paying habits as well as faster billing can result in savings owing to quick action on delinquent accounts or on regular payments due for collection.

On the whole, management must consider both the tangible and intangible benefits of computerization and balance these against the expected costs of installation, depreciation, maintenance and supplies. If the overall results of deliberations indicate that a computer will help the company grow, then management is ready to shop for a computer.

If Mr. Cruz were to apply the foregoing discussion to his firm, the Expertise Woodworks Corporation, he would find that:

(a) The quantification of his company's major operations is possible. The information Mr. Cruz needs is available, although not in the form he needs it;

(b) The company's information flow is not clearly defined; as a result, there is an unusual amount of redundant information and an equivalent amount of unnecessary information circulating in the company.

In order to computerize his company's information system, Mr. Cruz and management staff would first have to settle the question of who receives what information from whom and how this information is going to be used. Then, he and the managers must attend orientation courses on computers.

If Mr. Cruz compared the operations of his company with the conditions listed in the present section of the Manual, he would find that the Expertise Woodworks Corporation possesses most of the prerequisites that make computerization a feasible solution to its information problems.

C. What to computerize

1. The information systems

In the preceding chapters, five major information systems for manufacturing operations were identified, namely: (a) accounting information system; (b) production information system; (c) sales information system; (d) purchasing and inventory information system; and (e) engineering services information system. There are also two other major information systems, the personnel information system and the payroll information system. Together, these seven major information systems form the basic framework of a management information system for furniture and joinery firms. These systems can be subdivided further into small but distinct groups of related information or subsystems.

(a) The accounting information system

The accounting information system can be viewed as the central part of a management information system, where most, if not all, information generated within a company is eventually collected and reduced to dollars and cents. The more common subdivisions of this system are the general ledger subsystem, the accounts payable subsystem, the accounts receivable subsystem, the budgetary subsystem and the costing and pricing subsystem.

Of these, the first four are general subsystems common to all types of businesses. The fifth subsystem, however, varies with the nature of the business, the products or services offered and the nature of operations (as discussed in chapter II).

For small furniture and joinery firms in developing countries, particularly those with a single proprietor and where accounting activities are mainly the recording of cash spent and cash received, computerization of any of the four general subsystems would not be advisable because the activities involved are too simple and the volume of information too small to justify the

use of computers (regardless of the size of the computer). Depending on the volume of operations work, the costing and pricing subsystem may or may not be worthwhile computerizing.

For medium-sized and large-scale furniture and joinery firms, the feasibility of computerizing all five subsystems would depend largely on the complexity of the accounting practices in the company and the volume of accounting information generated within the company.

In the more advanced large-scale furniture and joinery firms, the costing and pricing subsystem could be expanded into a sophisticated pricing information system. This system would include a pricing simulation model, a subsystem to execute "pricing-decision rules" and a subsystem for analysing pricing information, in addition to the usual subsystems for gathering, storing and retrieving pricing information.

(b) The production information system

As discussed in chapter V, the production information system can be subdivided into the production planning and control subsystem and the production reporting subsystem.

The production planning and control subsystem usually includes production scheduling as well as labour usage, materials usage and machine utilization. The production reporting subsystem deals primarily with reports on production performance and operational scrap. These two subsystems meet at one point - when a report comparing actual against planned production activities is being prepared.

In small, labour-intensive furniture and joinery firms (for example, that of Mr. Cruz before mechanization) the computerization of the production planning and control subsystem is definitely not viable because the volume and frequency of information needs is small. On the other hand, a very simple computerized production reporting system would be useful as a tool for helping management to prepare its production plans (manually prepared) for incoming orders, particularly in making decisions on whether to hire more or release workers, depending on the volume of orders.

Medium- and large-scale furniture and joinery firms with fully or almost fully mechanized operations would find the computerization of both subsystems extremely useful management tools for critical decision-making on production operations. In the more advanced companies in developing countries, the production planning and control subsystem could be linked up to the sales forecasting subsystem, using the output as inputs for allocating work-loads to each machine (machine loading). Companies with a variety of standard product lines could even make use of a mathematical model for determining the most economical but profitable product mix.

(c) The sales information system

The two major subsystems of the sales information system are the sales forecasting subsystem and the sales reporting subsystem. In small furniture and joinery firms where sales depend primarily on customer orders and each product line is unique in itself (i.e., there are no standard product lines), computerization of either subsystem would not be of much use owing to the diversity of merchandise produced and the low volume of customer orders.

The computerization of either or both subsystems is advisable for medium- and large-scale furniture and joinery firms where the simplicity or complexity of the forecasting model depends on the type of merchandise being sold, the diversity of the product lines and the frequency with which each product line is sold. For example, in the case of Mr. Cruz and the Expertise Woodworks Corporation, a look at form No. 13 (summary of periodic sales) reveals that the company has diversified into several types of furnishings. The institutional products (e.g., office, hospital and school furnishings) have to be treated differently than the non-institutional ones, since the former are usually sold in bulk and the latter in sets, only one set being sold to one customer. In addition, some sales may be seasonal, for example, school furnishings.

In the more advanced large-scale furniture and joinery firms with a distinctly defined marketing function, the sales information system could be expanded into a full-scale marketing information system, where the market shares of the company and its competitors alike could be monitored and analysed. Appropriate marketing strategies could then be made, including recommendations for new pricing strategies when necessary.

(d) The purchasing and inventory control system

In a number of companies, this system is subdivided into four distinct subsystems, namely the purchasing subsystem, the raw materials inventory subsystem, the finished goods inventory subsystem and the spare parts inventory subsystem. The inventory subsystems discussed here are those designed primarily for the use of operations, with information passed on to the accounting information system rather than the other way around, as is usually the case when companies first computerize.

For small furniture and joinery firms that do not sell from inventory, the finished goods inventory subsystem does not require computerization, since a delivery is made as each order is completed. Computerization of the spare parts inventory subsystem is not necessary either, since labour-intensive production activities make use of hand tools that are used until replacements are required and there is little, if any, machinery. Computerization of very simple purchasing or raw materials inventory subsystems is advisable only if sizeable volumes or a very wide range of raw materials are ordered, purchased and maintained in stock. Another factor to consider is the inventory turnover rate. If it is relatively slow, then a computerized system may not be required.

Medium- and large-scale furniture and joinery firms usually maintain sizeable volumes of raw materials with varying rates of inventory turnover. These features make the computerization of the raw materials inventory subsystem desirable. For companies where most purchases are made on credit basis and a fairly large number of suppliers are maintained, the need for a computerized purchasing subsystem is clear. A sophisticated system for more advanced companies would include analyses of supplier performance with respect to the quality of merchandise delivered and reliability in meeting agreed-upon delivery dates.

In special cases where purchases include imported items and the purchasing department of the company is responsible for all details of such purchases (i.e., all requirements for importation are handled by the company itself), a small computerized subsystem can be added on to the main purchasing subsystem to prompt and monitor import activities provided, however, that imports are voluminous or costly and that import procedures defined by law are complex or require a great deal of paperwork.

(e) The engineering services information system

The engineering services information system is composed of many small subsystems, the major ones being the equipment maintenance and repair subsystem, the vehicle maintenance and repair subsystem, the wastage information subsystem and the machine utilization subsystem.

The first two subsystems are needed by the plant engineering department to plan and monitor maintenance and repair activities, since these are critical for manufacturing and sales activities. The wastage information subsystem receives information from the production information system on the conversion of raw materials into finished goods and from the raw materials inventory subsystem on raw materials issued to the production unit. This subsystem is used by industrial engineering to monitor the volume of operational scrap resulting from manufacturing operations. Information generated by this subsystem is also used to study ways and means of optimizing the utilization of raw materials. The machine utilization subsystem is used in industrial engineering to balance machine utilization in the manufacturing area, especially when new products or product lines are to be manufactured in addition to existing products or product lines. This is particularly important for furniture and joinery production activities, where the same operation can be performed on different machines.

In small, labour-intensive furniture and joinery firms where manufacturing equipment is usually limited to hand tools and a few pieces of machinery, the scheduling and monitoring of maintenance or repair activities as well as the monitoring of machine utilization can be easily handled with a well designed manual record-keeping system, thus making computerization of the first and third subsystem an uneconomical proposition. Likewise, the number of service vehicles used by these firms is probably limited to one or two delivery vans; hence the scheduling and monitoring of vehicle maintenance and repairs is best handled by a manual system. The computerization of the wastage information subsystem for small furniture and joinery firms in developing countries poses a unique problem in that manual manufacturing activities are more difficult to control (i.e., with respect to maintaining set standards) than mechanized manufacturing activities. This factor may, by introducing too many deviations from the norm, eventually reduce the effectiveness and usefulness of a computerized wastage information subsystem.

In medium- and large-scale furniture and joinery firms, the computerization of all four subsystems is a feasible proposition, primarily because:

(a) Owing to the large volume of machinery and vehicles maintained by these firms for manufacturing operations and sales activities, a relatively large clerical staff is necessary to prepare schedules and maintain records manually. In addition, the preparation of comprehensive analytical reports

would be a time-consuming activity made even more difficult by the volume of information that would have to be studied and evaluated;

(b) The amount of raw materials used and, consequently, the resulting volume of operational scrap are significant enough to require careful monitoring, which a computerized system would make possible.

(f) The personnel information system

The personnel information system, when considered in its most sophisticated form, covers a number of small subsystems. Some of these are relatively independent of the others and thus may be considered separately, or not considered at all, depending on the needs of the company. They include the employee information subsystem (the employee's record before joining the firm), the career information subsystem (the employee's record in the firm), the benefits information subsystem, the applicants' information subsystem, the classification information subsystem and the training information subsystem.

A computerized personnel information system of this type is advisable only for large-scale companies, particularly if company personnel are assigned to different locations. For large-scale furniture and joinery firms with more than one manufacturing base or sales outlet, a computerized personnel information system such as this would be very useful in helping management to keep track of personnel and pinpoint staff with potential. For small and medium-sized furniture and joinery firms, a computerized personnel information system is feasible only if the system is limited to basic employee information; otherwise, the complexity of the system overshadows its usefulness to the company.

(g) The payroll information system

Strictly speaking, this is a subsystem of the personnel information system. However, most companies prefer to keep these separate, with the payroll information system covering payroll operations (i.e., actual computation of remunerations and deductions, preparation of payroll reports and payslips) and the personnel information system concentrating purely on personnel reports such as personnel profiles, overtime statistics, career profiles and the like.

Computerized payroll systems are feasible for almost any (except the smallest) furniture and joinery firm. Usually, a payroll roster of 50 to 100 personnel is sufficient to justify computerization of the system, particularly if:

(a) A majority of the employees are daily paid labourers;

(b) There is more than one type of computation to be undertaken (e.g., salary and wage rates include daily rates, weekly rates, monthly rates and piece rates);

(c) Personnel are entitled to loans or purchases payable through salary deductions;

(d) A number of government payments are required (e.g., taxes, social security, medical care etc.) which must be deducted from employee earnings.

The degree of complexity of the computerized system depends on the company information needs and on the complexity of the computations and procedures undertaken.

2. Assigning priority in potential computerization projects

The decision as to which of all these different types of information systems should be computerized first becomes quite overwhelming, particularly if the end-users of the systems are all eager to computerize their operations. There are no hard and fast rules that dictate which system should be computerized first. Most companies trying to computerize for the first time opt for the computerization of the accounting system first, possibly because this system has the most well-established principles or standards to define it. However, there is a method of assigning priority that is being adopted by a number of companies the world over. It is relatively simple in that it requires no mathematical computations and can be applied by practically anyone, provided, however, that the people involved in the decision-making process have sufficient information on the system under discussion, including the tangible and intangible benefits that can be expected from computerization. The system works in this way:

(a) The decision-making body is usually composed of representatives of the company's top management;

(b) Each proposed project is presented to the decision-making body for evaluation;

(c) The decision-making body, drawing on its collective knowledge of the business and keeping in mind the company's short and long-term goals, classifies the proposed projects into four categories: essential; high priority; low priority; and others;

(d) Once each proposed project has been classified, the proposed projects in each category are reviewed and discussed further and re-ranked within each category using the same basic concept of essential, high priority, low priority, and others.

If there is a waiting list of proposed projects ranked by priority and a set of proposed projects must be introduced into this waiting list, the new project proposals are dealt with first (steps (a) to (c)). Then, the projects on the waiting list on which work has not yet begun and the new proposals in each category are re-ranked as in step (d).

D. How to computerize*

1. Establishing the computer systems function and staffing the data processing group

Having established that the time is right for computerization, management is ready to begin computerizing its information systems, by:

*This section of the Manual discusses computerization activities in a broad sense only and should give the reader an idea of the amount and type of work that goes into the computerization of a company's information systems.

(a) Defining the functions, size and organization of the data processing group, as well as its location within the company. This task must be carried out by a technically qualified person. Management could hire:

- (i) An experienced data processing manager. It is imperative that the person hired has had experience in setting up computer systems groups, not only managing them;
- (ii) A recognized computer consultant (either an individual or a firm);
- (iii) A recognized computer consultant to work with company personnel designated for this purpose. This option is feasible only if the employee is an experienced data processing manager or has both the managerial and the technical expertise needed to manage a data processing group. If a manual systems group already exists within the company and the manager of this group is qualified and interested, it is advisable that the manager be assigned to the job, provided the proper computer training is available;

(b) Identifying the information systems that will require computerization and determining the sequence in which these should be computerized. Depending on the amount of work to be done, the data processing manager or the consultant may recommend that senior staff undertake the second step. Such senior staff could be new employees (i.e., experienced computer systems analysts) or manual systems analysts within the firm who have had some training on the fundamentals of computers and computer systems or both. The data processing manager or consultant might, however, do the job;

(c) Choosing and eventually obtaining the computer equipment that will satisfy the needs of the company for at least the next three to five years. All the necessary decisions can be made by the data processing manager or the consultant;

(d) Determining the staffing requirements of the data processing group according to a plan or schedule drawn up by the data processing manager or the consultant. The data processing group personnel may be drawn from existing company personnel or from outside the company or both. Any of the staff who also have not had previous experience with the computer equipment to be used by the company must receive, in addition to whatever training is required for their new positions, training on the new computer equipment.

2. The life cycle of a computer systems project

The following are the major stages in the life cycle of a computer systems project:

(a) The work request. A computer system project is usually initiated through a work request prepared by a department or section. It seldom happens that the project is initiated by the data processing group itself, except where the computer system is active but the design has become so problematic (from the data processing group's point of view) that the system requires upgrading to facilitate or improve its operations;

(b) The preliminary survey. Since the demand for computer systems development projects usually exceeds the capabilities of the data processing group (in terms of volume of work), not all work requests can be handled by the data processing group. Hence, a preliminary survey should determine the need and urgency of each work request. The preliminary survey report, sometimes called a project proposal, includes a rough estimate of the time and resources required to complete the project. This report is reviewed by the decision-making body of the company charged with the responsibility of assigning priority to computer systems projects;

(c) The definition of user request. When the data processing group has sufficient resources (staff) for a project, the project proposal next in line in the list of approved project proposals is activated. The user's information requirements are defined in a series of data-gathering (interview) sessions. At this stage, the systems analyst defines user information needs in broad terms, i.e., the objectives and scope of the system to be designed, evaluates alternative designs for the system and prepares a recommendation on the design best suited to the user's requirements, taking into account the limitations of the company's computer equipment. The findings of the systems analyst are presented to the person requesting the project and to senior staff of the data processing group for approval;

(d) The preliminary design. The systems analyst probes the previously defined user information needs in depth, prepares rough layouts of reports to be produced by the system through the computer, outlines the manual procedures needed to support the computer system, prepares a rough flow-chart and narrative of the computer system, based on the design approved in the previous stage of the project's life cycle, and plans interfaces with the supporting manual system. The results of this activity must be approved by the requesting person and senior staff of the data processing group;

(e) The detailed design. All report layouts are finalized by the systems analyst, as are the computer system's functions, flow charts and narrative. The person requesting the project and all users concerned are required to signify approval in writing since the data prepared by the analyst will form the basis of the programs to be prepared in succeeding stages of project's life cycle. Senior data processing staff must also give written approval of the technical aspects of the system design;

(f) Preparation of program specifications. The system functions and logic are transformed by the systems analyst or senior programmers into a set of programs. For each program identified, specific instructions, called program specifications, are prepared. Those program specifications are reviewed and approved by senior data processing group staff;

(g) Programming and testing. Program specifications are assigned to each programmer in the project team. The programmers translate the program specifications into a coded language (program) that is easily understood by the computer; the programs are then tested using imaginary data prepared by the programmer. The senior programmers of the project team review the test results against the project specifications;

(h) Implementation planning. Simultaneous to the programming and testing stage is the preparation of plans by the systems analyst for implementing the computerized system. This includes alternative strategies and

schedules for implementation and the preparation of all systems documentation (user manuals, operator manuals etc.) needed by the user or the data processing group to run the system;

(i) System testing. Whereas in the programming and testing stage the computer system was tested on a per program basis or, at most, by a series of related programs, the entire system must be tested by the systems analyst, primarily to check that the flow of information through the system is smooth and as specified in the detailed design and program specifications stages. Whenever possible, actual data is used in the testing process, with minor changes to test exceptional cases pinpointed in the program specifications. The user is again asked to review the results of this phase, more specifically, to review the reports produced by the computer system and to check whether the original requests have been met;

(j) User training and system start up. Having received user approval of the computer system, the systems analyst trains users or data processing staff on the procedures involved in running the system, on the controls that must be implemented to ensure that the system runs smoothly and, finally, on the use and interpretation of reports produced by the system. In some cases, it is necessary to convert all or portions of existing, manually maintained user files into new files (format or media) to be used by the computer system. This is called the conversion stage and must precede the actual start up of the system (the actual implementation of the system for the first time). More often than not, the manual system is retained for the first or first few runs of the computer system. After each run, computer results are checked against manually prepared outputs. This allows the data processing group to correct the computer system as needed without unnecessary disruption of operations;

(k) User acceptance and operations turnover. When the users are satisfied that the computer system is doing what it was expected to do and that they have received sufficient training to run the system on their own, the final user acceptance is prepared in writing. Similarly, when the operations unit of the data processing group is satisfied that it has been given sufficient information to run the system, it accepts the responsibility for running the system as per instructions defined in the operations manual prepared by the systems analyst.

3. Equipment or hardware

When computer technology was relatively new, companies wishing to computerize had very limited choices as to the size of the computer. In addition, computers were designed to be run and maintained by a central body - the data processing group. In recent years, computer technology has made several large advances. There are now three major computer sizes - the large-scale computer, the minicomputer and the microcomputer.

The large-scale computer is physically larger than the other two and requires more careful supervision of its physical environment, i.e., temperature, humidity and the like. These computers are advisable for corporate systems that must be controlled by a central body within the company (e.g., personnel administration) and that generally process a significantly large volume of information.

The minicomputer is physically smaller than the large-scale one but larger than the microcomputer. It requires less rigid control over its physical environment. It generally cannot handle systems with a large information base, but it can do everything the large-scale computer does. However, the number of users who can use it at any given time is limited. Users can be trained to operate the machine on their own, but an operations staff has to be maintained (unlike for microcomputers).

A microcomputer is a desk-top type of computer. These computers are generally designed for single users (one user at a time), although a few are powerful enough to accommodate more than one user at a time. These computers are usually located in the user's work area, and users require relatively simple training before they can be left on their own to operate the machine and design simple programs or small systems.

4. Software

Software refers to the programs that are run on a computer. The software programs most visible to computer users are usually called "application programs" because these are designed and developed for use in computerized business or scientific applications (i.e., information systems or mathematical models, respectively). Higher-level programs or software not commonly known to those outside the world of computers are the "system software". These are the set of instructions that allow a computer to run, that is to perform arithmetic calculations, follow and check the logic of application programs, read data from input media, write data onto output media etc. Data gathered from various forms presented in this Manual could be processed and stored into output media through the use of both application programs and system software.

Thus, computer hardware and software go hand-in-hand; one without the other would be useless.

E. Pitfalls in computerization

Various pitfalls of computerization have already been mentioned in the preceding sections of the present chapter. These and other common problems encountered by organizations in their initial attempt to computerize can be listed as follows:

(a) The belief that computers can solve a company's information problems. Most people who are unfamiliar with the world of computers are so awed by the capabilities of the machines that they forget that the machine is only as intelligent as the people who develop the instructions that make them work. "Garbage-in, garbage-out" (GIGO) is the computer world's favorite motto - a reminder to all users, systems analysts, programmers and operators that it is they who can solve the company's information problems, not the machine;

(b) Computers as a status symbol. As with all innovations, the novelty of acquiring a computer is a lure to many companies, especially these days when computers of all sizes, shapes and colours are easily acquired at reasonable prices. The primary goal of some managers is to be able to boast to colleagues that they are now "fully computerized", without careful thought being given to how these machines can be utilized to assist business operations. In the long run, there is no prestige in owning a piece of machinery whose existence cannot be justified simply because it cannot be used properly;

(c) Attempting too much too soon. In their eagerness to reap the benefits of computerization as soon as possible, a good number of managers make the mistake of exchanging quantity for quality, the end result being a number of mediocre systems, none of which really satisfies the company's information needs;

(d) Poor choice of computer equipment. Two extremes are possible: (i) management, in an effort to cut costs, settles for a machine whose memory capacity or other features are too limited for the company's needs and as a result has to spend twice the amount they would have spent if they had planned more carefully; or (ii) management buys the best computer their money can buy and finds itself burdened with a machine that eats up the profits and cannot be made to show much benefit in return, simply because the company's information needs do not require so much power or such a sophisticated computer;

(e) Not enough emphasis on user involvement. Too often management does not realize that the design of computerized information systems is not purely a technical problem that only systems analysts and programmers can resolve. Hence, "desk-top analysis" is encouraged, and consultation with the eventual users of the system is limited to gathering data on existing manual procedures and little heed is paid to what the users expect the system to do. The result is that after some months of hard work, the analyst presents a system to the users and it is rejected by them, either because it does not really solve their basic problems or because it requires a change so drastic from existing manual procedures that the results would be chaotic if implementation of the system were to be attempted. Management and the systems analyst must always bear in mind that the success of a system lies largely in its acceptability to the user, primarily because it is the users who know the system best and are therefore in a better position to say whether a solution will work or not, and, secondly, because it is the users who will eventually make use of the system; if they are convinced it will work, it will (even if the design is mediocre), but if they are convinced it will not work, it will not, no matter how technically perfect the design may be;

(f) Expecting computerization to solve operational or procedural problems. Failure to identify and analyse a company's problems can lead to false expectations on the part of management. If a company's basic problems do not involve information processing, no amount of computerization will resolve those problems;

(g) Failure to consider interrelationships between individual computer systems. The development of one computer system is usually problematic enough without the added problem of link-ups with other systems. For example, equipment maintenance information can be used by the purchasing or inventory sub-systems to determine when to re-order or to gauge the need for updating existing standards on re-order quantities. Thus, most inexperienced systems analysts tend to miss the information needs that two or more systems may have in common. The end result is either a duplication of common information or the major revision of one or more of the related systems to allow common information to be shared. It is therefore of prime importance to include a quick look into system interrelationships during the development or revision of each computerized system.

F. Redesigning forms for computerization purposes

One of the major activities that must be undertaken in the computerization of an information system is a review of all the forms used in recording information for that system. Such a review is made primarily to ensure that all the information needed by the system is readily available in a form that facilitates encoding of this information. In the past, when all data entry or encoding had to be carried out by a unit in the data processing group, great care had to be exercised in the design of forms since the personnel encoding the data were usually not familiar with them. Today, through the use of on-line terminals which can be located in the user area, users can encode data themselves, and the design of forms for computerization purposes is no longer as strict as it used to be.

The comprehensive analysis and evaluation of a form for computerization purposes is largely dependent on the definition of the computerized system's objectives and scope. The following review of all the forms present in this Manual is merely a brief discussion of possible effects of computerization on the design of a form. Because computerization is not considered feasible in small family-type furniture and joinery shops, form Nos. 1 to 6 are not included here.

1. Sales order (form No. 7)

Entries that may require coding are:

<u>Entry</u>	<u>Coded data</u>
Terms of payment	Payment type code
Product description	Model number
Product line	Product type code

A separate column or box should be provided for the desired date of delivery, so it does not get overlooked in the details on product description.

2. Job order (form No. 8) and delivery receipt (form No. 9)

Entries that may require coding are:

<u>Entry</u>	<u>Coded data</u>
Product description	Model number
Product line	Product type code

3. Returned goods report (form No. 10) and sales invoice (form No. 11)

Entries that may require coding are:

<u>Entry</u>	<u>Coded data</u>
Product description	Model number
Product line	Product type code
Reason for return	Product return type code

Reasons for returning a product are numerous, but the main reasons can be established and coded, e.g., product defects, wrong specifications, wrong product delivered.

4. Summary of daily sales (form No. 12)

Form No. 12 may eventually be produced by the computerized system using pertinent information from one or more forms used to record sales information. The description of or code for the sales area must be obtainable from or, if computer generated, must be based on information in the previous forms.

5. Summary of periodic sales (form No. 13) and periodic summary of sales (form No. 18)

This report may likewise be produced by the computerized system. Data on "customer group" must be obtainable from existing sales forms. Product lines (e.g., bedroom furniture etc.) must be equivalent to product lines entered on sales forms. "Type of furnishings" (e.g., home, office etc.) should be identifiable through product lines.

6. Provisional receipt, collections (form No. 14)

No changes are necessary on this form.

7. Report on daily collections (form No. 15)

This report may be produced by the computerized system using pertinent information from the sales order and delivery receipt forms.

8. Summary of finished goods inventory (form No. 16)

This report may be produced by the computerized system using pertinent information from one or more forms used to record the production information on the finished product, withdrawals from finished goods warehouse and from previously recorded information on finished goods inventory levels.

9. Sales forecast (form No. 17)

This report may be produced by the computerized system if a sales forecasting model has been developed for the company's products. If, however, this report is to be used as a source of sales forecast information for the computerized sales information system, coded data must be provided for product lines (product type) and customer group (customer group type).

10. Production/shipment report (form No. 19)

This report may be produced by the computerized system using information from one or more forms used to report daily production and from previously recorded production information.

11. Consolidated report on finished goods inventory (form No. 20)

This form may be produced by the computerized finished goods inventory subsystem.

12. Schedule and aging of accounts receivable (form No. 21) and credit standing of customers (form No. 22)

This report may be produced by the computerized accounts receivable sub-system.

13. Summary of departmental costs, job order (form No. 23)

This report may be produced by the computerized accounting information system.

14. Monthly report - job order status (form No. 24)

This report may be produced by the computerized system using pertinent information from the sales and production information systems.

15. Purchase request (form No. 25) and purchase order (form No. 26)

One entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Materials service description	Materials/service code

A separate column for the job order number should be provided if this must always be indicated in the form.

16. Receiving report (form No. 27)

An entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Material description	Material code

17. Materials control card (form No. 28)

An entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Material description	Material code

The "units" entry should be moved closer to "Part No. and description", since it is still basically part of the materials description. The "usage" entry would be more appropriate placed where the "units" entry is located, since it is an entry that describes a variable condition and has no logical reference to material description.

18. Bin card (form No. 29)

No changes are necessary.

19. Transfer ticket (form No. 30)

The item or product description would be more appropriate placed where "quantity" and "unit" are located, since the item or product described is the primary entry on the form and both quantity and unit refer to the item or product described. If job or sales order numbers are required entries in the form, separate boxes should be provided for them, leaving the "remarks" column free for information not needed by the computerized system.

An entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Item description	The appropriate code for the type of item described, e.g., "product type code" for product line, "model No." for product description, "material code" for material description etc.

20. Supplier's performance report (form No. 31)

This report may be produced by the computerized purchasing subsystem using pertinent information from the purchase order, receiving report and other forms used to record information on purchases made by the company.

21. Materials requisition and issuance slip (form No. 32)

At the top of the form the instruction check box with the legend "check one" is a possible source of errors in encoding because it can very easily be encoded by a careless or rushed data encoder as the first entry in the type of material requisitioned or issued - "lumber plywood". If the procedures for filling out this form called for only one type of material per slip, the controls within the computerized system would catch the error. However, if several types of materials could be requisitioned or issued in one slip, the controls within the computerized system may miss the error, and the record on file in the computerized system will bear two types of materials requisitioned or issued instead of only one.

A solution would be to remove the box with the legend "check one" and re-design the form to identify the type of material requisitioned or issued, such as:

Type of material (check one):

Lumber/plywood	<input type="checkbox"/>
Finishing	<input type="checkbox"/>
Hardware	<input type="checkbox"/>
Upholstery	<input type="checkbox"/>
Supplies	<input type="checkbox"/>
Others	<input type="checkbox"/>

Computers work best with coded rather than descriptive data, especially when information for reporting purposes has to be arranged in a predetermined sequence (e.g., by department) or when entries in a form have to be checked for validity against a specific set of data (e.g., the entry for "department from" must refer to a department existing in the company). Entries that may require the assignment of codes are:

<u>Entry</u>	<u>Code data</u>
Department from	Department No.
Department charged	Department No.
Lumber/plywood	Material type code
Finishing	Material type code
Hardware	Material type code
Upholstery	Material type code

22. Returned materials report (form No. 33)

The comments on form No. 32 apply to form No. 33 as well. In addition, an entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Reason for return	Material return type code

A possible use for this entry would be to produce statistical information on the frequency of occurrence of each kind of reason for returning materials.

23. Direct labour ticket (form No. 34)

An entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Description of work performed	Operation number

A possible use for this entry would be to produce statistical information on the total hours worked per type of work performed.

24. Indirect labour ticket (form No. 35)

In addition to the comments on form No. 34, a separate column for the job order reference number should be provided, as in form No. 34.

25. Direct labour loss ticket (form No. 36)

An entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Reason for lost hours	Lost hours type code

A possible use for this entry would be to produce statistical information on the total hours lost per type of reason.

26. Machine equipment log (form No. 37)

The "department assigned" entry would be more visible if it were aligned below the "machine description" entry. If entries in the "remarks" column are needed by the computerized system, then general classifications of problems (e.g., machine breakdown) or activities (e.g., overtime) can be identified and coded accordingly.

27. Daily production report (form No 38)

Entries that may require coding are:

<u>Entry</u>	<u>Coded data</u>
Department/section	Department No. or section No.
Production description	Model number
Product line	Product type code

If entries in the "remarks" column are needed by the computerized production reporting subsystem, general classifications of defects can be identified and coded accordingly.

28. Consolidated weekly production report (form No. 39)

This report may be produced by the computerized production reporting subsystem.

29. Sequence of operations (form No. 40)

An entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Department	Department No.

30. Operations list (form No. 41)

No changes are necessary.

31. Time-study observation sheet (form No. 42)

The coding of the element description is not considered necessary since a computerized system needing time-study information would be unlikely to require such detailed entries. Time entries most likely to be required by the system would be "standard time - minutes per piece" or "standard time - minutes per 100 pieces". Other entries that the system may need to pick up are properly coded in the sample form.

32. Machine utilization report (form No. 43)

An entry that may require coding is:

<u>Entry</u>	<u>Coded data</u>
Machinery/equipment description	Equipment No.

The coding of "part(s) worked on" and "operations performed" are not considered necessary since a computerized system needing machine utilization information would be unlikely to require such detailed information.

33. Repair work order (form No. 44)

An entry that may require coding is:

Entry

Coded data

Department/unit

Department No. or unit No.

34. Vehicle repair status (form No. 45)

If the computerized vehicle maintenance and repair subsystem requires information on exceptional cases (e.g., reasons for delays in completion when the estimated completion date is not met), such entries, when present in the "remarks" column, must be coded.

35. Vehicle service card (form No. 46)

The "department assigned" entry would be more visible if it were aligned below the "vehicle description" entry. General classifications of "service performed" can be identified (check-up and service, regular maintenance, repairs etc.) and coded for pick up by the computerized vehicle maintenance and repair subsystem.

36. Monthly summary - vehicles maintenance/repair service (form No 47)

This report may be produced by the computerized vehicle maintenance and repair subsystem.

37. Machine/equipment service card (form No. 48)

General classifications of "service performed" can be identified (preventive maintenance, check-up and service, repairs etc.) and properly coded for pick up by the computerized equipment maintenance and repair subsystem.

38. Monthly summary - machinery and equipment maintenance/service (form No. 49)

This report may be produced by the computerized equipment maintenance and repair subsystem.

39. Worksheet - monthly job order costs (form Nos. 50 and 51)

Entries that may require coding are:

Entry

Coded data

Terms of payment

Payment type code

Product description

Model number

Product line

Product type code

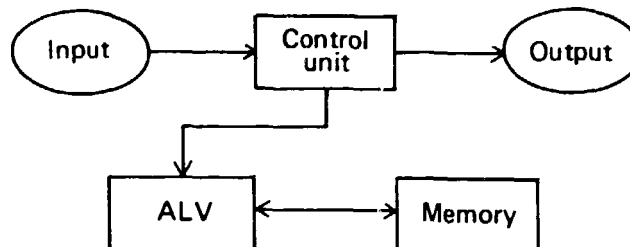
A separate column or box should be provided for the desired date of delivery, so that it does not get overlooked in the details on product description.

G. Glossary of technical computer terms

This section lists and defines all the technical computer terms used in the present chapter. The definitions have been taken from the Standard Dictionary of Computers and Information Processing* and simplified for easy understanding where necessary. Where the definition of a computer term involves the use of other computer terms not found in sections A to F above, the definitions of the other terms have also been included.

Arithmetic and logical unit (ALU). The portion of a computer that contains the circuits that perform the arithmetic, logic, shift and similar operations.

Computer. A device capable of solving problems by accepting data, performing prescribed operations on the data and supplying the results of these operations. Its five main units are: (a) an input unit; (b) a storage or memory unit; (c) an arithmetic and logical unit (ALU); (d) a control unit; and (e) an output unit. The five units interact as follows:



Control unit. The circuits that effect: (a) the selection and retrieval of instructions from storage or from outside the computer, in proper sequence; (b) the interpretation of each of the coded instructions; and (c) the development and application of proper signals to the arithmetic unit in accordance with the interpretation, in order to achieve execution of instructions by the arithmetic unit, storage unit and input/output units.

Data processing. Any operation or combination of operations on data, usually in accordance with a specified or implied set of rules.

File. A collection of related records

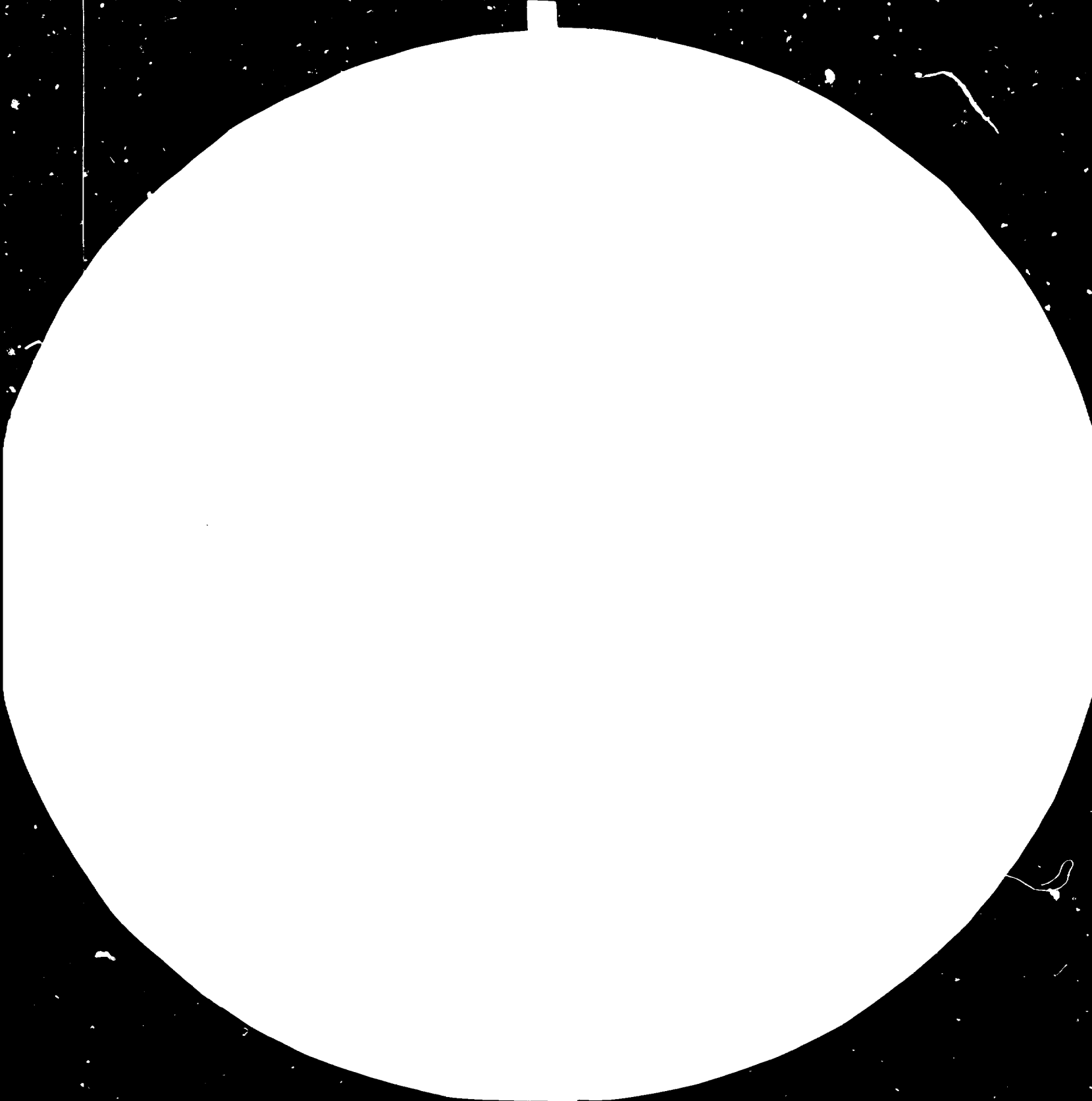
Hardware. Physical equipment; an entire computing system is considered a hardware item.

*Martin H. Weik, Standard Dictionary of Computers and Information Processing, 2nd rev. ed. (Rochelle Park, New Jersey, Hayden Book Co., 1977).



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MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

Input. Data that are to be processed or operated upon.

Input unit. A device capable of reading data from input media into the computing system, as specified by a program.

Medium (pl., media). A material or method for storing or otherwise handling data.

On-line. Pertaining to access to a computer by a person via a terminal.

Operator. A person who actually manipulates the computer controls.

Output. Data that have been processed.

Output unit. A device capable of transferring data from the computing system into output media, as specified by a program.

Program. A sequence of instructions or statements in a form acceptable to, and intended for execution on, a computer.

Programmer. A person who prepares and plans the sequence of events that a computer must undertake in order that a problem may be solved and/or that the desired output be obtained.

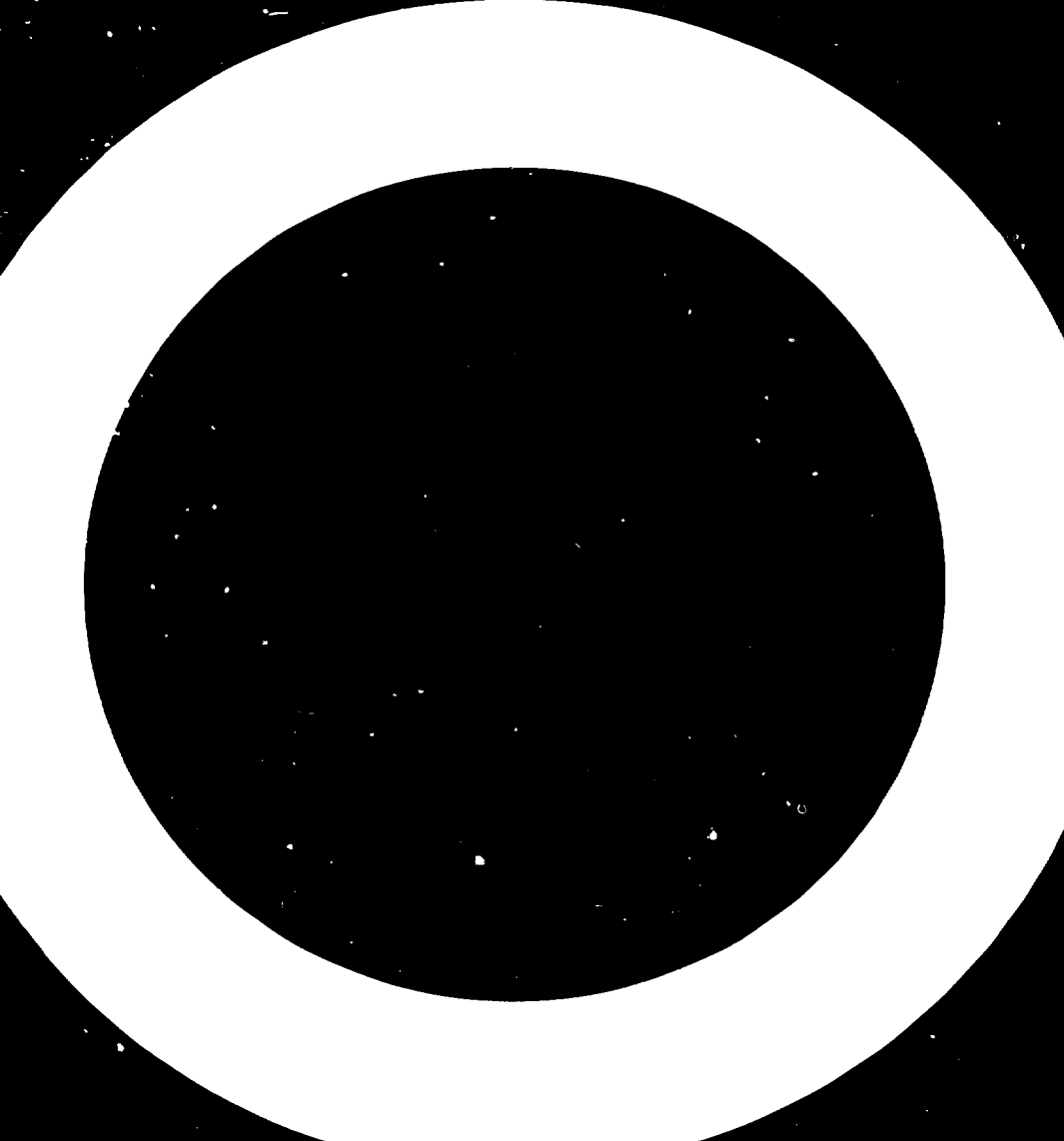
Systems analysis. The overall and thorough analysis of an activity, procedure, method, technique or business to arrive at the most appropriate way of accomplishing what has to be done.

Systems analyst. A person specially trained, experienced and particularly skilled in the definition and solution of a problem (i.e., in the conduct of a systems analysis). Such a person may deal specifically with information systems (information systems analyst) and, when these systems are computerized, the analyst is usually called a computer systems analyst.

Terminal. An input-output unit that a person may use to communicate with an automatic data processing system (e.g., a computer), usually in a conversational mode (i.e., question/command and response from person to computer or vice-versa).

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Annex I

LIST OF OPERATION NUMBERS

The various operations involved in the manufacture of furniture and joinery products that have been encountered in a number of firms in developing countries, using various levels of manufacturing sophistication and types of technology, are presented in the following list. All the production departments in the list may not be found in one furniture or joinery manufacturing firm. Similarly, a furniture or joinery firm in a developing country may not be using all the operations listed under one production department. The numbering scheme is recommended as indicated in the list, although each firm would include in an operations list only the departments and operations involved in its manufacturing activities.

The departments are numbered as follows:

<u>Number</u>	<u>Department</u>
1	Veneer taping
2	Machining
3	Panel building
4	Assembling
5	Finishing
6	Upholstering
7	Packing/crating

The operation code number is as follows:

(a) The first digit refers to the department number where the particular activity is a standard operation. It is followed by a hyphen;

(b) The next three digits refer to the number of the particular activity in the series of operations in the department;

(c) A small letter (a, b, c,) is appended to the operation number to denote repetition of the operation on the same workpiece, for example:

<u>Operation No.</u>	<u>Description of operation</u>
5-010a	Spraying first coat of lacquer
5-010b	Spraying second coat of lacquer
5-010c	Spraying third coat of lacquer

(d) All indirect labour activities are coded in the 900 series of operation numbers.

Operation No.	Description or name of operation
---------------	----------------------------------

Department No.: 1 Veneer taping

1-001	Undoing bundle of veneer
1-002	Veneer clipping (along grains of veneer) to rough dimension
1-003	Veneer trimming (across grains of veneer) to rough dimension
1-004	Veneer jointing (applied to stack of veneers)
1-005	Veneer splicing, on hot melt glue thread machine
1-006	Veneer jointing and splicing, combination jointer/splicer machine
1-007	Veneer sizing (clipping and trimming spliced veneer sheets to final dimensions)
1-008	Veneer splicing and clipping on continuous veneer sheet splicing machine
1-010	Veneer patching, manual
1-011	Veneer patching on patching machine
1-020	Veneer thickening on veneer sanding machine
1-900	Loading adhesive on machine
1-901	Changing cutting tools on machine
1-920	Material handling
1-997	Machine set up
1-998	Machine cleaning
1-999	Cleaning work area

Department No.: 2 Machining

2-001	Cutting to rough length, on radial arm saw
2-002	Ripping to rough width, on radial arm saw
2-003	Ripping, single pass, on straight line edger
2-004	Multi-ripping on multiple blade rip saw
2-005	Cutting to final length
2-006	Cutting to final width
2-010	Rough planing, one face
2-011	Rough planing, two faces
2-012	Finish planing, one face
2-013	Finish planing, two faces
2-014	Surfacing four faces, 4-side planer
2-015	Box planing (using a jig)
2-020	Edge shaping on vertical spindle moulder
2-021	Cant sawing on tilting arbor saw

Operation No	Description or name of operation
2-030	Drilling, single hole
2-031	Multi-hole drilling on multi-spindle drilling machine
2-040	Dowel milling
2-041	Dowel cutting and chamfering
2-050	Routing edge of workpiece
2-051	Routing cut-out
2-052	Routing/shaping rabbets
2-053	Routing ninge seats
2-060	Turning on simple lathe
2-061	Turning on automatic lathe
2-070	Mortizing on chain mortizer
2-071	Mortizing on router
2-072	Mortizing on drill/chisel mortizer
2-080	Tenoning on single end tenoner
2-081	Tenoning on double end tenoner
2-082	Tenoning special shaped tenon on special machine
2-090	Grooving with simple saw
2-091	Grooving with router
2-092	Grooving with Dado saw
2-100	Bandsawing
2-101	Jigsawing
2-110	Edge profiling with Dado cutter
2-111	Dovetailing with hand router
2-112	Dovetailing on dovetailing machine
2-120	Profiling on moulder
2-200	Hand sanding (with sanding block)
2-201	Sanding with hand sanding machine
2-202	Machine sanding plain edge
2-203	Edge profile sanding on belt sander
2-204	Stroke sanding, single belt stroke sander
2-205	Stroke sanding, double belt stroke sander
2-206	Single surfae sanding on wide belt sander
2-207	Double surface sanding on wide belt sander
2-208	Single surface sanding on triple drum sander
2-210	Sanding turned items on simple sanding machine
2-211	Sanding turned items on automatic sanding machine
2-220	Sanding cut-out edges, manual
2-221	Sanding cut-out edges, sanding machine
2-9C1	Changing cutting tools on machine
2-902	Changing sanding belts on machine

Operation No	Description or name of operation
2-920	Material handling
2-997	Machine set up
2-998	Machine cleaning
2-999	Cleaning work area

Department No.: 3 Panel building

3-001	Edge gluing core stock, manual
3-002	Edge gluing core stock, core composer
3-003	Sawing to rough sizes on panel saw
3-004	Thickness planing core panels
3-010	Veneer laying, manual
3-011	Veneer laying on machine
3-012	Cold pressing panels
3-013	Hot pressing panels
3-020	Cutting panels to rough size
3-021	Trimming panels to final size
3-022	Single edge banding with veneer, manual
3-023	Double edge banding with veneer, manual
3-024	Single edge banding on machine
3-025	Double edge banding on machine
3-030	Trimming excess veneer
3-040	Combination edge banding, excess veneer trimming and edge breaking - single edge on machine
3-041	Combination edge banding, excess veneer trimming and edge breaking - double edges on machine
3-900	Loading adhesive on machine
3-901	Changing cutting tools on machine
3-902	Changing sanding belts on machine
3-910	Panel repair
3-920	Material handling
3-997	Machine set up
3-998	Machine cleaning
3-999	Cleaning work area

Department No.: 4 Assembling

4-001	Assembling hardware on wooden components
4-002	Assembling other accessories on wooden components

Operation No	Description or name of operation
4-010	Assembling sub-assemblies
4-020	Assembling complete product
4-910	Repair work
4-920	Material handling
4-997	Machine set up
4-998	Machine cleaning
4-999	Cleaning work area

Department No.: 5 Finishing

5-001	Hand staining (daubing)
5-002	Spray staining
5-010	Spraying wash coat
5-011	Sanding wash coat
5-020	Applying wood filler
5-030	Spraying coat of sanding sealer
5-031	Applying coat of sanding sealer on curtain coating machine
5-032	Dipping in sealing solution
5-040	Hand sanding sealer coat
5-041	Machine sanding sealer coat
5-050	Spraying top coat
5-051	Applying top coat on curtain coating machine
5-052	Roller coating
5-060	Sanding top coat with hand sander
5-061	Hand polishing
5-062	Machine polishing
5-070	Applying decorative appliques
5-080	Silk-screening
5-900	Loading finishing materials on machine
5-901	Changing rubbing/polishing pads on machine
5-910	Repair and touch-up work
5-920	Material handling

Operation No	Description or name of operation
5-997	Machine set up
5-998	Machine cleaning
5-999	Cleaning work area

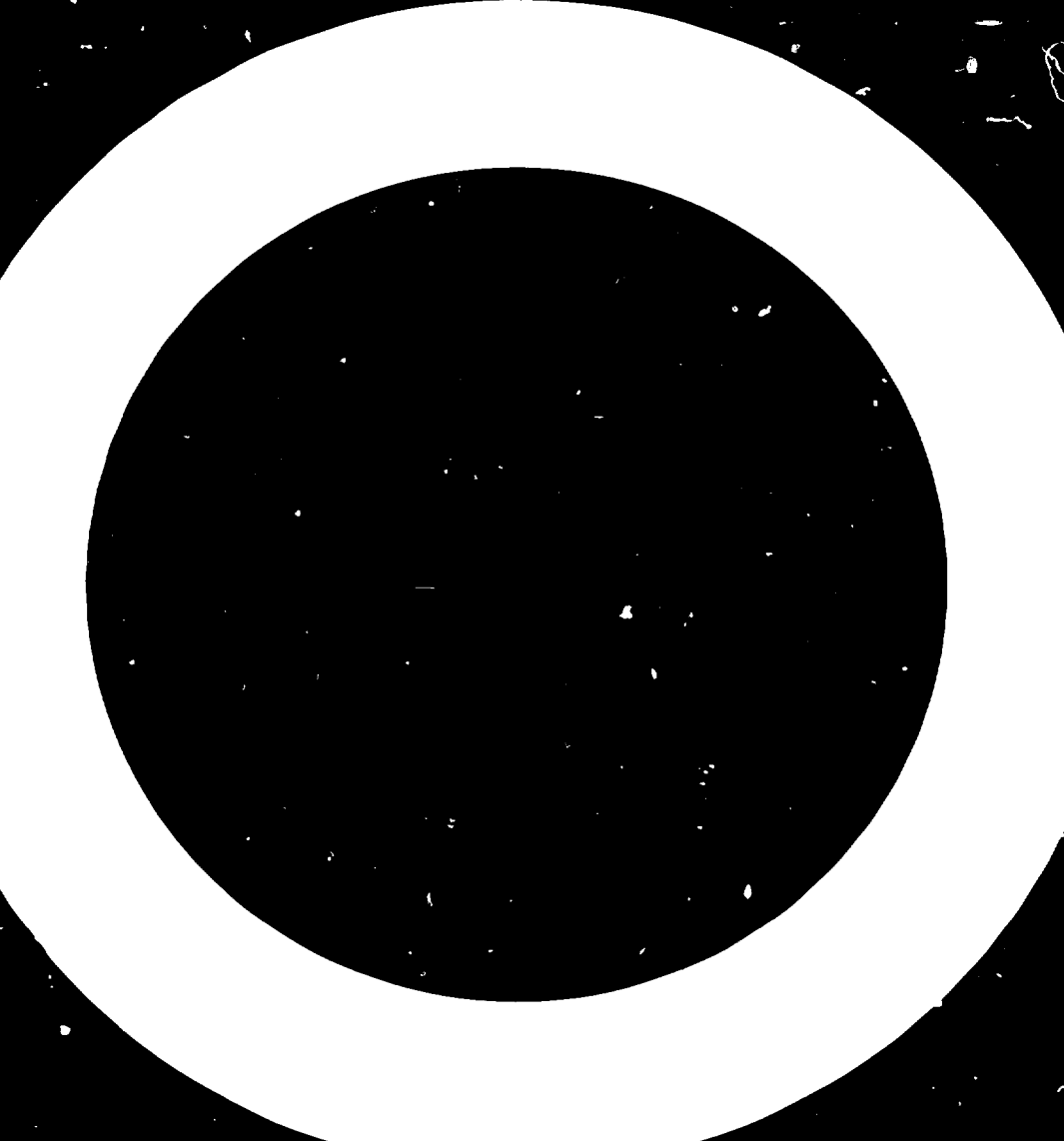
Department No.: 6 Upholstery

6-001	Leather/fabric laying and spreading, manual
6-002	Leather/fabric cutting with hand shears
6-003	Leather/fabric cutting, with hand cutting machine
6-004	Leather/fabric laying, spreading and cutting off on machine
6-005	Sorting pieces of cut fabric/leather
6-010	Sewing by hand
6-011	Sewing on sewing machine
6-020	Cutting "no sag" springs to length
6-021	Cutting webbings to length
6-022	Cutting coil springs to length
6-023	Cutting cushion materials to size
6-030	Gluing cushion materials to size and shape
6-040	Quilting, by hand
6-041	Quilting, by machine
6-050	Punching/forming button (metal) parts
6-051	Covering button heads with leather/fabric
6-052	Assembling button parts
6-060	Assembling springs on framework
6-061	Assembling webbings on framework
6-062	Assembling cushion materials on foundation works
6-063	Assembling leather/fabric covering on cushions and foundation works
6-064	Buttoning, manual
6-065	Buttoning, on machine
6-070	Assembling complete upholstery works on multiple assembly press
6-900	Loading adhesive on machine
6-901	Changing cutting tools on machine
6-902	Loading thread on machine
6-910	Repair and touch-up work
6-920	Material handling

Operation No	Description or name of operation
6-997	Machine set up
6-998	Machine cleaning
6-999	Cleaning work area

Department No.: 7 Packing/crating

7-001	Wrapping product components
7-002	Wrapping hardware and accessories
7-003	Bundling wrapped components
7-010	Assembling carton boxes
7-011	Packing in carton boxes
7-020	Assembling wooden crates, manual
7-021	Packing in wooden crates
7-030	Hand marking boxes/crates
7-031	Closing and marking carton boxes on machine
7-900	Loading adhesive on machine
7-902	Loading nails, wires or strapping steel on machine
7-920	Material handling
7-997	Machine set up
7-998	Machine cleaning
7-999	Clearing work area



Annex II

BLANK FORMS

Blank forms Nos. 1 to 50 in their original size are provided in the following pages to facilitate photocopying of any forms that may be of use to readers in their companies.

DELIVERY RECEIPT / INVOICE

Date: _____, 19 ____

DRI No. _____

Sold and Delivered to : _____
Address : _____

Quantity	Unit	Description of Product	Unit Price	Amount

Reference SPO No : _____

TOTAL AMOUNT-----

Delivered by:

Prepared by:

RECEIVED above listed goods in GOOD order & condition:
Customer: _____
By: _____

OFFICIAL RECEIPT

OR No. _____

Date: _____, 19 ____

RECEIVED from _____

_____ the amount of
_____ Dollars (\$ _____)

in (partial, full) payment for: _____

FORM of PAYMENT:

Cash: _____

Check: _____

Total: _____

Signature of Proprietor-Manager

Name in Print, Proprietor-Manager

--

SALES ORDER	S.O. - _____
--------------------	--------------

Date: _____

To: _____

Please deliver the following article(s) to:

Name and address of Customer:	Terms of Payment:
-------------------------------	-------------------

Quantity	Unit	Product Description	Unit Price	Amount

Copy Distribution: <input type="checkbox"/> Production <input type="checkbox"/> Sales <input type="checkbox"/> File	Order noted by: _____	Order confirmed by: _____
---	---------------------------------	-------------------------------------

JOB ORDER

J.O.-----

Customer:

Address:

Quantity

Unit

Description of Product(s)

Type(s) of Materials
to be used:

Type of Finish:

Unit Packaging:

Crating / Palletizing

Special Instructions:

Estimated
Starting DateEstimated
Completion Date

Delivery Schedule:

Copy Distribution:

- Production
- Materials Control
- Engineering
- Accounting

Refer to SALES
ORDER Number:

Prepared by:

Approved by:

Date: _____

Date: _____

DR _____

DELIVERY RECEIPT

Date: _____

RECEIVED from
the products listed below as (partial / complete) delivery against our order:

Quantity	Unit	Product Description

- Copy Distribution:
- Customer
 - Accounting
 - Materials Control
 - Sales

Delivery authorized by:

Reference Sales Order:
SO- _____

RECEIVED above goods in good order and condition.
Customer: _____

By:-
Signature : _____
Name in Print : _____
Title / Position : _____
Date Received : _____, 19 _____

RGR No. _____

RETURNED GOODS RECEIPT

Date: _____

RECEIVED the following goods from:

Customer: _____

Address: _____

Quantity	Unit	Description of Product (s)

Reason(s) for Return: _____

Copy Distribution:

- Customer
- Production
- Accounting
- Sales

Return Authorized by:

Reference Documents:

S.O. _____
D.R. _____

Received by:

Signature

Print Name and I. D. Number

INVOICE

INV-_____

Sold to: _____

Address: _____

Quantity	Unit	Description of Product (s)	Unit Price	Total Amount
Copy Distribution : <input type="checkbox"/> Customer <input type="checkbox"/> Accounting <input type="checkbox"/> Materials Control <input type="checkbox"/> File Copy		Reference Delivery Receipt (s):	Prepared by: _____ Date: _____	Certified correct by: _____

PERIODIC SUMMARY of SALES

For the Period: _____ to _____, 19__

Products	Customer Group				Sub-Totals
	Residential	Commercial/ Industrial	Institutional	Government	
A. Home Furnishings:					
Sub-Total					
B. Office Furnishings:					
Sub-Total					
C. School Furnishings:					
Sub-Total					
D. OTHER FURNISHINGS:					
Totals for Customer Groups					-----
GRAND TOTAL SALES for the Period _____					

Copy Distribution:
 Accounting Production Sales

Verified and checked: _____

Date: _____, 19__

PROVISIONAL RECEIPT

PR- _____

Date: _____, 19 ____

RECEIVED from _____

_____ the amount of
_____ Dollars (\$ _____)

in (partial/full) payment for: _____

FORM of PAYMENT:

Cash: _____

Check: _____

Money Order: _____

Total: _____

Signature of Collector

Name in Print: _____

I.D. No.: _____

SUMMARY of DAILY COLLECTIONS

Payment received on: _____, 19__

Sales Order		Customer and Address	Amount Paid Today
Number	Total Amount		
Total Collected Today -----			

Copy Distribution:

- Accounting (Cashier)
- Sales

Verified and checked:

Date: _____, 19__

SUMMARY of FINISHED GOODS INVENTORY
as of _____, 19__

Products									Totals	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
A. Home Furnishings										
B. Office Furnishings										
C. School Furnishings										
D. Other Furnishings (Specify)										

TOTAL VALUES: _____

- Copy Distribution:
- Accounting
 - Materials Control
 - Sales

Verified and checked: _____

Date: _____, 19__

SALES FORECAST FOR THE PERIOD _____ TO _____

	<u>Previous</u>	<u>Current</u>	<u>% Change Previous to Current</u>	<u>Forecast</u>	<u>% Change Current to Forecast</u>
I. <u>BY THE PRODUCT LINES :</u>					
A. Home Furnishings	\$ _____	\$ _____	____ %	\$ _____	____ %
B. Office Furnishings	_____	_____	_____	_____	_____
C. School Furnishings	_____	_____	_____	_____	_____
D. Others (Specify)	_____	_____	_____	_____	_____
Total Sales -----	\$ _____	\$ _____	____ %	\$ _____	____ %
II. <u>BY THE CUSTOMER GROUP :</u>					
A. Family	\$ _____	\$ _____	____ %	\$ _____	____ %
B. Commercial/Industrial	_____	_____	_____	_____	_____
C. Institutional	_____	_____	_____	_____	_____
D. Government	_____	_____	_____	_____	_____
Total Sales -----	\$ _____	\$ _____	____ %	\$ _____	____ %

III. BASIC CONSIDERATIONS AND ASSUMPTIONS FOR THE FORECAST :

Copy Distribution:

- | | |
|--------------------------------------|--|
| <input type="checkbox"/> Accounting | <input type="checkbox"/> Production |
| <input type="checkbox"/> Engineering | <input type="checkbox"/> Materials Control |
| <input type="checkbox"/> Sales | |

Recommended :

Date : _____, 19__

PERIODIC SUMMARY of SALES

For the Period: _____ to _____, 19 ____

Products	Customer Group				Sub-Totals
	Residential	Commercial/ Industrial	Institutional	Government	
A. SOLD FROM INVENTORY:					
Total ----					
B. SOLD ON CONTRACT BASIS:					
1. Home Furnishings -					
Sub-Total ----					
2. Office Furnishings -					
Sub-Total ----					
3. Others -					
Sub-Total ----					
Total, Contract Basis ----					
GRAND TOTALS for the Period -					

Copy Distribution:

- Accounting Materials Control
 Production Sales

Verified and checked: _____

Date: _____, 19 ____

PRODUCTION / SHIPMENT STATUS REPORT

Job Order No. _____

1. Year/Month	2. Date	3. Product/Model/Quantity									
		PRODUCTION					SHIPMENTS				
		4. Scheduled Today	5. Actual Today	6. Cumulative		7. + STATUS	8. Scheduled Today	9. Actual Today	10. Cumulative		11. + STATUS
				(A) Scheduled	(B) Actual				(A) Scheduled	(B) Actual	
	1										
	2										
	3										
	4										
	5										
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	30										
	31										

REMARKS:

<p>Copy Distribution:</p> <p><input type="checkbox"/> Sales <input type="checkbox"/> Production</p> <p><input type="checkbox"/> Accounting <input type="checkbox"/> Materials Control</p>	<p>Verified and checked:</p> <p>_____</p> <p>Date: _____, 19__</p>
---	--

SUMMARY of JOB ORDER COSTS - by DEPARTMENT

For the month of _____, 19__

S.O. No.	J.O. No.	Description	Department	Date Started	Cost Item	Total Accumulated Cost, To-Date	Total Estimated Cost	% Complete	Estimated Completion Date	Remarks
					Materials					
					Labour					
					Overhead					
					Materials					
					Labour					
					Overhead					
					Materials					
					Labour					
					Overhead					
					Materials					
					Labour					
					Overhead					
					Materials					
					Labour					
					Overhead					
					Materials					
					Labour					
					Overhead					
					Materials					
					Labour					
					Overhead					
					Materials					
					Labour					
					Overhead					
					Materials					
					Labour					
					Overhead					

Verified and checked:

- Copy Distribution:
- Sales
 - Production - Machining
 - Production - { Sanding & Assembly
 - Production - Finishing
 - Engineering
 - Production - Upholstering
 - Packing / Crating
 - Accounting

Date: _____, 19__

MONTHLY REPORT on SALES ORDER and JOB ORDER STATUS

For the month of: _____

Sales Order No.	Description	Job Order No.	Date Started	% Completion at Department			Estimated Completion Date	Remarks
				Machining	Assembling & Sanding	Finishing & Packing		

- Copy Distribution:
- Sales
 - Materials Control
 - Production
 - Accounting

Verified and checked: _____
 Date: _____, 19__

PURCHASE REQUEST					Materials <input type="checkbox"/>	Control No. _____
					Services <input type="checkbox"/>	
Description of Item(s)	Item Requested		Stock Status		Remarks	
	Unit	Quantity	On Hand	On Order		

Copy Distribution: <input type="checkbox"/> Purchasing <input type="checkbox"/> Department File	Ordered by: _____ Date: _____, 19__	For Convassing: _____ Date: _____, 19__	For Purchase Order: _____ Date: _____, 19__
---	--	--	--

PURCHASE ORDER

Control No.: _____

Please deliver to: _____

Terms of Payment: _____

Quantity	Unit	Description	Unit Price	Total Amount
Total Amount in words:				
Delivery Schedule / Remarks:				
Copy Distribution: <input type="checkbox"/> Supplier <input type="checkbox"/> Purchasing <input type="checkbox"/> Accounting <input type="checkbox"/> Inventory Control <input type="checkbox"/> Receiving		Order Confirmed by: Signature of Supplier or Authorized Representative Date: _____, 19__		P.O. Approved by: Date: _____, 19__

RECEIVING REPORT

RR-_____

RECEIVED From: _____

Date: _____

Purchase Order No.: _____

Quantity	Unit	Description of Items/Products Received

Copy Distribution :

- Accounting
- Warehouse, Materials Control
- Purchasing, Materials Control
- File Copy

Reference Delivery Receipt No.:

Inspected by:

Received by:

TRANSFER TICKET		TRANSFER TICKET		TRANSFER TICKET	
Control No.: _____		Control No.: _____		Control No.: _____	
Quantity	Unit	Quantity	Unit	Quantity	Unit
Description:		Description:		Description:	
FROM Department:	TO Department:	FROM Department:	TO Department:	FROM Department:	TO Department:
	Received by _____		Received by _____		Received by _____
Date:		Date:		Date:	
Remarks:		Remarks:		Remarks:	
FORWARDING Department C o p y		A C C O U N T I N G C o p y		R E C E I V I N G Department C o p y	

MATERIAL REQUISITION and ISSUANCE SLIP

Dept. From:	Dept. Charged:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Job Order No.:
		Check One	Lumber Plywood	Finishing	Hardware	Upholstery	Supplies	Others	
Quantity	Unit	Description					Unit Cost	Amount	
Remarks:									
Ordered By:				Date:			Received By:		
							I.D./Clock No. — Signature of Employee		

XWDCOR Form No.
Jan. 1983

Control Number:

RETURNED MATERIALS REPORT

Dept. From:	Dept. Charged:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Job Order No.:
		Check One	Lumber Plywood	Finishing	Hardware	Upholstery	Supplies	Others	
Quantity	Unit	Description					Unit Cost	Amount	
Reason For Return:									
Ordered By:				Date:			Received By:		
							I.D./Clock No. - Signature of Employee		

AWUCOR Form No.
Jan 1983

Control Number:

DIRECT LABOUR TICKET

Dept. No. Original Assignment	Job Order Reference	Description of Work Performed	Total Hours Worked
I.D. No. and Signature of Employee		Date:	Signature of Supervisor

XWDCOR
Form No.
Jan. 1963

INDIRECT LABOUR TICKET

Dept. No. Original Assignment	Description of Work Performed	Total Hours Worked
I.D. No. and Signature of Employee		Date:
Signature of Supervisor		

XWOCOR
Form No
Jan. 1983

DIRECT LABOUR LOSS TICKET

	Indicate hour(s) loss opposite reason:	Hour(s)	Total Hours Worked
I. D. No. and Signature of Employee	Power Failure		
Date:	Machine breakdown; check-up; repairs		
	Union/Company business meeting		
	Area cleaning		
Signature of Supervisor	Others (specify):		

KWDCOR
Form No.
Jan. 1983

MACHINE / EQUIPMENT LOG

Machine No.: _____

Department Assigned: _____

Machine Description: _____

For the week ending: _____, 19 _____

Note: Mark with a ✓ TIME STARTED and X for TIME STOPPED.

Date	Machine Operator	A. M.					P. M.					A. M.							No. of Hours		Remarks							
		7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1		2	3	4	5	6	IN USE	IDLE
		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		↓	↓	↓	↓			
TOTAL HOURS THIS WEEK -----																												

WARNING :- DO NOT REMOVE this record from this machine!

Verified and checked: _____

Foreman
Date: _____, 19 _____

REPAIR WORK ORDER

No. _____

To be filled up by Department requesting services

Machine/Vehicle	Description of machine/equipment/vehicle:	Department/Unit:
-----------------	---	------------------

Observations/Work required:

PRIORITY (check one only):

Routine
 Urgent
 EMERGENCY

Date: _____

Approved by: _____

To be filled up by Plant Engineering

Assigned to: _____	Time Received: _____	Received/Approved by: _____
	Date Received: _____	

Description of Work Performed:

Date and Time Completed :		Total	<u>Days</u>	<u>Hours</u>
Date and Time Started :		DOWNTIME		

Copy Distribution:

Plant Engineering
 Requesting Department

Repairs checked/approved by:

Noted by:

(Plant Engineering)

(Requesting Department)

VEHICLE REPAIR STATUS

For the Week Ending: _____

VEHICLE		Repair Work Order No.	Defects/Complaints	Date Started	% Completion										Estimated Completion Date	Remarks	
No.	Description				Mark (X) on appropriate block.												
					10	20	30	40	50	60	70	80	90	100			

COPY DISTRIBUTION:

- Sales Administration Engineering
- Production Materials Control

Verified and checked: _____

Date: _____, 19__

PRICING ANALYSIS FOR TENDERS

TENDER NO. _____

Product : _____ Product Number : _____ Quantity : _____ Units : _____

Customer : _____ Address : _____ Tel. Number : _____

Date Start : _____, 19__ Completion : _____, 19__ Delivery : _____, 19__ VIA : Truck/Lorry _____ Rail _____ Sea _____ Air _____

I. DIRECT LABOUR ANALYSIS

II. VARIABLE COST ANALYSIS (PER UNIT)

Production :	Hours	Rate/ Hour	Unit Cost	Total Cost
Machining Department	_____	_____	\$ _____	\$ _____
Assembling Department	_____	_____	_____	_____
Upholstery Department	_____	_____	_____	_____
Finishing Department	_____	_____	_____	_____
Packing Department	_____	_____	_____	_____
.....	_____	_____	_____	_____
A. TOTAL PRODUCTION LABOUR	-----			\$ _____ vvvvv

Variable Production Overhead :	% Direct Labour	Unit Cost	Total Cost
Machining Department	_____ %	\$ _____	\$ _____
Assembling Department	_____ %	_____	_____
Upholstery Department	_____ %	_____	_____
Finishing Department	_____ %	_____	_____
Packing Department	_____ %	_____	_____
.....	_____ %	_____	_____
B. TOTAL VARIABLE PRODUCTION OVERHEAD	-----		\$ _____ vvvvv

Engineering Labour :	Variable		Fixed	
	Unit Cost	Total Cost	Unit Cost	Total Cost
Design	\$ _____	\$ _____	\$ _____	\$ _____
Drafting	_____	_____	_____	_____
Industrial	_____	_____	_____	_____
Tooling	_____	_____	_____	_____
Jigs and Fixtures	_____	_____	_____	_____
Fabrication	_____	_____	_____	_____
Production Gauges	_____	_____	_____	_____
Fabrication	_____	_____	_____	_____
.....	_____	_____	_____	_____
.....	_____	_____	_____	_____
C. Total Engineering Labour	-----		\$ _____	\$ _____
D. Engineering Overhead at _____% of Total Engineering Labour	-----		\$ _____	\$ _____
E. TOTAL ENGINEERING DIRECT COST	-----		\$ _____ vvvvv	\$ _____ vvvvv

Other Direct Labour, Specific :	Unit Cost	Total Cost	
.....	\$ _____	\$ _____	
.....	_____	_____	
F. TOTAL, OTHER DIRECT LABOUR	-----		\$ _____ vvvvv
G. OTHER VARIABLE OVERHEAD, at _____% DIRECT LABOUR	-----		\$ _____ vvvvv
H. TOTAL DIRECT LABOUR	-----		\$ _____
K. TOTAL VARIABLE OVERHEAD	-----		\$ _____

A. Direct Labour, Production and Engineering	-----	\$ _____
B. Projected Labour Increase, _____ %	-----	\$ _____
C. TOTAL DIRECT LABOUR	-----	\$ _____
D. TOTAL VARIABLE OVERHEAD	-----	\$ _____

Materials Costs :		
Lumber	\$ _____	
Plywood	_____	
Glue	_____	
Upholstery Materials	_____	
Paint/Varnish Materials	_____	
Hardware, Screws and Nails	_____	
Packing Materials	_____	
Sub-Contracted Materials	_____	
E. TOTAL MATERIALS COSTS	-----	\$ _____ vvvvv

Other Variable Manufacturing Costs :		
.....	\$ _____	
.....	_____	
.....	_____	
.....	_____	
F. TOTAL, OTHER VARIABLE MANUFACTURING COSTS	-----	\$ _____
G. ESTIMATED SELLING AND ADMINISTRATION COSTS, _____ %	-----	\$ _____
H. COMMISSIONS, _____ %	-----	\$ _____
J. FREIGHT COSTS FROM _____ TO _____	-----	\$ _____
K. TOTAL PROJECT VARIABLE COST	-----	\$ _____ vvvvv

New or Added Fixed Costs :		
.....	\$ _____	
.....	_____	
.....	_____	
L. TOTAL, NEW OR ADDED FIXED COSTS	-----	\$ _____ vvvvv

PRICING BASIS :	Unit Price	Approved:
At 20% Marginal Income	\$ _____	_____
At 25% Marginal Income	\$ _____	_____
At 30% Marginal Income	\$ _____	_____
At 35% Marginal Income	\$ _____	_____
At 40% Marginal Income	\$ _____	_____
At _____ % Marginal Income	\$ _____	_____
At _____ % Marginal Income	\$ _____	_____

Prepared by : _____
Date Submitted : _____

CALCULATED PROJECT VALUE BASED
ON APPROVED % MARGINAL INCOME : \$ _____
vvvvvvvvvv

