
UNIT 14 CODIFICATION AND STANDARDISATION OF THE MATERIALS

Objectives

After completing this unit, you will be able to:

- Describe the need and role of codification, standardisation and simplification of materials from the viewpoint of the functions of planning, control, purchases, inventory, stores, etc.;
- Describe the importance of standardisation and codification;
- Describe the design and implementation of codification systems, and standardisation in information system design; and
- Portray the use of computerization of materials using codification and standardisation.

Structure

- 14.1 Introduction
- 14.2 Codification
- 14.3 Codification Systems
- 14.4 Advantages of Codification
- 14.5 Standardization
- 14.6 Advantages of Standardisation
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14.1 INTRODUCTION

Due to the growth of industrial activity and diverse kind of industrial requirements, a large no. of organizations have to store a large number of items, often running into several thousands and even lacs. Therefore, there should be some means of identifying them. A common practice is to describe the items by individuals names. Since several departments use the same item, they call the same item by different names and store them in different places. One of the most useful techniques of “Materials Management” is a rationalized codification system for properly classifying equipments, raw materials, components and spares to suit to the particular needs of any organization.

Old system of functional codification is no longer suitable for the already large and increasing inventory range of stocks and stores. It has come across several instances of duplication of stock of the same item under different nomenclature and codes and under different stores categories where such items are common to more than one consumption center. It is necessary that items are brought together for the purpose standardization, variety reduction and the application of other modern materials management techniques such as value analysis, operational research etc. so that the maximum return could be secured with the

minimum of inventory range and values. Standardisation leads to cheaper & easier procurement and cost of replacement can also be reduced.

14.2 CODIFICATION

An article of stores is identified by its simple description or nomenclature. Difficulty arises when the same article is known by different names. For example, chipping goggles, grinder goggles, or white goggles are one item but may be stored separately under same nomenclature as different items. One store-keeper might classify an item as Sal Ammoniac, whereas a research chemist might identify it under the name of Ammonium Chloride, only to be told that it is not available. A classic example comes from the U.K. An electric firm found that a simple item of a screw with a width of 3/8" and length of 6" had as many as 118 names depending on the type of usage and the department using the screw.

A few names are: (a) Plunger, (b) dowel pin, (c) roller, (d) locating peg, (e) drive pin (f) pinion spindle, (g) pin mould holding, (h) motor drive spindle, (i) trip arm pin, (j) armature stud etc.

Two firms in Western India have been able to reduce the variety of lubricating oils from 30 and 32 to 9 and 7 respectively. At a control depot of State Road Transport Authority, 583 hardware items were reduced to 105 through codification. In a large electrical firm, it was found that excessive stocks of copper items were due to designers specifying too many sizes.

A planned reduction of say 20 per cent in number of items would not only reduce the material cost, but would also correspondingly bring about reduction in routine work, stores purchase, inspection, production and accounts. In short, a rationalized system of codification would reduce the number substantially and at the same time make their identification an easier job avoiding lengthy description and confusion.

The need for Codification arises because of the following reasons:

- (i) Speed, (ii) Unambiguity, (iii) Saving of Effort, (iv) Space Saving on forms, (v) Ease of classification, (vi) Mechanization.

Characteristics of Codes

As far as possible uniform dimension say, the metric system should be adopted.

- i) Code should be Simple.
- ii) Code should be unique.
- iii) Coding should be compact, concise and consistent.
- iv) Code should be sufficiently flexible to meet future demands.

Basic Requirements of a Code

- i) Identify commodities
- ii) Name commodities
- iii) Specify commodities
- iv) Classify commodities
- v) Indicate inter-relationships between commodities
- vi) Indicate the source of origin of commodities
- vii) Refer specifically to an individual and unique commodity.

Objectives of Codification

In order to identify the items correctly and logically for processing the transactions, and to facilitate easy location in stores, a codification system should be evolved with the following objectives.

- i) **Accurate and logical identification:** A separate code allotted to each of the items available in the warehouse indicating the size, quality price, usability, special characteristics, specification etc.
- ii) **Prevention of duplication:** All items are separately codified and are arranged in a logical order. Similar materials are grouped together (such as stationery items, hardware items) and given a code.
- iii) **Standardisation and reduction of varieties:** For codification, grouping of identical item is done and it enables the stores to examine the entire range of items. It facilitates the elimination of those varieties in place of which other varieties of the same quality can be used. This reduces the number of varieties to a minimum. If proper standardisation is achieved and the number of items is kept at the minimum, it will considerably reduce investment in various items as well as the cost of inventory carrying.
- iv) **Efficient purchasing:** The filling up of purchase requisition, and preparation of purchase orders are simplified by the use of codes which easily indicates the materials required. Buying instructions to the suppliers become easy and quick if there is proper understanding of codification by the suppliers.
- v) Efficient recording and accounting codes leads to effective stock control, efficient recording and it results in yielding accounting. Chances of mistakes are minimized. Pricing and valuation also become more accurate and reliable.
- vi) Easy locating, indexing and inspection of all materials is possible.
- vii) **Easy computerization:** The computer work better with codes than with long description of materials.

14.3 CODIFICATION SYSTEMS

One of the prerequisites of classification and codification is to know the basic nature and characteristics of all materials used in an enterprise and then classify them in broad categories and then to group and sub-group them in logical progression of kinds, type and sizes etc. As for example, Raw materials, Semi-processed Materials, Mechanical (Products and equipment), Electrical (products and equipments), Chemicals (Allied products and chemical processing equipment), Laboratory and office (equipment and supplies) etc. can be classified, grouped and sub-grouped first.

After classification in a broad way, a code or symbol is allocated to each of element, the code or symbol so allotted should be simple, flexible and it should be easily adaptable in order to exploit the full advantages of codification.

Therefore, codification is a process of representing each item by a number, the digits of which indicate the group, the subgroup, the type and the dimension of item. The first two digits normally represent the major groups, such as raw tools, oil stationery, etc. The next two digits indicate the sub-groups, such as ferrous, non-ferrous, etc. Dimensional characteristics of length, width, head diameter usually constitute the further three digits and the last digit is reserved for minor variations.



Many organizations in the private and public sectors like, Railways and DGSD have their own system of codification. The number of digits in a code may typically be somewhere between eight to thirteen.

There are several methods of codification but the most useful method is that, which give along with standard form, the history size and type of material.

However, a great care should be taken to develop the code to satisfy a variety of users.

Some of the systems of codification are:

- 1) Arbitrary system
- 2) Numerical System
- 3) Mnemonic system or alpha numeric system
- 4) Decimal system
- 5) Brisch system
- 6) Kodak system

Arbitrary Systems

Arbitrary system as the word 'arbitrary' indicates, is based on the serial number under which a material is received and the same is allotted as a code number. Using this approach, all inventory items are simply assigned arbitrary numbers in sequence as they are added to the stores account. Each item thus has a discrete number, but it bears no systematic relationship to the numbers assigned to related items. Two similar items or two mating parts may have numbers several thousand digits apart. For example, if bearings are received and suppose a number 5090 has already been allotted to the previous item received, then the code number of these bearings will be 5091. This system has the advantage that there is no fixed limit for codifying any number of items.

Moreover, one cannot know the history of the items. This is the reason why the system is not popular.

Numerical System

A numerical system assigns a six to ten digit code number to each item. The first several numbers usually indicate the classification to which the item belongs, the next several numbers typically indicate the sub-class, and the last three numbers are usually uncoded. The following example illustrates the concept:

3	129	017	503
General Class	Generic Class	Sub-class	Specific item number

This ten digit code number is one firm's stock number for a ¼ by ¾ inch stainless steel square neck carriage bolt. The first digit indicates that the item is a purchased part as per the following general classification :

- 1) Raw material
- 2) Manufactured parts
- 3) Purchased parts
- 4) MRO supplies
- 5) Work in process

The next three digits indicate the generic classification of the item. In this case it is a fastener, code number 129. All items are generically classified by their nature and carry a number from 000 to 999.

The next three digits indicate the sub-class to which the item belongs. In this case, 017 is a carriage bolt with a square neck. All fasteners are sub-classified into a class bearing number from 000 to 999.

The last three digits indicate the specific part number of the item. In this case, all part numbers under 500 designate plain steel and numbers over 500 represent various alloys; 503 is stainless steel, $\frac{1}{4}$ by $\frac{3}{4}$ inch.

Mnemonic System

A mnemonic system functions much like a numerical system. However, it combines numeric and alphabetic notations in its symbols. For example, the carriage bolt described under the numerical system in the following manner :

P Fa BCS 503

P denotes a purchased part,

Fa is a fastener, BCS stands for bolt, carriage, with a square neck, and 503 represents the specific number of the bolt.

Mnemonic systems, particularly where a small number of items are involved, frequently make visual identification easier because they are more descriptive and they are often shorter. As more and different types of items are added to the inventory, however, this advantage diminishes because the number of good symbols are limited.

Decimal System

Decimal system of codification may said to be the universal in its working. It is simple and easy to codify items under this system. Day by day, the number of items in almost every sphere of industry is increasing. Hence, codifications should be such as may meet the increasing requirements and it should also be simple, handy and easily adaptable. Under this system items up to 5,00,000 can be easily codified and at the same time each symbol will give the history, size, specification and complete picture of the item. Modern industrial concerns are generally adopting 7 to 11 digits for codifying the materials.

In the decimal codification system, each digit indicates some thing or the other. For example :

1st digit -Section

2nd digit-Class

3rd digit-Group

4th digit -Type of materials

5th digit -Size, part no. specification or any other details required

Example:

Section	0 — Plants and machinery
	1 — Machine and hand tools
	2 — Construction materials etc.



Class
(For section-1)

- 0 — Hand tools
- 1 — Machine tools
- 2 — Holding tools
- 3 — Cutting tools
- 4 — Tripped cutting tools etc.

Group
(For section-1)

- 0 — Cutters
- 1 — Files
- 2 — Knurls
- 3 — Scrapper etc.

Suppose a fileflat, single cut smooth, size 25 mm is to be codified. It will be indicated by 1st, 2nd and 3rd digits as 131. Further fourth and fifth digit will be classified as :

4th digit to indicate the shape of the file, thus

- 0 — for flat
- 1 — for hand
- 2 — for saure
- 3 — for round
- 4 — for tapered etc.

5th digit to indicate the teeth of file, thus

- 0 — for single cut, rough
- 1 — for single cut, coarse
- 2 — for single cut, smooth
- 3 — for double cut, coarse etc.

The 6th, 7th and 8th digits indicate the size of the file in mm. Therefore, file flat, single cut smooth size 25 mm will be codified as – 13102025.

Brisch System

The Brisch system consist of seven digits applied in three stages. The items are grouped into suitable preliminary categories, such as assemblies, sub-assemblies, components and off the shelf items. After these preliminary categories, items are grouped within the respective class in order to bring similar items together. The Brisch system through it consists only of seven digits, is quite comprehensive as the basis is on logical major groupings.

Kodak System

The Kodak system consists of 10 digits of numerical code. The logic of major grouping is based on sources of supply. All materials are divided into 100 basic classifications, contributed only by procurement considerations. For instance, a bolt is listed as hardware item if this is listed in hardware catalogues and available with hardware suppliers. If this bolt is available as a part of the machine, it will be available under maintenance.

14.4 ADVANTAGES OF CODIFICATION

Let us discuss some advantages of codification in material management.

- a) As a result of rationalized codification, many firms have reduced the number of items.
- b) It enables systematic grouping of similar items and avoids confusion caused by long description of the items.
- c) Since standardisation of names is achieved through codification, it serves as the starting point of simplification and standardization.
- d) It helps in avoiding duplication of items and results in the minimization of the number of items, leading to accurate records.
- e) Codification enables easy recognition of an item in stores, thereby reducing clerical efforts to be minimum.
- f) If items are coded according to the sources, it is possible to bulk the items while ordering.

Activity 1

Explain BRISCH System & KODAK System with the help of an example.

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14.5 STANDARDIZATION

Mass production techniques of industrial production are based on the principle of uniformity and interchangeability of many parts, components and material used in the production process. Standard products can be manufactured on a mass scale and their production cost can be kept minimum. Standardisation leads to cheaper and easier procurement and cost of replacement can also be reduced.

In our country Indian Standards Institution (ISI) is the national body which deals with standardisation at national level. There are various committees dealing with different industries who formulate national standards.

ISI in collaboration with NTH (National Test House) and with the help of their control laboratories they issue the ISI certification mark, which is a third party and is accepted nationally as a proof of standard quality. Some of the international standards are British Standard (BS), American Standards Association (ASA) or the American Society for Testing Materials (ASTM). However, all the industrially advanced countries in the world have their own national standards. International Standards Organization (ISO) with its HQ at Geneva, issues international specifications. India being a member of ISO adopt, Standard are meant for economy, efficiency and convenience while there may be a general acceptance as to be desirability of standardization, there is no possibility of complete standardization.



Designing a product and its manufacturing is not a simple matter of assembling standard parts.

Furthermore, operations of many a companies consist of manufacturing products to special according to specifications of customers over which they have virtually no control. Such, inherent limitations imposed by such special factors frequently results in complete standardization. Yet, every effort should be made to follow it:

In the field of stores and material management, standardisation enables industry to proceed on scientific lines to locate factors influencing preparation of inventory control programmes, for achieving economy of materials and parts, avoiding wastages, disposal of unwanted stores and reduction in stock. Again through standardisation and variety reduction, rationalized codification becomes easier. The role of standardisation and variety reduction in inventory simplification has therefore real significance in industrial materials management field.

The standards could cover variety of industries, such as engineering, textile, chemical, pharmaceutical and agricultural as well as education. Certain points to remember regarding standardisation are:

- Standards are at the basis of all mass production. They make possible thousands of different articles to be placed within the each of everybody.
- When one purchases a new spark plug for a Scooter or Car, he knows that it will screw into the engine head all right. Why? Because spark plug threads are standardized.
- Standards convey the sense that there are only certain specific sizes made and sold.
- Standards are carefully established specifications for products, materials.
- Standardisation means producing maximum variety of products from minimum variety of (i.e. standardized) materials, parts, tools and processes.
- Standardisation is the way which leads to economical products.

Standardisation usually means that non-standard products will not be produced except when a customer orders them to be made. Standardisation is the process of establishing standards or units of measure by which extent, quality, quantity value, performance, etc. may be compared and measured.

Steps involved in standardisation procedure are as follows:

- a) With the help of market research, sales statistics, etc. decide what to sell in future.
- b) Then, define a standard range of products.
- c) From the range, ask the designer to develop minimum variety of components to match the range.
- d) Introduce new materials, components, etc. if necessary.

14.6 ADVANTAGES OF STANDARDIZATION

Let us discuss some advantages of standardisation in material management.

- 1) All sections of a company benefit to some degree from standardization.
 - Design department
 - Fewer specifications, drawings and part lists have to be prepared and issued. Thus more item is available to develop new designs or to improve established designs.

- Better resources utilization.
- Lesser design mistakes and design alterations.
- Less qualified personnel can handle routine design work.

2) Manufacturing department

- Lower unit costs.
- Better quality products.
- Better, methods and tooling.
- Better services of production control, stock control, purchasing, etc.
- Fewer tool changes and process set-ups.
- Increased interchangeability of parts.
- Better utilization of manpower and equipments.
- Longer production runs are possible with fewer changeovers; wider use of automation and mechanization.
- The operations can be analyzed and broken down into short repetitive cycles which can be easily mastered.

3) Marketing department

- Marketing section gets better quality products of proven design at reasonable prices. This leads to a greater sales volume.
- Increased margin of profit.
- Less pressure of after-sales-services.
- Better product deliveries.
- Easy availability of spare parts.

4) Production planning section

- Scope for improved methods, processes and layouts.
- Opportunities for more efficient tool design.
- Greatly reduced pre-production planning activities. Fewer issues of new planning cards.

5) Production control department

- Well proven design and methods improve planning and control.
- Fewer delays arise from waiting for materials, instructions, tools, etc.
- Accurate delivery promises.

6) Purchase and stock control section

- Holding stock of standard items, (i.e., less variety of materials and components) means less paper work and fewer requisitions and orders.
- Storage and part location can be improved.
- Because of large purchase quantities involves, favorable purchase contacts can be made.
- Newer techniques can be used for better control of stocks.

7) Quality control department

- Better inspection and quality control is possible.
- Operators become familiar with the work and produce jobs of consistent quality.
- Quality standards can be more clearly defined.

Disadvantages of Standardisation

However, there are some disadvantages also, that are attached with standardisation.

- Reduction in choice because of reduced variety and consequent loss of business or customers.
- Changes in public taste seriously affect a company producing only standardized product range.
- It becomes difficult to introduce new models because of less flexible (existing) production facilities and due to the high cost of specialised production equipment.
- Standardisation tends to favour large famous companies because small or new concerns can rarely get much business even by producing same items and by selling them at the same price as the big companies.
- Standards once set, resist change and thus standardisation may become an obstacle to progress.

Applications of Standardisation

Standardisation can be applied to a major extent in the following fields:

- 1) Finished products, e.g., cars and televisions.
- 2) Sub-assemblies and components, e.g., automobile gearboxes and autoelectric bulbs.
- 3) Material Standardisation, e.g., both of direct materials (plain carbon and alloy steels, are welding electrode core wires, etc.) and indirect materials (such as oils and greases).
- 4) Production equipment standardisation, e.g., that of machine tools, presses, welding equipments, etc.

14.7 INTERNATIONAL STANDARDISATION

If one has to do business globally, one has to adhere to international standardisation.

- It becomes essential to follow international standards if a country has to capture the export market.
- The work of international standardisation is carried out under the aegis of ISO (International Organisation for Standardisation).
- Most industrialised countries are members of ISO.
- ISO does not issue independent standards of its own but it makes recommendations which are included in the National Standards of the collaborating countries.

14.8 CLASSIFICATION

Classification of materials involve grouping of items according to a predetermined criteria since large number of items are regularly handled by warehouses and therefore their planning and co-ordination need special attention.

The objectives of classification are as follows:

- to facilitate planning, co-ordination and control of materials in warehouses according to the class assigned.

- to ensure uniformity in purchase procedures, inspection methods, and storing and issuing procedures for each of the different class of materials.
- to devise accounting and evaluation procedures which are uniform to each of the different class of materials.

The process of classifying the materials can be carried out based on either nature of the materials or it can be based on the usability of the materials.

Classifying the materials based on the nature of the materials can be done depending upon the following criterias:

- Raw Materials:** All those materials which are purchased from the suppliers for processing and value addition are allotted a specific class.
- Machinery, equipments & spares:** All machineries, equipments and spares which are procured to facilitate the process of manufacturing can have a common class.
- Consumables:** Those materials which get consumed during the manufacturing process and cannot be used for the second time for the same purpose are consumables. All these items can be classified together.
- Fuels and Chemicals used in the manufacturing process:** can come under the same class.
- Other items:** Usually in all organization a variety of items are required for day-to-day operations, e.g., furniture, scrap, packaging materials, stationeries etc. Depending upon the nature of the business and organization, these requirements might change. Therefore, all organization devise different systems to classify the materials according to their requirement for ensuring operational ease.

The Materials can also be classified based on their useability. the following class can be devised:

- Serviceability of the items:** There can be items in organization which become useless after its life is over as they cannot be repaired. This can be used as a criteria to classify the materials.
- Finished and semi-finished items:** Finished goods are those items which are ready for sale as their manufacturing has been completed. On the contrary, in case of semi-finished items, some further processing is required before they are ready for sale.
- Unused items:** These items cannot be used for manufacturing as they are defective or damaged. Due to this reason they are rendered unusable.

Certain points to remember regarding classification are:

- Classification is of great value in material and component standardisation.
- Classification aims at systematically grouping items together by their common features and sub-dividing them by their special features.
- A system of classification and coding is necessary for the design of new products within the range defined.

Classification procedure involves the following steps

- Define all items.
- Classify each items according to its basic characteristics.
- Identify each items by allocating to it some meaningful code number.

14.9 SIMPLIFICATION

The process of standardisation logically leads to simplification or variety reduction. This implies reducing unnecessary varieties and standardising to the most economical sizes, grades, shapes colour types of parts and so on. In large organization handling lakhs of item, it is quite possible that there are several effectiveness. Nevertheless these continue to be in stock for historical reasons. The items can be analysed for their frequency of usage over the past few years. Such frequency or movement analysis would bring out items which are seldom used or not used at all. On the basis of this analysis the organization could set the standards to replace these items.

- The concept of simplification is closely related to standardisation.
- Simplification is the process of reducing the variety of products manufactured (known as variety reduction).
- Simplification is concerned with the reduction of product range, assemblies, parts materials and design.
- A manufacturer may reduce the number of different types of radio sets from a dozen to three or four to simplify his range.
- Simplification makes a product, assembly or design, simpler, less complex or less difficult.
- Simplification removes the superfluous. It decreases variety of size; for example a garment factory making T-shirts in size 16, 16 $\frac{1}{4}$, 16 $\frac{1}{2}$, 16 $\frac{3}{4}$, 17, 17 $\frac{1}{4}$., can eliminate superfluous sizes such 16 $\frac{1}{4}$, 16 $\frac{3}{4}$, etc. and thus simplify its production line.
- The availability of suitable standards assist in simplification.

Considerations in Simplifying Items (i.e., products components, etc.)

- i) Can simplification be effectively achieved depending upon the nature of item?
- ii) How the simplification will affect customer demand and volume of sale?
- iii) Does market competition permit simplification or it encourages product diversification?

14.10 ADVANTAGES OF SIMPLIFICATION

Simplification involves fewer, parts, varieties and changes in products: this reduces manufacturing operations and risk of obsolescence.

- Since simplification reduces variety, volume of remaining products may be increased.
- Simplification provides quick delivery and better after-sales service.
- Simplification reduces inventory and thus results in better inventory control.
- Generally speaking, simplification means fewer parts and fewer the parts, the lower are the production costs.
- Thus, simplification reduces price of a product.
- Simplification improves product quality.

Activity 2

Discuss the role of standardisation and simplification in stores management.

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14.11 SUMMARY

Organization have to handle a large number of materials with varying degree of sizes, shapes, prices, physical and chemical properties, sources of supply etc. To meet the complexity of such variety, the items need to classified accordingly.

In order to identify materials a long description might be required. Using number and alphabets instead of such description will help in easy retrieval of information required regarding the materials. Codification is a useful means to describe items conveniently.

Several items with similar functional and dimensional characteristics can be grouped to a single dimension and other technical characteristics with negligible loss of functional requirements through the process of standardisation. This also helps in simplification and variety reduction.

14.12 SELF ASSESSMENT EXERCISES

- 1) What do you understand by the term codification? What type of information should be built into a code?
- 2) What are the objectives of codification, standardisation and simplification?
- 3) What are the essential requirements that a coding system should satisfy?
- 4) How does standardisation lead to variety reduction?
- 5) Explain the different system used to codify materials.
- 6) Discuss the advantages and disadvantages of standardisation.
- 7) Discuss of decimal system of codification.
- 8) Elucidate upon the importance of classification in stores management.
- 9) Write notes on simplification and variety reduction.