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STRENGTHENING THE TECHNICAL AND MANAGERIAL CAPACITIES OF THE CARPENTRY COOPERATIVES IN MUKALLA AND SEIYUN

SM/YEM/92/035*

THE REPUBLIC OF YEMEN

Technical report: Training Manual on Inventory Control and Purchase Decisions**

Prepared for the Government of the Republic of Yemen
by the United Nations Industrial Development Organization
acting as executing agency for the United Nations Development Programme

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* Previously SM/PDY/87/005.
** This document has not been edited.

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TABLE OF CONTENTS

ANNEXES

INTRODUCTION

This training manual is one of a series prepared by a UNIDO expert while serving as Chief Technical Adviser on a UNDP financed and UNIDO executed project in the Republic of Yemen, to strengthen the Technical and Managerial Capacities of the Carpentry Cooperatives in Mukalla and Seiyun (project No. SM/PDY/87/005).

The entire scope of the training envisaged to be given, with the intended audience for each topic is given in Annex I.

The syllabus, namely the topics, the duration of lectures (theory) and practical work and the level of competence attained after completion of the course on this topic is given in Annex II.

INVENTORY CONTROL AND PURCHASE DECISIONS

In manufacturing companies inventories are normally taken at three phases of production: inventories of raw materials, of goods in process and inventories of finished goods. The relative importance of these three inventories depends on the nature of the system. Inventories of finished products usually have the greatest importance because their value is greatest. However, raw materials inventories can be of the greatest significance depending on the nature of the supply market and whether or not stockpiling is important. In-process inventories will have the greatest significance in systems where the in-process flow time is great and the value of the product is high.

In the secondary wood processing industries, all three inventories are significant. Timber needs to be stockpiled and seasoned. The production process can last up to one month or more, and in-process inventories are rather big. Because of serial production, inventories of finished products are often high.

Besides these three inventories, there are also inventories of tools and auxiliary materials, inventories of spare parts for machines and facilities, and inventories of supplies for the office, shops and workshops.

It is not uncommon for a manufacturing company producing furniture and joinery to have up to 25 percent of its capital tied in inventories. Since inventories can be very expensive they must be kept under careful control and all inventories must be justified from the economical point of view.

The purpose of this training manual is to point out the importance of inventory control and to introduce methods for planning and maintaining an optimal level of inventories.

1. Inventories and their function

The function of inventories is to assure continuous production process and sales of products. This means to make it possible to disconnect one segment of a process from another, so that work on each segment can be carried out at an optimal level of performance.

One of the main prerequisites for complying with delivery times is that the proper materials in the right quantity, of the right quality, must be available at the right time and at the right price. A company's success will partly depend on finding and acquiring adequate supplies of all the material inputs. For production management to succeed, the planning and controlling of materials inventories, ordering points, sources of supply, materials receiving, storing and handling must be efficient - and rational.

Inventories exist throughout the system as raw material supplies, in-process inventories, and inventories in transit to distributors and customers.

Additional stocks are common because it is economic to order and ship in larger quantity, rather than on the basis of a hand-to-mouth supply, and these are called cyclical inventories.

Another aspect of size of stocks relates to the random variations in demand; these are known as safety or buffer stocks. If demand is seasonal it may be more economic to absorb some of the seasonal demand through seasonal inventories. Maintaining independent inventories make it possible to carry out various activities relatively independently of each other.

The pipeline inventory is the volume of stock necessary to simply sustain the process. It represents an absolute minimum inventory for the system, assuming a determined demand, a hand-to-mouth supply, a continuous operation and continuous shipment, with no seasonal fluctuations in demand. It would be extremely expensive to operate this way. However, in some highly automated industries, which apply the so-called "just in time" system, the manufacturing process is based on pipeline inventories.

Cyclical inventories try to minimize costs of ordering and shipping. It is more economical to order in lots than one at a time. Also, because of the cost of machine set-up, it is more economic to manufacture in batches. Shipment costs are cheaper in lots than for single units. Our focus here will be on methods to determine economic order quantities.

Buffer inventories are needed to absorb variations in rate of demand and supply times. Buffer stocks are used to protect production against these variations and to assure continuous production and sales in case of an increased demand. The costs of buffer inventories must not exceed the costs of downtime of equipment and idle labour.

Seasonal inventories are used if the products have seasonal fluctuations of demand. The costs of seasonal inventories must be cheaper than changing production rates over the year to absorb these seasonal fluctuations (additional costs of overtime or hiring additional labour).

In the case of the Carpentry Cooperatives in Mukalla and Seiyun, the cyclical and buffer inventory systems are applied. There is no seasonal fluctuation in demand for certain items, but there are some cases of variations in the suppiy time. Materials purchased are in lots, and these lots include also some buffer inventories to cover eventual delays of the next shipments. In order to minimize the costs of inventories, an optimal size of lots should be determined for each type of material.

In-process inventories could be also brought down to an optimal level by organizational means, through a better planning of the sequences of the processing operations and an optimal size of series.

Inventories of finished goods could be reduced by a more precise forecasting of sales and by applying a modular system in product development, so that various products can be delivered with a lower stock of finished or semi-finished products.

Inventories of tools, spares and office supplies must not be ignored, because there are always some items on the stock which will never be used. These items must be sold immediately.

2. Forecasting and planning inventories

A large number of factors may affect the demand for a given item. some of them may be quite predictable and some not. However, any factor can be placed in one of these two categories: (1) factors that have generated a demand in the past months and are not to the future, and (2) factors affecting total demand that appear for the first time. The term forecast means the projection of the past into the future. Factors that appear for the first time that affect total demand come under a different concept and the term predict is used meaning management's anticipation of changes and of new factors affecting demand. Thus forecasting will deal with the projection of the past into the future.

Forecasts may serve a wide variety of purposes within an organization. To be useful for operations planning and control it is important that demand forecast data be available in a form that can be translated into demands for specific items of materials.

Organizational plans are appropriate for different time spans, such as those for the current operations and for the immediate future, intermediate and long-range plans. For this purpose, attention should be focused on the shorter range plans for current operations and for the immediate future.

The value of forecasting may depend to a significant extent on the nature and structure of the information feedback system. Thus, the very purpose of forecasting is to short-circuit the ordinary information system so as to have up-to-date data on what is happening and to use this data to project and plan.

The Carpentry Cooperatives in Mukalla and Seiyun have a rather stable demand for certain products such as doors, windows, wardrobes and beds. An increase in demand for certain products is expected, and the limit for the plan is not demand, but manufacturing capacities. Based on this fact the Cooperatives can make rather reliable forecasts of demand for certain products for their short range plans, and the necessary materials can easily be derived out of these plans.

3. Components of demand

The components of demand are:

- average demand,
- trends in the average demand,
- seasonal patterns,
- cyclical patterns, and
- random variations around the basic pattern.

The statistics of past demand give average demand and trends in average demand during a certain period. The average of the most recent months will give a more meaningful average, especially if the trend is dominant. The basic prerequisites for an optimal level of inventories are: an optimal production programme (product mix), an optimal size of production series and an optimal timing of production operations. Not only do the inventories of materials need to be optimized, but inventories of finished products have also to be optimized.

Fig. 1 shows a dynamic management model for the secondary wood processing industry, which could be applied in the two Cooperatives. This model also shows what and where it is necessary to optimize in the production process.

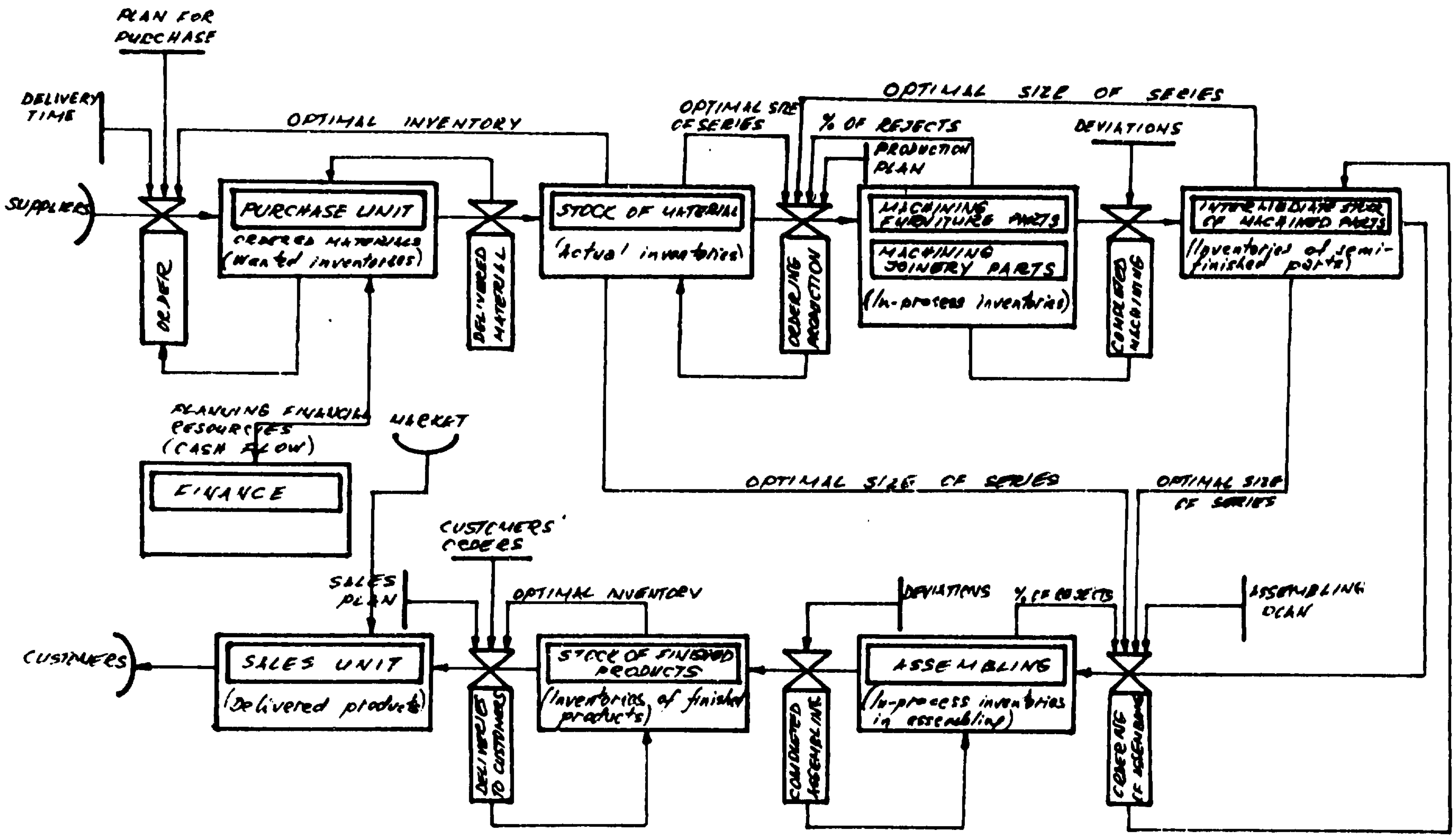
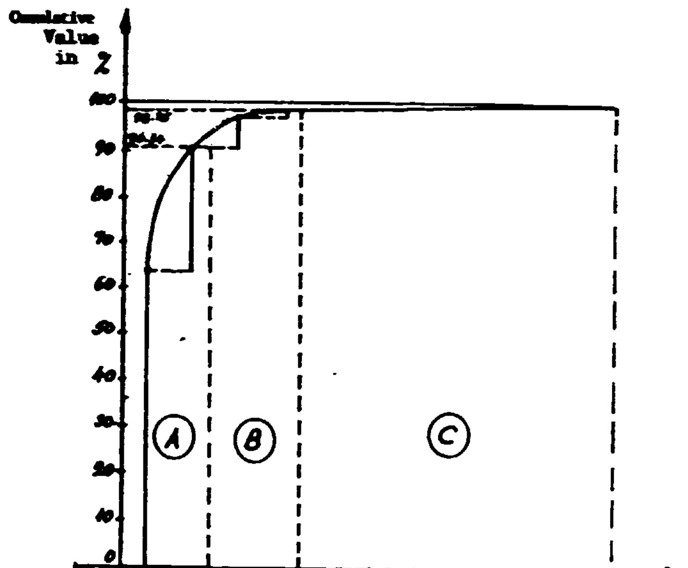


Fig. 1: A dynamic management model for planning and control of inventories

Total quantity of production, production management model and components of lemand are starting points in determining optimal sizes of lots for various materials and/or finished products.

4. Pareto (ABC) analysis of inventories

It is recommended to use a selective approach for planning inventories. The total value of a single material, its importance and the situation in a market are the main selection criteria. The first selection should be made on the basis of total value. For that purpose, the "ABC analysis" method can be used. This is a very simple and practical method (see Fig. 2).



Value as a % of total	%	62.24	28.10	6.60	1.80	0.90	0.18	0.06	0.04	0.03	0.03	0.01
	Material	Timber	Plywood	Formica	Mirrors	Floral glass	Iron rodes	Plastic profiles	Paint	Window hooks	Piano hinges	Varnish
Rating		1	2	3	4	5	6	7	8	9	10	11

Fig. 2: ABC analysis of the inventories purchased by the Coastal Strip Carpentry Cooperative in Mukalla in 1990
Total value: YD 731,570.--

First, percentages are calculated as a ratio of values of single materials to the total value of all materials. The materials then are listed starting from the highest and going down to the lowest percentage. The graph shown in Fig. 2 with cumulated percentages is then plotted.

The first group (A) includes materials representing approximately 80 percent of the total value. The next group (B) contains materials between group (A) and approximately 95 percent of the total value. The remaining materials, representing up to 5 percent of the total value, are group (C). The nature of this classification is that a relatively small number of items in group (A) represent about 80 percent of total value, while a big number of items in group (C) add up to only about 5 percent. Group (B) is in between.

This enables management to focus its attention on those items (usually small in number) which have a decisive influence on production costs. Different purchase techniques and the level of control should be applied for materials from different groups.

Some materials are very important and indispensable for a continuous production process, though their value is insignificant. Some other materials are difficult to obtain because of the market situation. Such materials, usually belonging to groups (B) or (C), could be moved to group (A) in order to give them more attention and keep them under permanent control.

Materials classified in group (A) are usually used for the majority, if not for the totality of products. Inventories of these materials should be managed on the basis minimum/maximum (mini-max) inventories and optimal sizes of purchase lots. Materials classified in group (B) should be purchased only for already determined production orders and in the required quantity. Materials classified in group (C) could be purchased on a quarterly basis in order to minimize expenses of purchases and deliveries.

5. Classical inventory models

Since the level of inventory has a remarkable influence on the costs of products it raises the question of how to determine the optimal level of inventories and how to maintain minimum inventory costs. Basically, the question is how many units to keep in stock. To maintain an economic level of inventories the first step is to determine the optimal size of a purchase order.

The objective of the classical inventory model is to determine the lot size under idealized conditions. Fig. 3 shows the assumed structure of inventory level in relation to time.

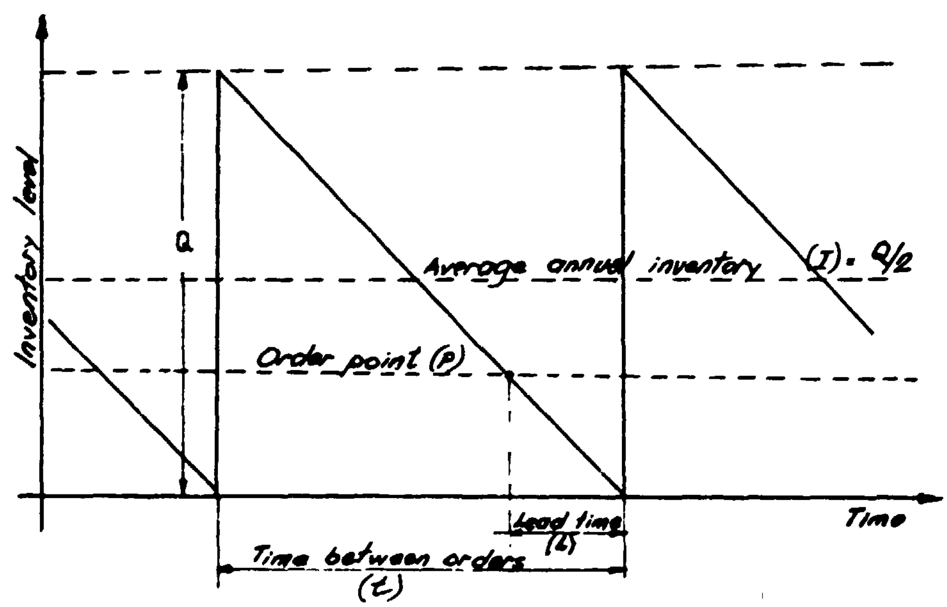


Fig. 3: Simplified structure of inventory level in relation to time.

(Q) units are ordered when the inventory has declined to the re-order (signal) point (P).

The order is placed precisely at point (P) and usage of materials in the production during lead time (L) will draw the inventory down to zero. The previous order for (Q) units must be received exactly at that point, which raises the inventory level back to (Q), and the cycle repeats itself.

In order to calculate the optimal size of a purchase order, the following symbols are used:

TIC	Total incremental cost.
TIC^*	Total incremental cost for an optimal solution
Q	Lot size.
Q^*	Optimal lot size (economic order quantity)
R	Annual requirements in units
C_h	Inventory holding cost per year.
C_p	Preparation cost per order
P	Order point
L	Lead time
B	Buffer stock
I	Inventory level.

The incremental costs for this simple system are associated with holding inventory and those associated with the preparation cost of an order of size (Q). The cost function to be minimized is:

TIC = Inventory holding cost + preparation costs

The lot size (Q) is a variable under managerial control. If (Q) is increased, the average inventory level increases proportionally, as shown in Fig. 4.

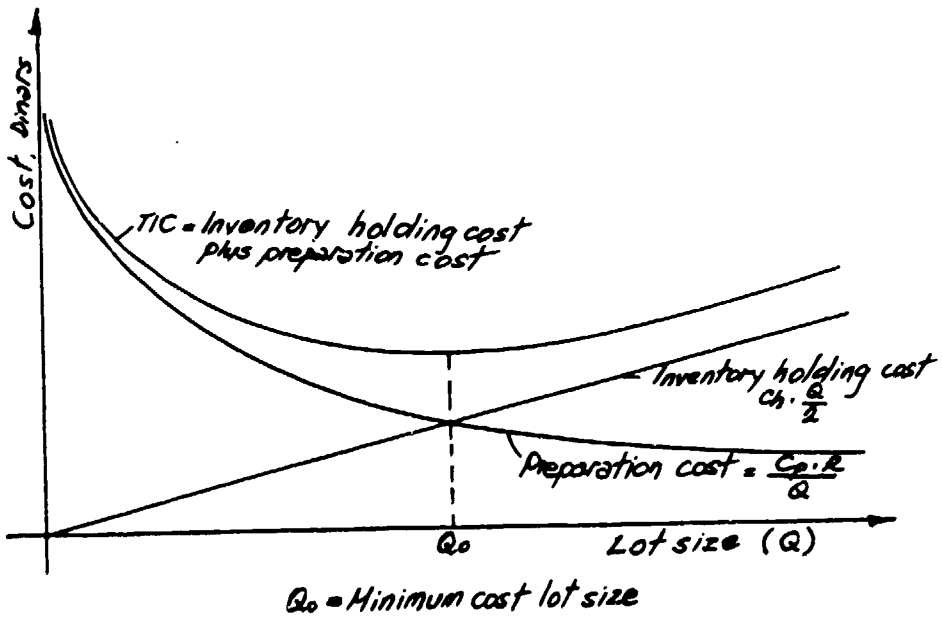


Fig. 4: Classic inventory model.

On the other hand, preparation costs per unit decline as (Q) increases. When two components of cost are added together the result is the total incremental cost curve which has a minimum point determining minimum cost lot size.

The optimal lot size (size of optimal purchase order) can be calculated by using the formula:

$$Q_o = \sqrt{2}\ Cp\ R/Ch$$

Example: The Cooperative has an annual consumption (r) of 800 m^3 of plywood. Cost per order (C_p) is 500 Dinars. Inventory holding cost C_h is 20 Dinars. Optimal lot size is:

$$Q_o = \sqrt{2}.500.800/20 = 200m3\ (\textit{values are assumed})$$

This classic model assumes that shortages or back orders are not allowed.

When back-orders are expected and allowed more complex formulas are used to determine an economical order size.

In the case of quantity discount, additional expenses of an increased order should be compared with the total discount obtained.

There are many methods used nowadays to determine and to control optimum inventories. For the secondary wood processing industry one of the two most often used methods will suffice. These are:

1. Determination of inventory levels at continuous and even usage of materials;
2. Determination of inventory levels at continuous but uneven usage of materials.

In the first case, the usage is known, continuous and even for each time unit. Delivery of materials can be late with regard to the scheduled delivery time. This method can fit to the inventories of raw materials and semi-finished products which are processed in the production in even quantities every day.

In the second case, the usage of materials can vary with the delivery time table; delivery time can vary with a stable usage of materials; or both usage of materials and delivery time can vary. In all these cases average values and standard deviations should be calculated for all variable factors. To calculate certain level of inventories the average values should be increased by adding a multiple of standard deviation (σ_i) and risk factor (u).

For example, some risk factors for certain levels of risk are:

Risk 1 % - u = 2.33
Risk 5 % - u = 1.64
Risk 10 % - u = 1.28

A graphical presentation of the structure of inventory level considered here is shown in Fig. 5.

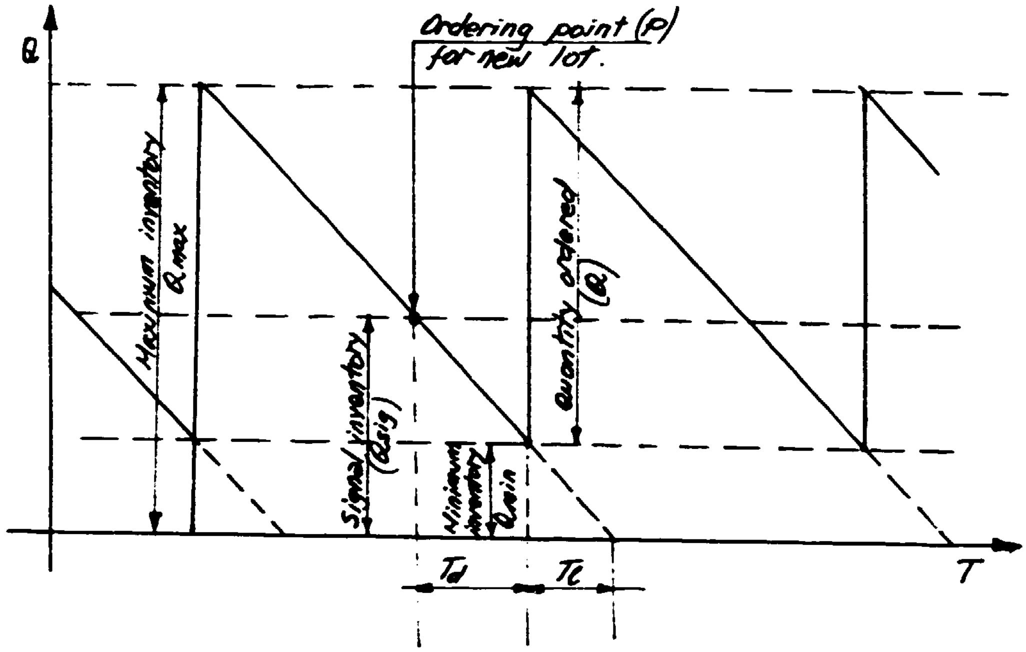


Fig. 5: Hypothetical structure of inventory levels in relation to time.

For the calculation, the following symbols are used:

q	Consumption of a material per unit time (this unit can be one day, one week or one month).
Q_{max}	Maximum inventory.
Q_{sig}	Signal inventory at which a new purchase order should be placed.
Q_{min}	Minimum inventory to cover eventual delay of delivery of materials.
Q	Quantity of material ordered.
T_d	Delivery time
T_l	Maximum delay of delivery time.
T_m	Usage time for ordered quantity of material.

Q_{min} = $T_l . q$ (Quantity units)

Q_{sig} = $(T_d + T_l) . q$ (units)

Q = $T_m . q$ (units)

Q_{max} = $Q_{min} + Q$ (units)

Example:

The Carpentry Cooperative in Mukalla has a daily usage of $4m^3$ of sawnwood. From the time of placing an order until delivery of sawnwood, it takes B - 60 days. Possible delay of delivery is up to C - 30 days. The Cooperative places orders in the quantity needed to cover six months consumption, which is Q - $520m^3$.

Solution:

$$Q_{min} = 4 \times 30 = 120 \ m^3$$

$$Q_{sig} = (60 + 30) \times 4 = 360 \ m^3$$

$$Q_{max} = 120 + 520 = 640 \ m^3$$

For every manufacturing company the rapid turnover of the capital is of great importance, and a prerequisite for this is the rapid turnover of inventories. Unjustified big inventories of materials, which are not moving at a satisfactory speed, are causing the following economic and other consequences:

- Unnecessary engagement of money and therefore unnecessary expenses;
- Increased costs of storage;
- Increased expenses of interest paid for the working capital;
- Decline in the quality of materials because of long storage;
- Damages, and waste of materials.

For example:

If the interest rate on a loan for working capital is 12 percent annually, then the turnover of inventories has the following influence on the annual costs of interests:

Number of turnovers per year	Cost in interest in percent
1	12
2	6
3	4
4	3
5	2.4
6	2

The interest rate is unchanged but the amount paid for interest decreases because less money is used to finance the same quantity of inventory.

6. Variations in demand

The classical inventory model and its variations assume that demand is constant. But, sometimes demand varies, and buffer or safety stocks are required to absorb these variations.

Fig. 6 shows the structure of inventory levels when demand varies. The planned buffer stock is equal to the difference between reasonable maximum usage during lead time (D_{max}) and average usage ($\bar{D}$). The larger the buffer stock the smaller will be the risk of running out of stock.

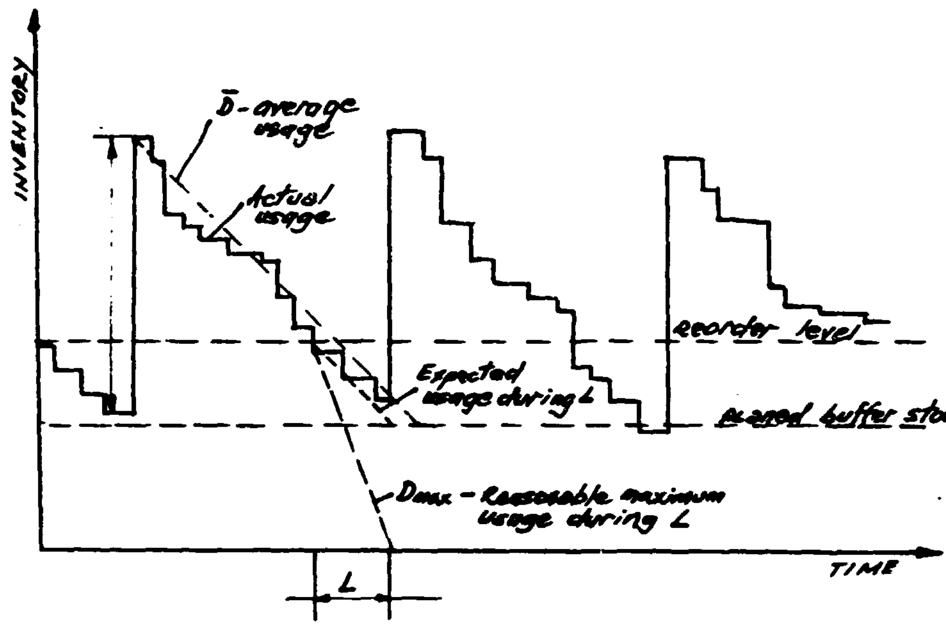


Fig. 6: Structure of inventory levels when demand varies.

The size of the buffer stock will depend on the nature of the distribution of demand. Normal distribution can be used adequately for distribution, maximum demand during lead time is determined. Safety stock can be computed using the following formula:

$$B = D_{max} - \bar{D}$$

$\bar{D}$ is the average use of materials

D_{max} is a reasonable maximum usage during the lead period (L).

7. Inventory system for managerial control

There are three commonly used inventory techniques for inventory control:

1. Fixed reorder quantity system;
2. Fixed reorder cycle system;
3. Optional replenishment system.

Fixed reorder quantity systems are focused on the order point (P) as an inventory level signal to place orders for some predetermined quantity (Q). The determination of Q may be based on one of the formulae for computing the economic order size, or could be based simply on experience. Buffer stocks are determined by setting risk levels and computing $B = D_{max} - D$. A periodic review of requirements is an integral part of the system, at which time new system parameters for (Q) and (P) may be set.

Fixed reorder cycle systems are based on periodic reordering rather than on an order point signalled by quantity. The quantity ordered varies depending on usage of materials in the immediate past period. The orders placed are of varying size over a fixed periodic cycle. As with the fixed reorder quantity system, there is a periodic review of requirements which may result in a change in the maximum inventory level or the length of the periodic review and ordering point.

The fixed reorder cycle system makes it possible to group orders for a number of individual items from one supplier and possibly take advantage of lower shipping costs. The fixed cycle system has a quick response to demand changes and, in general, is applicable to high activity situations where close surveillance over both demand and inventory is of importance.

The optional replenishment system is commonly known as (s, S) system and it combines the essential control mechanisms of both the fixed reorder quantity and reorder cycle system. This system establishes a maximum on-hand and on-order inventory level, a periodic review period, as well as the reorder point. The decision rules for ordering are as follows: at the time of each review, it must be determined if the inventory on hand and on order is less than the order point. If the order point has been reached, the quantity that will bring inventory on-hand (on stock) up to the maximum level should be ordered. If the order point has not been reached, no order is placed and a reexamination occurs at the time of the next review with the same decision rules. The system combines the advantages of the two other systems.

The inventory control system used in the Carpentry Cooperatives in Mukalla and Seiyun is close to the fixed reorder cycle system, with some elements of the optional replenishment system.

It is not necessary, even it is not advisable, to use the same system for all kinds of materials. For raw materials, with rather even usage in production, the fixed reorder quantity system would be most appropriate, while for hardware and some other imported components the optional replenishment system is better suited.

And finally, it is not enough to know various systems and methods, but to use them in everyday practice. Only this way can one avoid shortages of materials for permanent supply of the production and minimize costs related to the procurement and storage of materials. Actually, this is the main task of the inventory control system.

ANNEX I

TRAINING PROGRAMME FOR FURNITURE AND JOINERY PRODUCTION

This training programme is designed to achieve the objectives and outputs of the project entitled "Strengthening the Technical and Managerial Capacities of the Carpentry Cooperatives in Mukalla and Seiyun" (project No. SM/PDY/87/005).

After visiting all the production units of these Cooperatives, (the three units of the Coastal Strip Carpentry Cooperative and the four units of the Carpentry Cooperative, Seiyun), and after studying the present state of their production, it has been concluded that a thorough training of operators and managerial staff is a prerequisite for all improvement. Due to this conclusion, the training programme prepared and proposed hereunder is more comprehensive, and the training activities are more numerous than originally planned in the project document. It has been designed to meet the specific requirements of the cooperatives which are on the point of transmitting from handicraft to industrial production. The topics for the training courses selected are:

COURSE NUMBER	TITLE OF COURSE	DESIGNED FOR:
1.	Production systems and types of production in the wood processing industry.	Management staff of the Cooperatives and their production units.
2.	Furniture products, classification, standards, design and construction	Production Department staff
3.	Joinery products, classification, standards, design and construction	Production Department staff
4.	Product development in the secondary wood processing industry	Staff of the production and sales departments.
5.	Organization and planning of production.	Production planning staff.
6.	Work allocation and control of production	Production planning staff, supervisors and foremen.
7.	Planning, cost accounting, pricing, cost control and optimization of a product line.	Accountants, salesmen and staff of the production department.
8.	Inventory control and purchasing techniques.	Purchasing unit's staff and staff of the production department concerned with material planning.
9.	Basic elements of marketing	Management, sales and production department staff.
10.	Modern industrial production management	Managerial staff.
11.	Information and documentation systems in the secondary wood processing industry.	Managerial staff, top and middle management of the cooperatives.
12.	Plant layout	Staff of the production department and production supervisors.
13.	Wood, affiliated products and other materials used in the production of furniture and joinery	The technical department's staff, supervisors, foremen and operators.
14.	Wood seasoning and preparation	The technical department's staff and people working in the timber yard.

COURSE NUMBER	TITLE OF COURSE	DESIGNED FOR:
15.	Crosscutting and trimming of sawnwood	Operators of crosscutting and ripping machines, and foremen in the wood cutting area.
16.	Panel sizing.	Operators of panel sizing machines and their foremen.
17.	Veneering and laminating surfaces and edges of wood based panels.	Operators laminating surfaces and edges of panel furniture components.
18.	Surface planing and thicknessing of components	Operators of surface planers/jointers and thicknessers and their foremen.
19.	Tenoning, mortising and drilling	Operators of tenoning, mortising and drilling machines and their foremen.
20.	Moulding and routing	Operators of moulding and routing machines and their foremen.
21.	Sanding and surface finishing.	Operators of sanding and surface finishing machines and their foremen.
22.	Preassembling, assembling and packaging.	Assemblers, packagers and their foremen.
23.	Managing of quality and quality control	Managerial staff at all levels, foremen and quality controllers.
24.	Jigs, templates and fixtures in the secondary wood processing industry.	Production department's staff.
25.	Tool sharpening, maintenance and managing.	Tool sharpeners and persons in charge of ordering tools.
26.	Internal transport, receiving and storage of materials and shipping of products.	Persons working in storage and internal transport services.
27.	Maintenance of equipment	Maintenance personnel.
28.	Safety measures in the secondary wood processing industries.	Foremen and supervisors in workshops.
29.	Motivation of employees	Managerial staff at all levels.
30.	Innovation and development techniques and methods.	Managerial and production department staff.

PURPOSE AND METHOD OF TRAINING

Training of employees is an integral part of production in modern industrial enterprises. Technical and technological developments offer new technical means and new production methods which make human work easier, safer and more productive. To be able to utilize such advancement, people working in industry have to learn and to train in order to achieve new knowledge and skills necessary for handling modern equipment and processes.

In developing countries, such training has decisive importance for the better utilization of new production techniques and for mastering new technological processes. To avoid unnecessary mistakes and gain indispensable skills, training courses are the most suitable way, because, in a short time, people can learn the best way of performing their duties in production.

The output of these training courses should be knowledge acquired by workers who will increase their abilities for effective production. To achieve this, the training method will rest on three stops as follows:

1. The lecturer will explain a new method.
2. The lecturer will demonstrate the new method.

3. The trainee will perform the new method under the lecturer's supervision.

Short manuals written in a simple language, understandable to the workers, will be prepared by lecturers for each course, translated into Arabic and distributed to the trainees. All graphs, tables and formulas will be adjusted to the level understandable to the people to be trained.

Theoretical teaching will be conducted in a classroom and its duration will be adapted to the minimum of theory which has to be known for a certain job. This part of the training will be performed by the CTA, other experts in the project and by United Nations Volunteers assigned to the project.

The practical part of the training will be organized at the work areas of the respective production operations. This part of the training will be carried out jointly by the experts and the UN Volunteers. The working area must be organized in a proper way, including the prepared production documents, tools, jigs, gauges, protective devices, pallets, materials and everything that is necessary for safe, productive and good quality work. The lectures should explain and show how to check a machine, tools, jigs, and in the case of wrong adjustment, how to correct them and how to prepare correctly all that is needed for the production operation.

The lecturer will show the correct way of performing the operation and supervise the performance of the trainees until he concludes that their work is fully acceptable and that the quality of the products is satisfactory. The counterparts with higher skills and experience will also be engaged to train less qualified labourers and to supervise their practical work.

Most of the training courses conducted for the Coastal Strip Carpentry Cooperative will be repeated for the Carpentry Cooperative in Seiyun, while in some cases the trainees from Seiyun will be invited to come to Mukalla. Persons from the production units outside of Mukalla and Seiyun will be travelling to these two places. Some of the practical training could and should be carried out in the satellite units by he UN volunteers.

SELECTION OF TRAINEES

Trainees will be selected by the counterpart, according to their jobs and to the topics of the training programme. Besides workers who will directly perform particular production operations, all other people concerned with certain aspects of the production, such as: foremen, supervisors, management staff, maintenance personnel, etc. can be included in the training. The list of trainees is an integral part of the training programme and it determines the number of copies of the training manuals to be prepared and distributed for each course.

TIMING OF TRAINING COURSES

The training courses will be prepared and conducted mostly during the experts' missions, and those to be conducted by the volunteers will be scheduled in between those missions. The priority should be given to the courses which are a prerequisite for the better understanding of other topics.

The timetable of all courses is a part of this programme, though the exact schedule can be changed depending on the timing of the future missions by the experts.

Some of the courses are intentionally foreseen for the last mission, hoping that by that time the workshops will be the missing equipment, which is indispensable for a proper training of the operators.

SYLLABI OF COURSES

This programme contains syllabi of all courses planned to be conducted during the project execution. The courses are broken down into topics, and, for each topic, the training duration, both theoretical and practical, and the level of competence to be reached are given.

The selection of topics and the required level of competence is aimed to reach a minimum knowledge needed for successful manufacturing of furniture and joinery products in a medium-scale factory.

Each course has its number and topics are subdivided into a decimal classification following the numbers of the courses.

Once all the training courses are completed the training material can be compiled into a printed handbook to be used throughout the country.

ANNEX II

SYLLABUS OF THE COURSE ON INVENTORY CONTROL AND PURCHASE DECISIONS (course No. 8 in Annex I)

This course is foreseen for the purchase unit staff and the production department people concerned with planning materials.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEORY	PRACTICE	
8-1	Introduction.	0.25	--	Understanding the purpose of the course.
8-2	Inventories and their functions.	0.50	--	Understanding the functions of inventories at different stages: raw materials, work in process and finished goods.
8-3	Forecasting and planning inventories.	0.5	--	Being able to predict the correct needs for various inventories.
8-4	Components of demand.	0.5	--	Understanding an average demand and random effects.
8-5	Pareto (ABC) analysis of inventory.	0.5	1	Being able to select inventory items according to their total value.
8-6	The classical inventory models.	1	1	Being able to maintain an inventory control system.
8-7	Variability of demand.	0.5	0.5	Being able to maintain an optimal level of inventories.
8-8	Inventory system for managerial control.	0.50	--	Knowing about inventory control and purchasing techniques.
	TOTAL	4.25	2.5	