GOVERNMENT OF MALAYSIA

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No. 7 of 1991

GUIDELINES ON QUALITY CONTROL CIRCLES (QCC) IN THE PUBLIC SERVICE

Prime Minister's Department
Malaysia
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Circulated to:
Secretaries General of Ministries
Heads of Federal Departments
Heads of Federal Statutory Bodies
Hon. State Secretaries
Local Government Authorities

OBJECTIVE

1. This Circular contains guidelines on the implementation of Quality Control Circles (QCC) in the Public Service. The guidelines on the Implementation of Quality Control Circles in the Public Service is in the Appendix to this Circular.

QUALITY MANAGEMENT THROUGH QCC

2. With the lunching of the Excellent Work Culture Movement in 1989, the Government places great emphasis on the roles to be played by both the Management and the employees in improving quality in Government departments /offices. For this purpose, the Government encourages the establishment of Work Teams at the Officer-level and QCC with membership from employees in the C & D categories to solve problems at the Work place.

3. The contributions of both the Management and also the QCC members in problem solving and improving productivity as well as quality are important in the Government's efforts towards Total Quality management in the Public Sector.

4. This Circular is effective from the date of its issue.

TAN SRI DATO' SRI AHMAD SARJI BIN ABDUL HAMID
Chief Secretary to the Government

(Appendix To Development
Administration Circular
No. 7 of 1991)

GUIDELINES ON QUALITY CONTROL CIRCLES (QCC) IN THE PUBLIC SERVICE

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I. OBJECTIVE

1. The objective of these Guidelines is to assist Government Departments /offices in implementing Quality Control Circles (QCC) in their respective organisations.

II. THE CONCEPT OF QCC

Definition

2. A Quality Control Circle is a small group of workers (6-10 persons) from the same work unit who meet regularly to identify, select and analyse work-related problems. The group then puts forward suggested solutions to the Management for consideration and decision. Subsequently, they implement the decisions of the Management.

Philosophy

3. The philosophy of QCC is based on the concepts of participative management and humanistic management. Humanistic management refers to management that gives importance to people and their feelings. This is because people are the most valuable asset of a department / office. Participative management means that very worker regardless of his / her position in the organisation is given the opportunity to make meaningful contribution to the department / office. QCC is, therefore a mechanism whereby workers are able to participate in the problem-solving process leading to improvement of quality and productivity in their department / office.

Objective

4. The objective of QCC is to improve and upgrade quality of work through:

(a) The problem solving capability of the workers;

(b) Team work;

(c) The cultivation and assimilation of positive values and work ethics;

(d) Involvement and interest in work;

(e) High motivation for work; and

(f) Awareness of responsibility towards oneself, the group, the department / office and the nation.

Basic Principles Of QCC

5. QCC is based on the following basic principles:

(a) Workers are recognised as the most valuable resource along with other management resources;

(b) Development of workers as useful members of the department / officer;

(c) Participation and support from all levels;

(d) Team-work;

(e) Constant encouragement of creativity; and

(f) The projects are related to daily work.

Benefits of QCC

6. Numerous benefits can be obtained through the implementation of QCC. Among these are:

(a) Closer relationship between the workers and Management;

(b) Cultivation of cooperation among workers;

(c) Job satisfaction;

(d) Increased motivation to work;

(e) Building of self-confidence;

(f) Development of leadership among workers;

(g) Encouragement of creativity among workers; and

(h) Improvement of systems and work procedures.

III. IMPLEMENTATION OF QCC

7. The prerequisites necessary for implementing QCC are:

(a) Establishment of a QCC structure;
(b) Effective training; and
(c) Effective recognition system.

QCC Structure

8. The QCC structure as being practised currently consists of components as shown in *Diagram 1* namely:

(a) QCC Steering Committee;
(b) Facilitators;
(c) Quality Circle Leaders; and
(d) Quality Circle Members.

(a) *QCC Steering Committee*

The Steering Committee is the committee that formulates policies for the implementation of QCC. It also deliberates as well as decides on the suggestions forwarded by QCC for solving problems.

(b) *Facilitators*

Facilitators are chosen from among Heads of Divisions or workers selected by the Management. These facilitators are responsible for one or more QCC. The roles of the facilitators are as follows:

(i) Communicating with all levels of management and obtaining their support and assistance;

(ii) Providing training to QCC leaders and assisting in training of QCC members where required;

(iii) Maintaining an open and supportive environment;

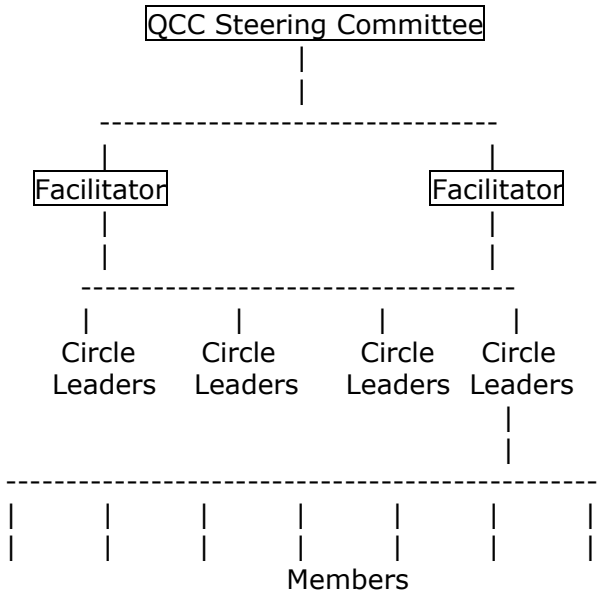
(iv) Ensuring QCC members direct their activities to work-related problems;

(v) As a mediator in problem-solving;

(vi) As a resource person to the Circle; and

(vii) Evaluating the costs and benefits of the QCC programme and reporting to the Management.

DIAGRAM 1: QCC STRUCTURE



(c) *Circle Leaders*

Circle leaders may come from among Unit Heads or selected workers and have the following roles:

(i) Training members on problems-solving techniques with the assistance of the facilitator where required;

(ii) Responsible for the smooth operation of QCC activities and fostering the spirit of cooperation and harmony among members;

(iii) Assisting the Circle members in record keeping and in the preparation of management presentations;

(iv) Conducting meetings in an orderly and effective manner;

(v) Showing interest and support to the Circle;

(vi) Encouraging other workers to become members;

(vii) Assisting members in problem-solving; and

(viii) Enforcing team discipline.

(d) *Members*

The QCC members have the following roles:

(i) Attending meetings regularly;

(ii) Directing their efforts towards solving work-related problems;

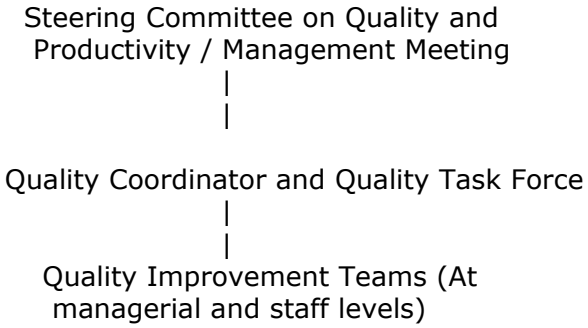
(iii) Identifying problems, contributing ideas, undertaking research and investigation (where necessary) and assisting the QCC in problem-solving; and

(iv) Participating in management presentations.

Quality / Productivity Management

9. With the implementation of the quality program in the Public Service, every Government agency is required to form a quality / productivity management structure in their respective agencies. The structure is as shown in *Diagram 2*.

DIAGRAM 2: STRUCTURE FOR QUALITY/PRODUCTIVITY MANAGEMENT



10. In view of the fact that this structure is responsible for the overall quality / productivity management, the QCC Steering Committee can be replaced by the Steering Committee on Quality and Productivity / the Management Meeting. Besides, for an organisation that may have many facilitators, a Chief Facilitator should be appointed to the Task Force on Quality and Productivity. The Chief Facilitator is responsible for keeping the Task Force informed on the progress of implementation of QCC.

Training

11. Training plays an important role in ensuring the effectiveness of the QCC programme. The members of the QCC should be equipped with skills and techniques to implement QCC projects. They need to understand their individual roles in successfully implementing QQC activities. In this context, INTAN (the National Institute of Public Administration) conducts a series of training programmes for QCC facilitators. The facilitators who have undergone this training are responsible for training Circle leaders in their respective agencies. Training for QCC members is also undertaken by Circle leaders during QCC meetings.

Recognition System

12. In order to encourage participation by workers in QCC activities and also to sustain existing QCCs, the Management should give recognition to QCC which have successfully brought about improvements or introduced innovations in their work places. Towards this end an appropriate recognition programme to show appreciation to the QCC members should be established. Among the forms of appreciation that can be given are the following:

(a) The presence of the Management during project presentation;

(b) Letters of Appreciation;

(c) Awarding of mementos;

(d) Certificates of appreciation;

(e) Invitation to attend functions with the Management;

(f) Publishing success stories in bulletins;

(g) Making video recording of QCC presentations;

(h) Publishing photographs of the winning QCC in bulletins or displaying them on the notice boards;

(i) Providing the opportunity for QCC members to participate at the National-level QCC Convention; and

(j) Study tours.

13. Realising the fact that recognition is an important factor in motivating QCC to continue their good work, the Government organises the QCC Convention. The objectives of the Convention are:

(a) To recognise and appreciate workers participating in QCC activities by providing them with the opportunity to make presentations;

(b) To prove and convince the Public Service that QCC can be implemented in the public sector;

(c) To convince that QCC can assist the Public Service in solving work related problems; and

(d) To obtain feedback on the problems faced in the implementation of QCC in the public sector, with the view to improve the effectiveness of the programme.

14. At the National-level QCC Convention, the top three QCC are selected to receive the following Certificates of Appreciation and Awards:

(a) The Chief Secretary To the Government Award:

(b) The Director-General of Public Services Award: and

(c) The Director-General of MAMPU Award.

Factors Leading To The Successful Implementation of QCC

15. Factors leading to the successful implementation of QCC are as follows:

(a) Positive attitudes, and commitment from top management. This includes the willingness of the Management to allow time and manpower to be spent on implementing the programme;

(b) An effective training system;

(c) Support from all levels;

(d) The establishment of a recognition system for QCC members;

(e) Provision of facilities by the Management such as stationeries, overhead projectors, transparencies and meeting rooms;

(f) QCC should be considered as a long-term exercise. As such QCC

should be initiated on a small scale initially to ensure its sustainability;

(g) The progress of QCC should be publicised throughout the organisation;

(h) The ability of the Steering Committee to plan, implement, coordinate and take action on recommendations; and

(i) Carrying out promotional activities through posters, slogans and pamphlets.

IV. WORK IMPROVEMENT PROCESS

Steps Involved In QCC

16. The approach used by QCC in improving quality of work is the Plan, Do, Check, Action - P.D.C.A method. The activities involved in P.D.C.A are as in *Diagram 3*.

Step 1- Plan

17. At the planning stage, QCC members are required to identify and select projects / problems which need to be attended to. For each project / problem identified for action, an implementation schedule needs to be prepared to ensure that the project / problem is completed within the scheduled time period.

18. Three activities are required at this stage, namely;

(a) *Project / Problem Identification*

QCC projects or problems may be selected at the request of the Management or from suggestions made by QCC members, facilitators, other workers or other Circles. Projects or problems, which are selected and solved through QCC, are mainly work-related problems. Among the problems are those on filing systems, workflows and counter services.

In the process of identifying project / problems, QCC members are advised not to discuss certain matters such as:

(i) Departmental policies;
(ii) Unions agreements;
(iii) Matters related to discipline;
(iv) Personal matters
(v) Salaries and allowances;

(vi) Departmental budget;
(vii) Service conditions;
(viii) Job distribution;
(ix) Promotion policies; and
(x) Other matters not connected to work-related problems.

(b) *Selection of Project / Problems*

At the preliminary stage, through brain-storming sessions, QCC members may identify numerous project / problems for remedial action. However, they are allowed to select only one project / problems for action. The selection of the project / problem may be through a process of voting or through prioritisation of projects / problems. The project / problem selected should be the most important or most critical one that requires immediate action.

(c) *Preparation of Implementation Schedule*

After selecting the project / problem for action, QCC members should prepare an implementation schedule as in *Table 1*. The steps involved in the preparation of the implementation Schedules are:

(i) Identification of all activities required;

(ii) Estimation of time required for each activity, that is, date of commencement and date of completion;

(iii) Identification of important sequences to complete the activity with the setting of dates for inspection and monitoring of the activity; and

(iv) Recording of actual achievement as against the planned targets for each activity.

Step 2 - Do

19. The activities involved in the step 'Do' are:

(a) Problem analysis;

(b) Alternative solutions;

(c) Presentation to the Management;

(d) Consideration of suggestions and decision by the Management; and

(e) Project implementation by the QCC members.

(a) *Problem Analysis*

After selecting the project / problem, QCC members should analyse the root-causes of the problem. This can be carried out by using the Cause and Effect technique and data which has been collected.

(b) *Alternative Solutions*

This process requires QCC members to identify alternative solutions to the problem. The advantages as well as tangible and non-tangible benefits occurring from the suggested solution should be explained one by one. Financial implications should also be considered. The QCC members should select the best solution through system of voting or a through analysis of the alternatives.

(c) *QCC Presentation*

When the QCC is ready to present their recommendations to the Management, it is important that they do so in an effective, confident and systematic manner. To do so, QCC members require various presentation skills. Among them are:

(i) Oral presentations;

(ii) Preparation of a project report; and

(iii) The use of audio-visual aids such as videos, television sets, and slides.

QCC members making the presentation to the Management must pay heed to various matters, namely:

(i) The presentation should be made within 20-30 minutes including the time for opening and closing remarks by the Circle Leader;

(ii) All members should be introduced by the Circle Leader and the Circle Leader should answer all

questions raised at the end of the presentation;

(iii) All members should participate in the presentation;

(iv) All information gathered to be used in the presentation should be in the form of charts, graphs and diagrams;

(v) A rough outline of the presentation should be prepared;

(vi) The presentation should be conducted systematically and orderly; and

(vii) All guests, members of the Steering Committee and members of other Circles should be invited at least a week before the presentation.

The QCC project presentation is important in conveying the Circle's suggestion to the Management. Among the benefits to be obtained from such a presentation are:

(i) It improves the relationship between the Management and workers;

(ii) It indicates the concern, support and involvement of the Management in QCCs;

(iii) It fosters the spirit of cooperation and esprit de corp among workers; and

(iv) It acts as a token of recognition and appreciation of the efforts of the QCC members.

(d) *Consideration and Decision*

Projects or problems to which solutions have been identified will be presented to the Management. The Management should give due consideration to these solutions and arrive to a decision. Where a decision cannot be given immediately, the Management should indicate the length of time needed for decision-making.

(e) *Implementation*

The implementation process involves QCC members

discussing with the facilitator on the various ways to implement the proposed solutions, which have been approved. Where necessary, a trial run can be undertaken. The members of the organisation should be informed of the trial run and the time period of the project. Even if there is no trial run, members of the organisation should also be informed of the project being undertaken. The information can be disseminated through a briefing session or a memorandum / circular letter can be sent to all members of the organisation.

Step 3 - Check

20. At this stage, the activity to be undertaken is evaluation. QCC members should carry out an evaluation of the proposed solution being undertaken. This will indicate whether the objective of the project has been attained or otherwise. The evolution can be carried out through data collection and analysis during the trial run. Once evaluation has been completed, the QCC members can decide whether to implement the proposed solution or otherwise.

Step 4 - Action

21. This forms the final stage of the P.D.C.A approach. The activity involved is the standardisation of the corrective action. As a result of the evolution undertaken, QCC members will be able to identify the improvements arising out of the corrective action taken. If there are improvements, then QCC members can standardise the action implemented and make it a part of the procedure or operations of the department / office. A briefing on the new procedure should be given to other members of the department / office. QCC members could also check on the possibility of the causes of the problem recurring or other side effects that may arise.

Conducting Meetings

22. QCC activities are carried out by holding regular meetings. The QCC should give attention to various matters to ensure that these meetings are conducted effectively, namely:

(a) Having an agenda;

(b) Establishing procedures to be followed by all QCC members;

(c) Ensuring clear objective setting for each meeting;

(d) Allocating duties to each QCC member; and

(e) Preparing minutes of meetings.

V. PROBLEM-SOLVING TECHNIQUES

23. In solving problems, QCC members can use various techniques. The use of various techniques must be supported with accurate information and data. Data and information collection is the most important step in the problem-solving process. Lack of necessary data and information or insufficient data could lead to a situation where decisions or corrective action cannot be implemented effectively. Data and information should be collected for the following purposes:

(a) To understand the actual situation and to support or reinforce an option; and

(b) To establish the relationship between the problem and its causes.

DATA COLLECTION METHOD

24. Data can be collected using five methods, namely:

(a) Interviews;
(b) Questionnaires;
(c) Observation;
(d) From reports; and
(e) From complaints by the public.

25. The data collected should be recorded including information on the date of collection, method of collection and the individual who collated the data. The data must be recorded in a manner, which facilitates its use that is, it must be arranged in specific categories. For example, it should be categorised according to the four management resources namely, man, method, material and machine.

Sampling Techniques

26. In data collection, samples are used. This involves the collection of data from a small proportion of the total population involved. The sampling techniques generally used are:

(a) *Random Sampling*

This process involves the random selection of the sample units. The selection can be made by the use of a random number through table or lists of names to prevent any bias.

(b) *Systematic Sampling*

This process involves the systematic selection of the sample to be used. For example, choosing every tenth name from a list of names.

(c) *Stratified Sampling*

This process involves the selection of the sample according to specific categories such as age, sex and income group, etc.

27. QCC members may use various techniques in the problem solving process. The techniques generally used include the following:

(a) Brainstorming;
(b) Cause and Effect Analysis;
(c) Check-sheets;
(d) Pareto Analysis;
(e) Bar Charts;
(f) Pie Charts;
(g) Histograms; and
(h) Process Analysis.

(a) *Brainstorming*

Brainstorming can be defined as the methodology used to encourage every individual in the Circle to express freely their opinions or give ideas in an open discussion.

Brainstorming can be used to list down all the problems faced by an organisation, their causes and the potential effects if a certain suggestion is implemented.

To ensure the success of the brainstorming process, it is important for the Circle to follow the following rules:

(i) The subject for brainstorming should be clear and accurate. For example, members may brainstorm to identify the causes and reasons why a certain task cannot be completed on schedule.

(ii) Each member will give only one opinion / idea at each turn regardless of the number of ideas he / she may have.

(iii) A tension-free atmosphere must be maintained to

encourage free expression of ideas.

(iv) Every idea expressed should be written on the black / white board, flip chart or noted down by a secretary.

(v) At the end of the brainstorming session, all the ideas expressed should be evaluated one by one and short-listed.

(iv) Voting is used to list the ideas according to priority. The prioritisation is based on the number of votes received for each idea.

(b) *Cause and Effect Analysis*

The Cause and Effect Analysis is also known as the Fish-Bone Analysis. This technique is used to analyse problems with the identification of causes of a problem through brainstorming. This technique is easy to use as it summarises, arranges and explains all the causes of a problem which has been identified in the form of a diagram. It also allows for the identification of many possible causes of a problem. There are five steps in the construction of a Cause and Effect Diagram.

Step 1: Identify a Problem

The first step is to identify the problem and to state the problem accurately. For example the problem identified is "Reports Cannot be Printed Within The Time Period Specified". Start the Cause and Effect Diagram with an arrow pointing from left to right towards the problem that has been identified, as in *Diagram 4*.

DIAGRAM 4 : PROBLEM INDENTIFICATION

EFFECT

CAUSE --------> Reports Cannot be Printed Within The Time Period Specified

Step 2: Determine the Main Causes

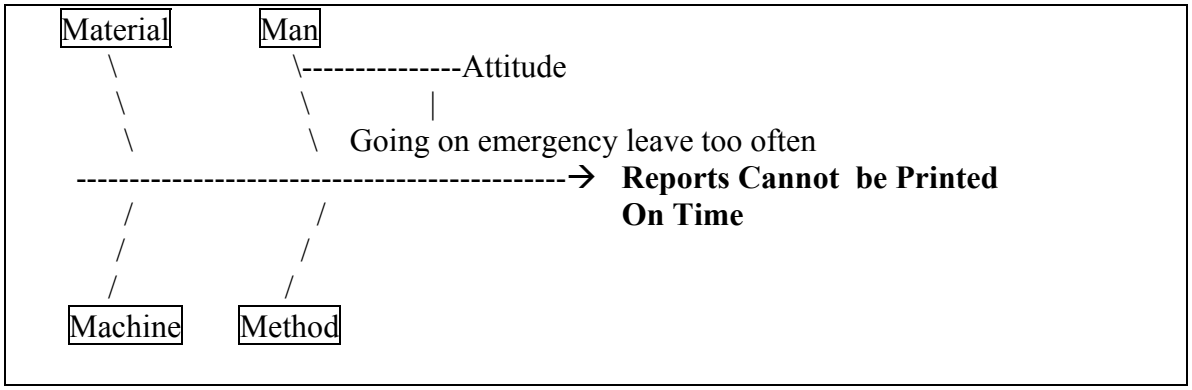
A problem is caused by various factors. These factors can be categorised according to the resources of production such as man, machine, material and method as shown in *Diagram 5*.

DIAGRAM 5: DETERMINING THE MAIN CAUSES

Step 3: Determine the Sub-Causes under The Main Causes

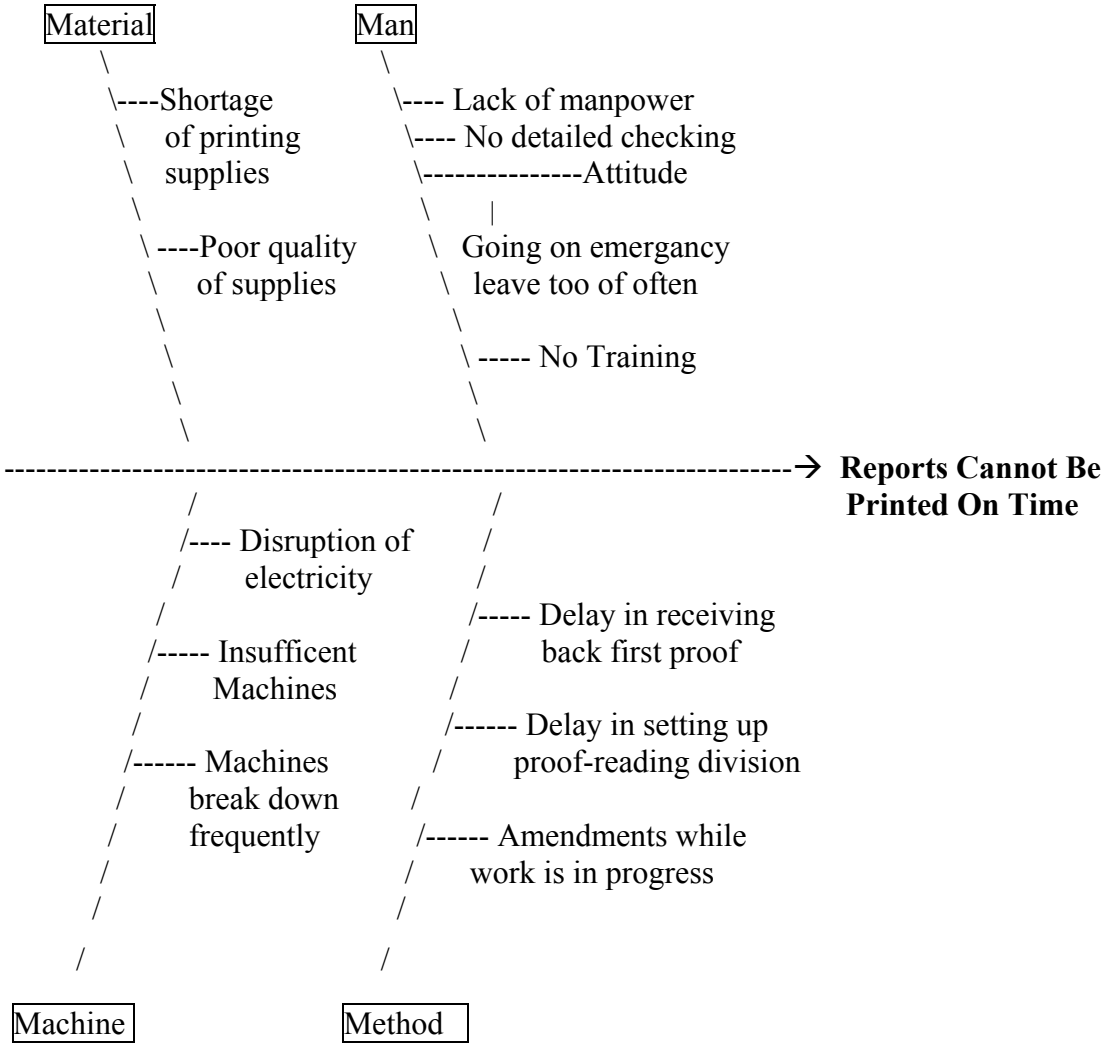
Through a process of brainstorming, the sub-causes of the problem are identified and entered below the appropriate main causes. Where possible, the sub-causes are further broken down into more detailed sub-sub-causes as shown in *Diagram 6*.

DIAGRAM 6: DETERMINING THE SUB-CAUSES



For instance, the sub-cause to the main "Man" is "attitude" and "Going on emergency leave too often" is the sub-sub-cause. This is because a negative attitude results in an officer going on emergency leave too often. Once all the sub-causes and the sub-sub causes have been identified, the Cause and Effect Diagram will appear as in *Diagram 7*.

DIAGRAM 7: THE COMPLETED DIAGRAM ESTABLISHING THE SUB-CAUSES



Step 4: Verify Actual Causes

This can be done through two ways, namely through the use of data or by allowing each Circle member to vote on every cause, which they think, is important. If voting is used, the votes should be recorded in the Cause and Effect Diagram. The actual causes (that is those that receive the most number of votes) are circled. At this stage, the Cause and Effect Diagram will appear as in *Diagram 8.*

Step 5: Prioritisation of Sub-Causes

Additional data on each sub-cause and each sub-sub-cause, which have been circled are collected to choose one or more main cause. These causes are then arranged in order of priority through a voting process. This is shown as in *Diagram 9.*

Points To Be Noted

In preparing the Cause and Effect Diagram, the following points should be given attention:

(i) This technique is not suitable in cases where the problem is easy to solve or its causes / solution are apparent.

(ii) During the brainstorming process to identity the causes of a certain problem, the focus should be on the causes only and not on the solutions.

(iii) Use the questioning technique when Circle members face difficulties in completing the diagram by, using words such as "what", "why", "where", "when", "who" and "how", and

(iv) Use a separate Cause and Effect Diagram for each problem.

(c) Check-sheets

Check-sheets are used to record data in a more orderly and systematic manner according to the frequency of occurrence of the problem or its causes. The steps involved in preparing a check-sheet are as follows:

Step 1: Designing A Check-sheet For Data Collection

At this step, members will collect data related to the frequency of occurrence of each sub-cause identified in a pre-determined format. For example, the problem identified may be "Loss of Items From Lodging Rooms" and the sub-causes leading to these problems have been identified as in *Table 2.* Data on each of these sub-causes are listed according to the week in which they occurred. An example is shown in *Table 2.*

Step 2: Summarising The Data Collected

Data on each of the sub-causes can be collected for a specified number of days, weeks or months using a check-sheet. In view of the fact that many check-sheets will be used in data collection, all the data gathered should be summarised into one check-sheet as shown in *Table 3.*

Step 3: Relative Frequency and Cumulative Frequency

The data presented in *Table 3* can be rearranged in a descending order. The relative as well as the cumulative frequency can also be calculated as shown in *Table 4*.

The use of check-sheets is more effective if Circle members:

(i) Are clearly aware of the purpose of the data collection;

(ii) Collect data with care and accuracy;

(iii) Choose an appropriate type of check-sheet;

(iv) Design a suitable format as well as instructions on the use of the form;

(v) Identify the person responsible for recording the data for a specific time period; and

(vi) Determine the sample size.

(d) Pareto Analysis

The Pareto Analysis is the most frequently used methodology for data analysis by Circle members. The Pareto Diagram is a special kind of graph, which shows data in the form of vertical or bars in a descending order of length. This diagram shows the major causes of a problem. The tallest indicates the most important cause followed by other main causes. With this, attention can be given to overcoming the major causes of a problem.

The Pareto Diagram can also be used to confirm a certain decision, that is by comparing diagrams based on information before and after corrective action has been taken. The effectiveness of the corrective action can then be established.

The Pareto Diagram is based on the Pareto principle, which is also known as "80-20 Rule". This principle shows that usually a small number of activities can cause numerous problems, or produce the most results. As an example, 80% of typing errors are caused by 20% of the typists or 80% of sales of a company are made by 20% of the sales personnel. This means that scarce resources should be directed towards the most important areas or aspects.

The Pareto Diagram can be prepared based on the data collected as in *Table 4*. The types of data is shown on the horizontal axis whereas the frequency of occurrence is on the left vertical axis. The cumulative frequency in the form of percentages is indicated on the right vertical axis.

A Pareto Diagram indicating the frequency of each item is presented in *Diagram 10.*

The cumulative frequency curve is plotted as follows:

(i) Start at zero point and connect the line to the right-hand corner of the first bar, that is at level 121, with a straight line;

(ii) Connect the print at level 121 and the point at level 195;

(ii) Connect the point at level 195 to the point at level 246 and onwards to level 273 or 100% at the right-hand vertical axis.

A legend to the Pareto diagram should be prepared to indicate the sources of data / information as shown in *Table 5.*

The purpose of the legend is to explain the data as well as the sources from which the data / information was obtained. The data collected must be accurate because inaccurate data can lead to incorrect or wrong conclusions.

The Use of the Pareto Diagram

(i) The Pareto Diagram Is The First Step To Improve The Quality Of Work

The Pareto diagram is important because by examining the diagram, the reader can be made aware of the main causes of a certain problem. The tallest column indicates the main cause of a certain problem.

(ii) To Confirm Decisions

By comparing Pareto diagrams before and after corrective action, circle members will be able to confirm whether the correct course of action has been taken. This is shown in *Diagram 11.*

(e) *Bar Charts*

Bar charts can be used to indicate the importance of an event through

the frequency of occurrence of a problem. *Diagram 12* is an example of a Bar Chart which shows the number and type of complaints.

Methodology For Constructing Bar Charts

The vertical scale indicates quantity. If this begins at zero point, then the highest scale should be given. For example, if the highest figure on the scale is 978, then the maximum scale, which should be used, is 1000.

The bar chart need not be drawn to its full extent if big numbers are involved. It is sufficient to use a partial chart as shown in *Diagram 13.*

(f) *Pie Charts*

Pie charts are used to compare one quantity with another quantity. These charts are also convenient for comparing a particular data with its total. The steps involved in preparing a pie chart are as follows:

Step 1

The data collected is converted to percentage form and the number of degrees. This data is shown in *Table 6* and is converted to a Pie Chart as in *Diagram 14.*

Calculation of percentage and degrees.

$$\text{Percentage: } \frac{\text{Total number of units per specific item}}{\text{Total number of units}} \times 100$$

Item A = 35 /121 X 100 = 29%

The calculation using the above formula is made for other items namely B, C and D.

Degrees : One full circle = 360 = 100%

Thus 1% = 360 /100 = 3.60 degrees

Thus 29% for item A = 29% x 3.60 = 104 degrees

This process is continued to calculate the number of degrees for the other items namely B, C and D.

Step 2

Two concentric circles are drawn. The smaller circle indicates the total number of units that is 121 as in *Diagram 14.*

Step 3

The circle should be divided into sectors that is from A to D according to percentage as shown in *Diagram 14.*

Step 4

The sectors are arranged clock-wise starting from the 12 o'clock position. The arrangement is from the biggest / most to the smaller/ lesser. This chart should also provide information such as its date, purpose and other necessary information.

(g) Histograms

Histograms can be used to present data in an easy and effective manner. These are used to indicate the frequency of occurrence of the identified causes. The frequency is shown by the height of the columns in the histograms.

For example there are complaints in a Government agency that some of the workers come late to office. A histogram is prepared to depict this problem. The method of preparation is as follows:

Step 1: Determine The Number of Classes Required

Classes can be different as the arrangement of the data collected according to specific categories such as time or number of cases. Usually 5 to 20 classes can be used depending on the number of observations planned and the degree of accuracy required. In the above example, based on records from the punch-clock cards, it is found that there is no case of any worker clocking in after 8.45 a.m. Here, an arbitrary choice of 9 classes is made considering a range of 45 minutes.

Step 2: Establish Class Intervals

Class intervals are decided through comparison of the highest and the lowest value in the distribution with the number of classes selected. As in the example, anyone arriving in office after 8.00 am is late. The class interval for this example is:

$$(8.45 - 8.00) /9 = 45/9 = 5 \text{ minutes}$$

Step 3: Determine Class Boundaries

Class boundaries need to be determined starting with the lowest taking into consideration the smallest value and building on subsequent classes. Class boundaries should be selected to avoid situations where a certain value can be included in a certain class.

In this example, the classes chosen are:

8.01	-	8.05 minutes
8.06	-	8.10 minutes
8.11	-	8.15 minutes
8.16	-	8.20 minutes
8.21	-	8.25 minutes
8.26	-	8.30 minutes
8.31	-	8.35 minutes
8.36	-	8.40 minutes
8.41	-	8.45 minutes

Step 4: Use A Check-sheet To Collect Data

Once the class boundaries have been established as in Step 3, data can be collected according to the various classes using a check-sheet. For the examples being used, data can be collected from punch-clock cards for the past months. On the assumption that the Management has decided that data be collected from punch-clock cards for one day only, then the data collected using the check-sheet is as in *Table 7.*

Step 5: Transfer The Information From The Check-sheet To A Frequency Table

The information from the check-sheet needs to be transferred to a frequency table before a histogram can be prepared. The example of the frequency table is as in *Table 8.*

Step 6: Preparing A. Histogram

Based on the Frequency table above, a histogram can be prepared as in *Diagram 15.*

(i) The horizontal axis is a continuous scale showing the

selected classes;

(ii) For each class, a square vertical column is drawn starting from the lower class limit to the upper class limit;

(iii) There is no space between the columns in a histogram; and

(iv) The vertical axis shows the frequency that is the number of employees.

A Histogram can be used to draw conclusions and also to confirm whether a complain is justified or not. In the above example, a total of 187 employees were found to be late on the date concerned. However, all 187 arrived before 8.45 am. This indicates that 37.4% out of the total number of employees were late and therefore the complaint is justified. From the histogram, it can also be seen that 65 out of the 187 employees who came late, were late by 10 minutes only. One clear finding is that 25 employees were between 41- 45 minutes late.

(h) *Process Analysis*

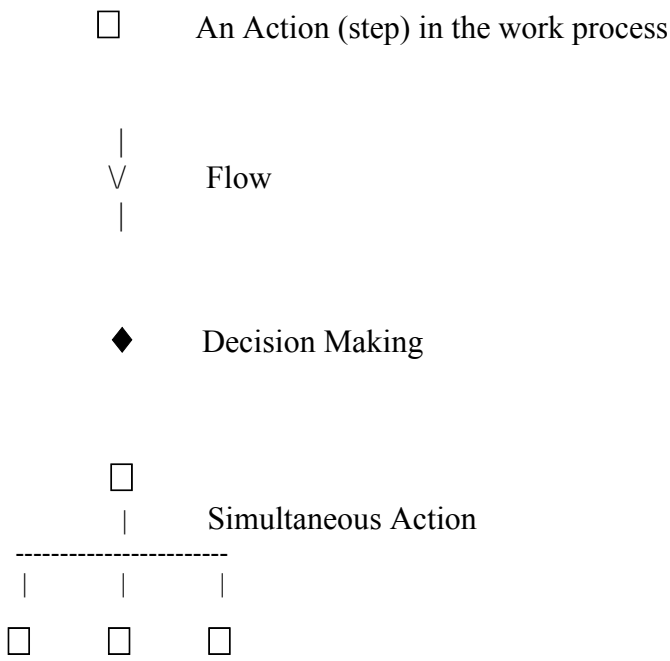
Sometimes the source of a problem found in a division or at one stage of a process could originate from other divisions or the preceding stage of the process. In such a situation, a technique that can be used to trace or identify the specific stage where the problem originates is the Process Analysis Technique. Process Analysis can be undertaken through Work Processes or Work Flow Charts.

A Work Process is a sequential chain of actions involved in carrying out a certain activity.

A Work Process ensures quality of work by way of pre-determined work standards. At the same time, a work process facilitates and streamlines the daily office routine as well as maintaining the level of efficiency and effectiveness of an employee's work. By analysing a Work Process, Circle members will be able to identify weaknesses or problems arising as well as the officers involved in the process. This is helpful to Circle members at the problem solving stage.

A Work Flow Chart should be prepared after the Work Process Chart has been completed. A Work Flow Chart is a graphical depiction or a diagram on all the actions involved in an activity or procedure. A Work Flow Chart is useful because it shows clearly each step or action which has to be taken in order of the correct sequence that is it shows in brief the starting point as well as the finishing point. Flow charts also help the

staff to understand their respective duties and responsibilities better as well as improving coordination between departments. Flow charts can also pinpoint areas of delay or bottlenecks as well as repetitive work. It also depicts the overall picture of the activity being undertaken. Specific symbols that are used in the preparation of a Flow Chart are:


An Action (step) in the work process
Flow
Decision Making
Simultaneous Action
Storage or No Further Action
Connector

The steps involved in the preparation of a Work Flow Chart, are as follows:

(i) Refer to the Work Process for the activity concerned.

(ii) Prepare a detailed Work Flow Chart based on the Work Process for that activity.

(iii) Use the symbols specified.

An example of the Work Flow Chart is as in *Diagram 16.*

Based on the Flow Chart and other information collected, Circle members can analyse the causes of problems guided by the following question:

(i) *What* are the steps involved ?

(ii) *Why* is this step important? Can a good service / product be produced without undertaking this step?

(iii) *Where* should this step be undertaken? Can it be carried out in an easier way and in a shorter time period, that is by rearranging the seating positions of officers or location of office equipment?

(iv) *When* should this step be carried out ? Is this step part of a continuous arrangement?
Can it be carried out earlier or later? Can it be further simplified or combined with other steps ?

(v) *Who* should be carrying out this task? Is it being undertaken by an officer who has the required skills / expertise or should the task be transferred to other officers?

(vi) *How* should this task be implemented? Can it be done in a better way? Should other office equipment be used or should the office layout be improved, such that the task can be carried out more easily by all those involved?

CONCLUSION

28. Government agencies which have not set up QCC to improve the quality of their output or services should immediately plan for and implement the QCC programme in an

orderly and systematic way. For those which have already done so, the Management is responsible to sustain the activity so that it becomes a part of their corporate culture.

DIAGRAM 3 : P.D.C.A APPROACH

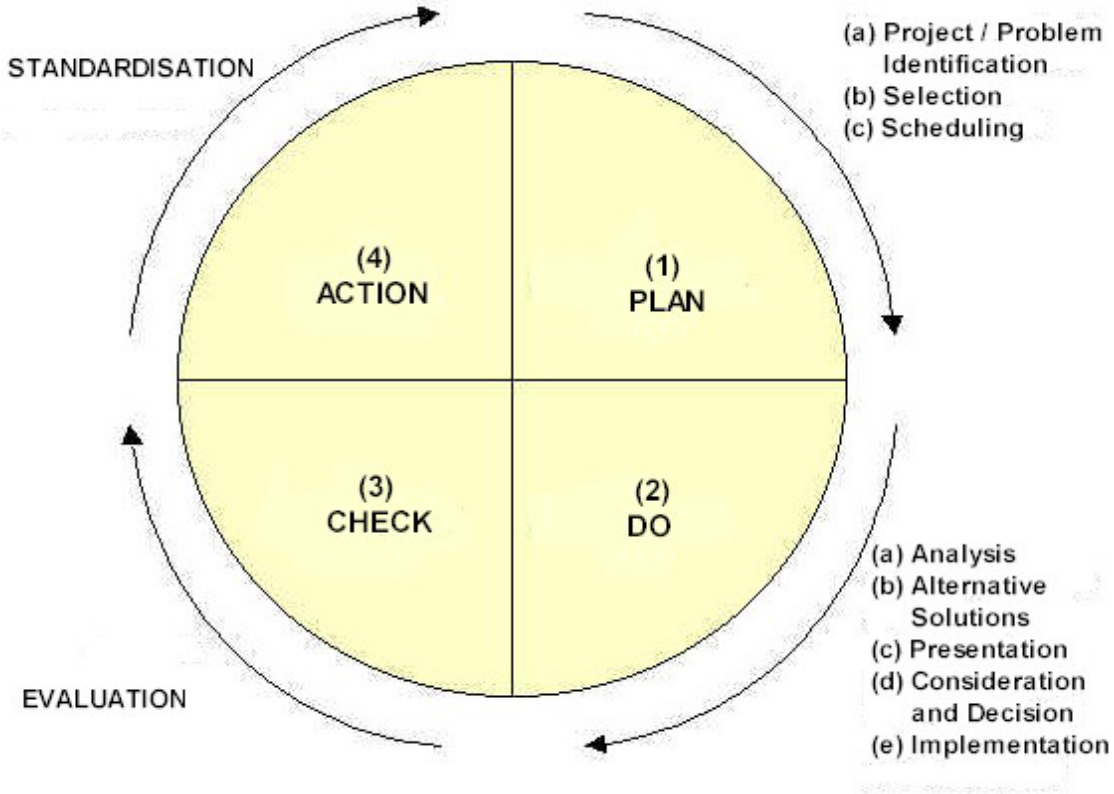


DIAGRAM 8 : VERIFYING THE ACTUAL CAUSES

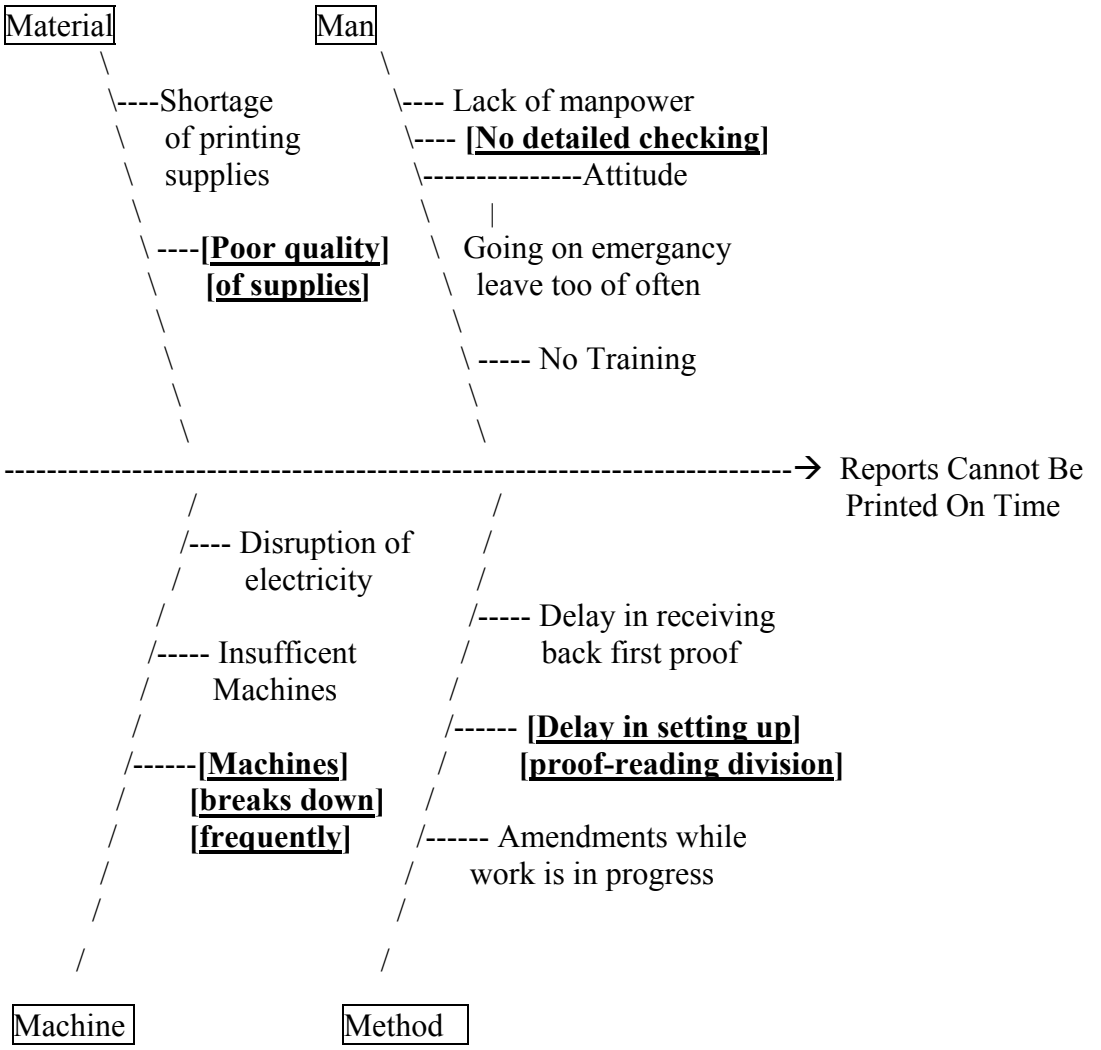


DIAGRAM 9 : ARRANGEMENT OF SUB-CAUSES ACCORDING TO PRIORITIES

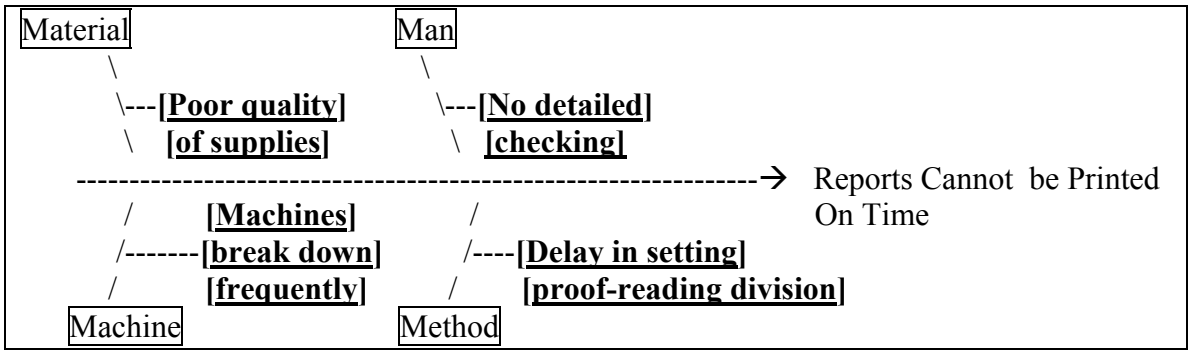


DIAGRAM 10 : PARETO DIAGRAM

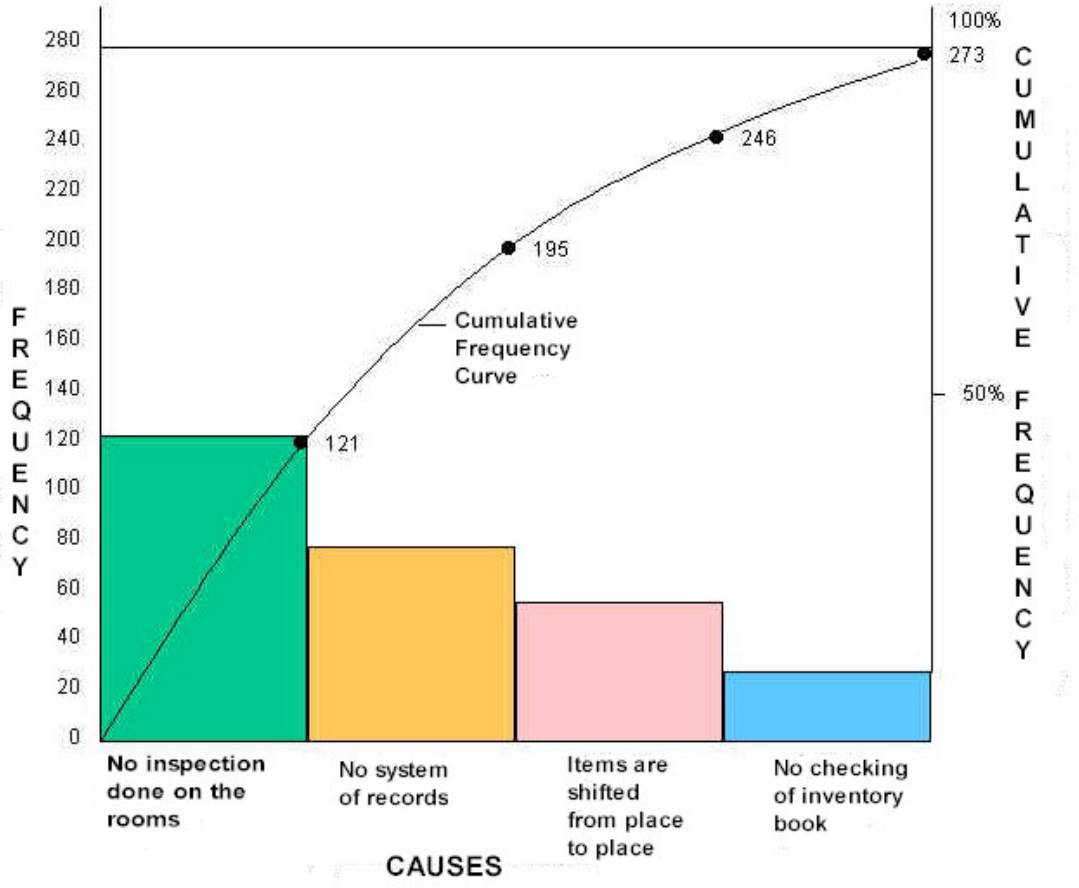


DIAGRAM 11 : COMPARISON OF PARETO CHART BEFORE AND AFTER CORRECTIVE ACTION HAS BEEN TAKEN

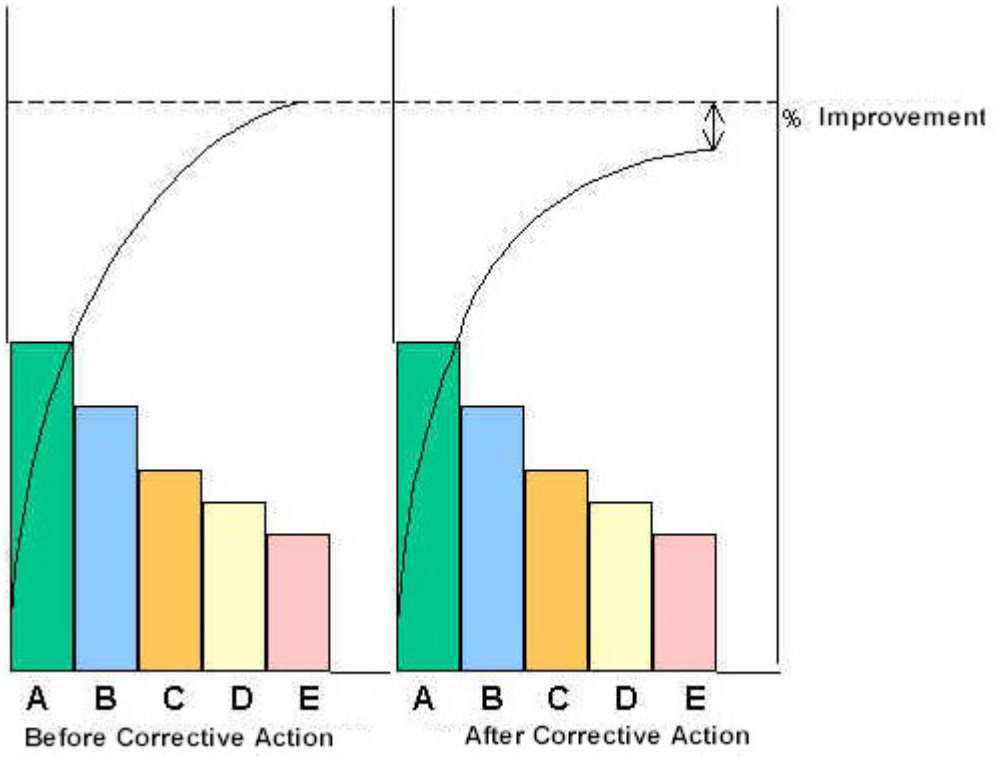
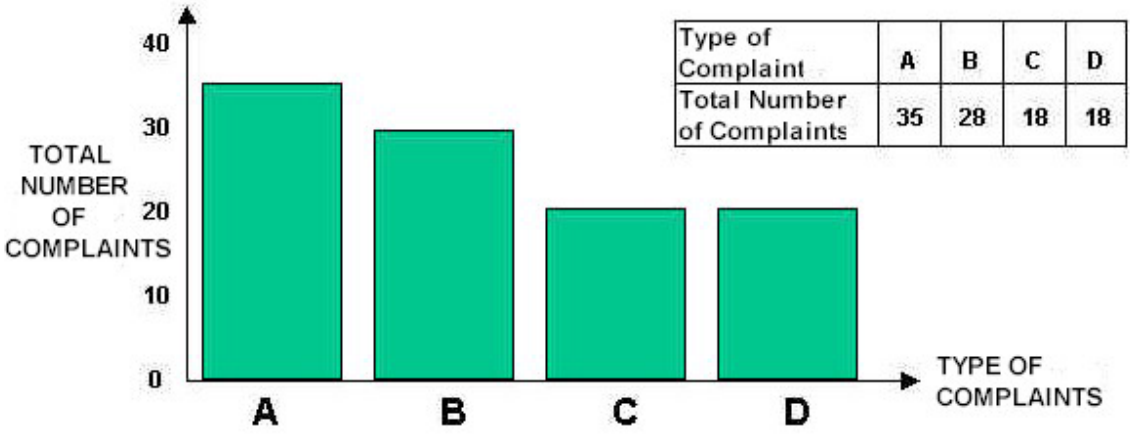


DIAGRAM 12 : EXAMPLE OF BAR CHART 1



Type of Complaint	A	B	C	D
Total Number of Complaints	35	28	18	18

DIAGRAM 13 : EXAMPLE OF BAR CHART 2

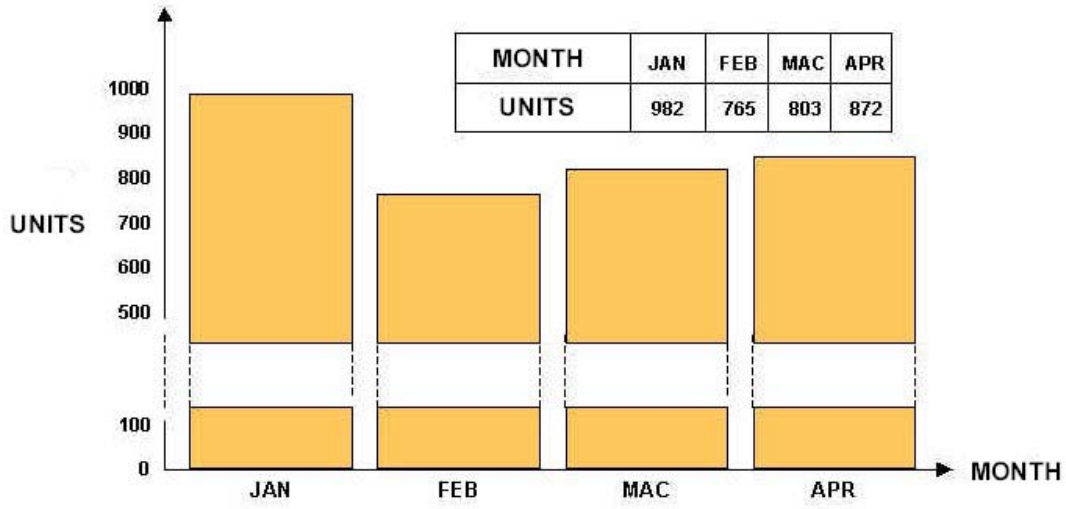


DIAGRAM 14 : AN EXAMPLE OF A PIE CHART

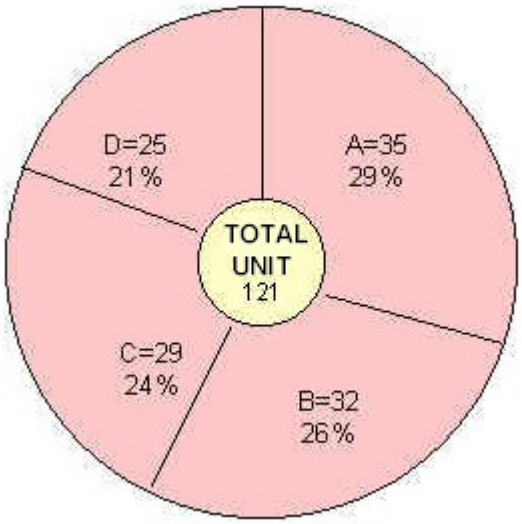


DIAGRAM 15 : HISTOGRAM – NUMBER OF LATE COMERS

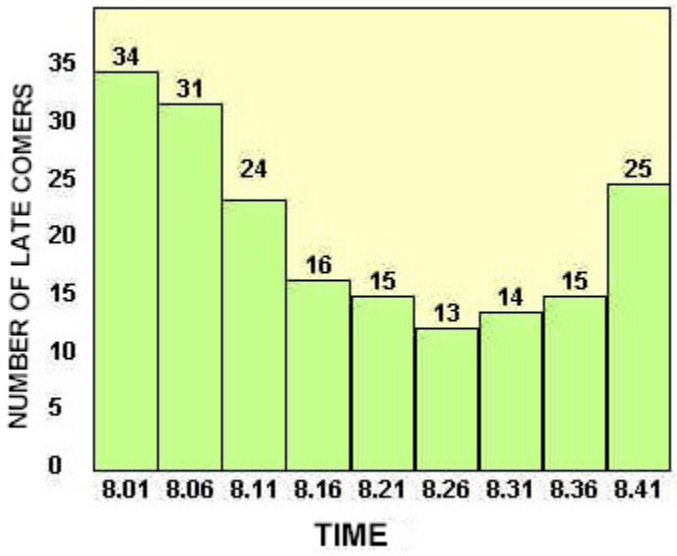


DIAGRAM 16 : EXAMPLE OF FLOW CHART FOR JOB CONFIRMATION ACTIVITY

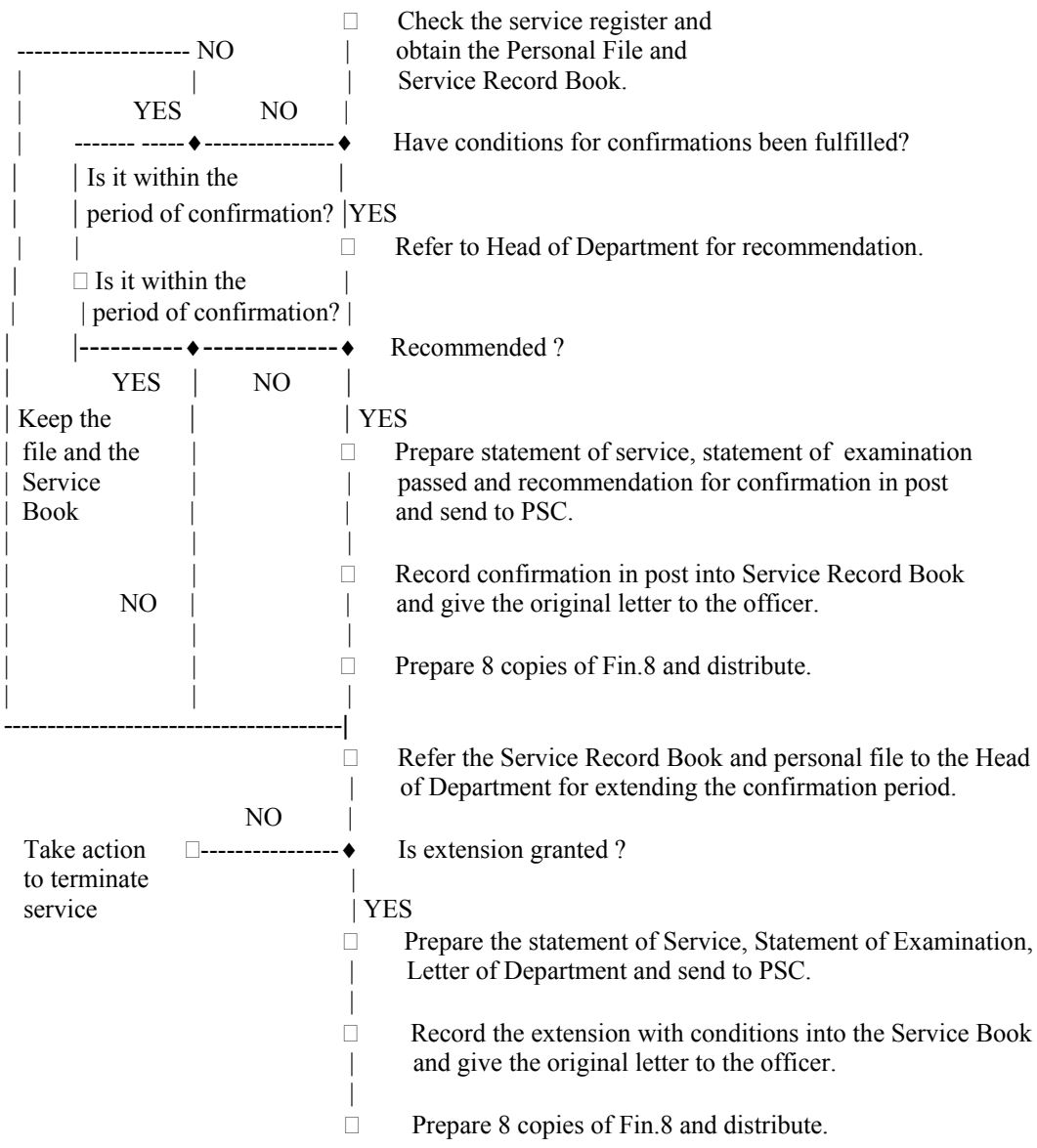
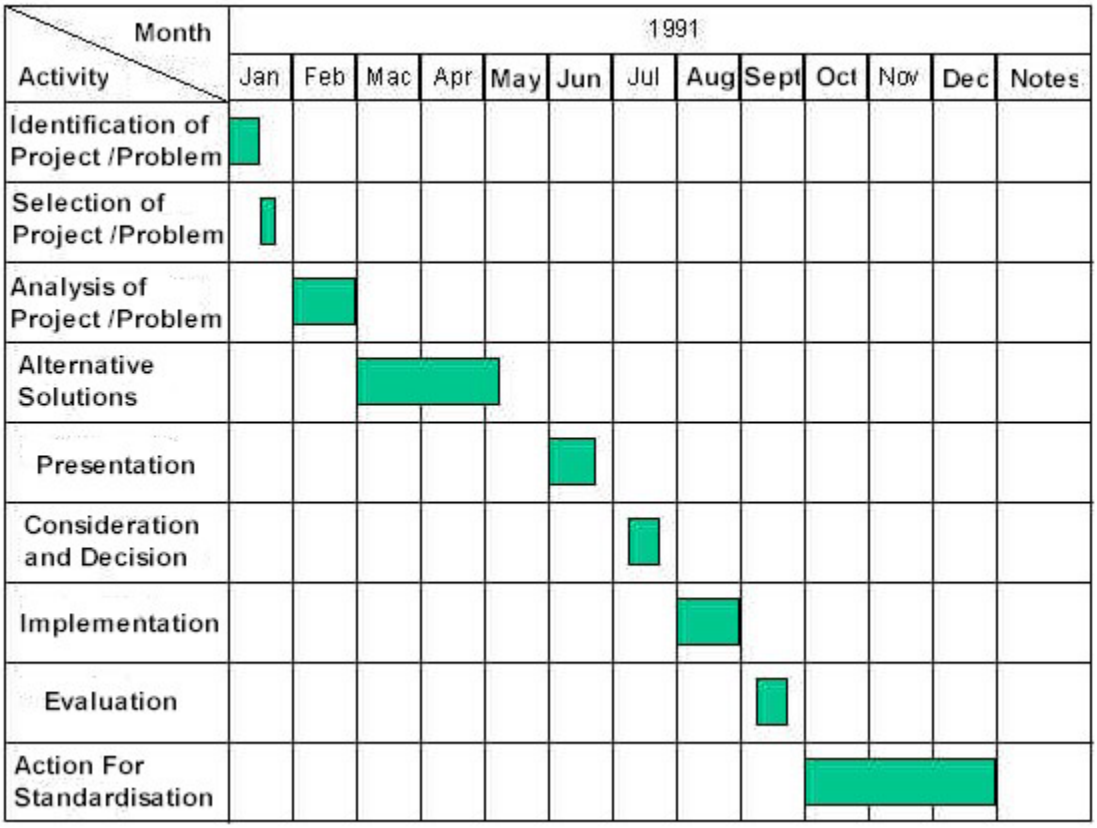


TABLE 1 : IMPLEMENTATION SCHEDULE FOR PROJECT / PROBLEM



Legend

□ Activities

TABLE 2 : FREQUENCY OF OCCURRENCE OF SUB-CAUSES

No.	Time period / Sub-causes	October — Week 1	Week 2	Week 3	Week 4	Week 5	
1.	No inspection of the rooms		/		//	/	4
2.	No system of records	/			/		2
3.	Items are shifted from place to place		//	/	///		6
4.	No checking of inventory book	//	/	///	////	//	12
	Total	3	4	4	10	3	24

TABLE 3 : SUMMARY CHECKSHEET

No.	Time period / Sub-causes	1987			Total
		Oct.	Nov	Dec.	
1.	No system of records	4	13	17	34
2.	No inspection of the rooms	2	26	93	121
3.	Items are shifted from place to place	6	15	30	51
4.	No checking of inventory book	12	10	5	27

Prepared by	**: Mr. A**
Date	**: 7 January 1988**
Place	**: Lodging Room**
Time Period	**: 3 months (October – December 1987)**
No. of course Participant Staying in	**: 444 persons**
Number of Courses	**: 12**
Methodology	**: Observation and Inspection**

TABLE 4 : RELATIVE AND CUMULATIVE FREQUENCY AND AVERAGE OCCURANCE (OCT. – DEC. 1987)

No.	Sub-causes	Total (Frequency of Occurance)	Percen-tage %	Cumulative Frequency
1.	No inspection of the rooms	121	44.32	121
2.	No system of records	74	27.11	195
3.	Items are shifted from place to place	51	18.68	246
4.	No checking of inventory book	27	9.89	273
		273	100	-------

TABLE 5: LEGEND TO PARETO DIAGRAM	
Problems / Project	*Loss of Items in Lodging Rooms*
Time Period	2 months
Date of Completion	1.1.91
Sources	Departmental Study

TABLE 6 : EXAMPLE OF A TABLE USED FOR PREPARING A PIE CHART

ITEM	*A*	*B*	*C*	*D*	*Total*
Unit	35	32	29	25	121
Percentage	29	26	24	21	100
Degree	104	94	86	76	360

TABLE 7: CHECKLIST ON TOTAL NUMBER OF LATE COMERS

Class (minute)	Frequency
8:01 - 8:05	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ////
8:06 - 8:10	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 /
8:11 - 8:15	𝍸 𝍸 𝍸 𝍸 ////
8:16 - 8:20	𝍸 𝍸 𝍸 /
8:21 - 8:25	𝍸 𝍸 𝍸
8:26 - 8:30	𝍸 𝍸 ///
8:31 - 8:35	𝍸 𝍸 ////
8:36 - 8:40	𝍸 𝍸 𝍸
8:41 - 8:45	𝍸 𝍸 𝍸 𝍸 𝍸

TABLE 8: FREQUENCY TABLE FOR TOTAL NUMBER OF LATE COMERS

Class (minute)	Total Number of Late Comers
8:01 - 8:05	34
8:06 - 8:10	31
8:11 - 8:15	24
8:16 - 8:20	16
8:21 - 8:25	15
8:26 - 8:30	13
8:31 - 8:35	14
8:36 - 8:40	15
8:41 - 8:45	25
Total	**187**