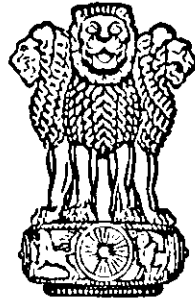


**REPORT**  
**OF**  
**CONSTRUCTION PLANT**  
**AND**  
**MACHINERY COMMITTEE**  
**1972**  
**VOL. I (REPORT)**



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**REPORT OF  
CONSTRUCTION PLANT AND MACHINERY COMMITTEE  
1972  
VOL. I (REPORT)**

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Central Water & Power Commission  
(Water Wing)  
Construction Plant & Machinery  
Committee, Bikaner House,  
Shahjehan Road, New Delhi-11,  
*the 30th June, 1972.*

My dear Sir,

It is almost 18 years since the first Construction Plant & Machinery Committee Report was published in 1954. Our report, second in sequence, is presented at a time when the complexity of construction jobs has increased and the equipment employed thereon has become more sophisticated and expensive.

The First Committee had the onerous responsibility of defining the Standard Practice to be followed by the river valley projects in planning, operation, maintenance and repair of equipment, accounting of costs and training of Operators and Mechanics. The main objective was to suggest an all-encompassing management role, so that all those employed on construction work get properly involved in increased productivity and economy and thus lead to the utmost benefit to the job at hand. This provided the guidelines for pre-planning of tasks/jobs by using a standard method—a method that would have been standardised within an organisation for the type of work under certain job conditions.

The Report of that Committee has been the book of reference for all major users of equipment in the country, even outside the river valley projects, since, in the mean while, the field of application of such equipment got extensively widened to cover land reclamation, the mining industry—coal, iron ore, lignite, and other minerals and metals, road construction and port development etc.

With a view to sharing experience and pooling of information by all major users of equipment, our Committee was constituted, enlisting participation of nominated representatives of other major users—the N.M.D.C., the N.C.D.C., Ministry of Transport, D.G.B.R., and a leading manufacturer of equipment in public sector. Joint deliberations and visits to the works of users in different sectors acquainted the Committee with the techniques and methods employed in the country in management of operation, maintenance, repair and utilisation of equipment. The common problems faced by the equipment users in improving management and utilisation of equipment could thus be better identified and suggestions made for overcoming these.

It is our observation that the standard practices as previously recommended, have become more a matter of routine even though it should be normally expected that anyone intimately acquainted with the work being done would always have the opportunity to effectively devise new and better methods of doing the jobs more economically and faster.

In fact, there are areas of deficiencies and short-comings which have generally come in the way of satisfactory performance and utilisation of equipment. It was, therefore, necessary to elaborate the technical details of subjects covered by the terms of reference so that the subject of 'Equipment Economics' is better understood.

The task assigned to our Committee, as specified in the terms of reference, is more of the nature of a general study about the deficiencies and shortcomings, reasons contributing to the same and the measures/methods necessary to improve the existing position. Accordingly, it has been our attempt to suggest ways and means to improve the existing methods of work, so that less physical effort is required to achieve a reasonable productivity from the machines for the wages and other costs incurred. Some of the suggestions may seem rather elementary and a sophisticated person may pass them by. Some may even consider the suggestions as an insult to a reasonable man's intelligence. These are only common reactions and attitudes. We are well aware of the common belief on part of some that "No one could solve their problems, but themselves." Those managing equipment operations are often heard to say, "My work is different". This would not mean that the whole concept of methods improvement is being summarily dismissed in the belief that they are already accomplishing the same results without the bother of any organised, or formal techniques for methods improvement. The acceptance of scheduling techniques, such as 'CPM', and 'PERT' by construction agencies/projects and the testimony of significant savings in time and more through their use, are proof that new ideas are not always ignored. Evidently, the organisations use the overall job planning techniques; but only few take the next step to organise and plan the tasks in different segments of work. The techniques for task planning, closely parallel those of project planning, now in wide use. They involve a detailed consideration of the site, tools, man-power and tasks. Ideally, most operations should be preplanned. Realistically, however, planning is applied as a corrective action only after a loss or poor organisation became apparent.

In order that planning of equipment is done more realistically in future, by all major users of equipment, it would be necessary to establish a suitable coordination system for exchange of technical information and for mutual sharing of experience in operation, repair, maintenance and overhaul of equipment. We are fully convinced that a suitable organisation has to be created at one focal point for effective coordination of this type, so that the common problems can be solved in a simple manner by collective thinking, participation, and joint actions. Such means of communication would give an incentive for work improvement methods and techniques—time and methods studies, operations research, work sampling, etc., etc., to be put to use. Unfortunately, such techniques are not in use as widely as we may desire. This organisation will also be the Coordinating Agency on behalf of the major users of equipment for matters relating to: import trade control policies and procedures; indigeneous manufacture of equipment and spare parts of proper design and quality; preparation of a central record of norms and standards for production with different types and categories of machines; their costs—operational, repair, maintenance, etc.; simplification of procedures for procurement of spare parts and equipment; enforcement of formalised training programmes; review of information on inter-changeability of parts; standardisation of equipment etc., etc.

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We have accordingly, suggested the constitution of a Standing Committee of Equipment Planning, comprised of members to be nominated by the major sectors using such construction plant and equipment on a large scale. The Irrigation and Power Sector being the major user of such equipment (they own equipment worth Rs. 1400 million out of a total of Rs. 3500 million worth of equipment in the country) may establish the proposed Committee in consultation with other departments/public sector undertakings who will be listed as partners in this.

The effectiveness of the work to be done by this Committee could be achieved only if the equipment operating authorities follow a proper method of record keeping in relation to all activities of the equipment in use. Even though there is a greater awareness in the mind of an average equipment user, for entailing economy to equipment operations, an analytical approach is not made by them for cost evaluation and cost effectiveness, based on defect analysis reports relative to machines in use. This is a direct handicap resulting from poor record keeping.

Another subject for joint venture or mutual participation by all is the training of operators, mechanics and supervisory personnel. For proper control in establishment and operation of Technical Training Centres, to impart formalised training to Operators and Mechanics, whether in the I&P Sector, or under the aegis of other important sectors using such equipment, it has been suggested that a Governing Body be constituted comprised of members from the I&P Sector, mining sector, the road building sector the Planning Commission and the Ministry of Finance. This organisation will review the curricula and syllabi of the training courses in the Technical Training Centres, with a view to enforcing uniformity in standard of education in this field. The envisaged participation and partnership of all major users of equipment would help produce better standards of training.

It is also our opinion that, in addition to the training of Operators and Mechanics, is necessary to train Supervisors and other executives in the Technical Training Centres, so that they can have a better control on operation and repair activities while equipment is on the job.

From the management angle the supervisory and executive personnel managing operation, maintenance, repair and overhaul of equipment, should necessarily familiarise themselves with other important aspects relating to equipment selection, job application, work improvement methods, time and methods studies, operation, maintenance and repair techniques etc., etc. Such training can be imparted by introducing training courses of 6 to 8 weeks duration in the CW & PC. The trainers in this case would be selected from different sectors using large sized fleets of such equipment, so that the instructions imparted are beneficial to all the trainees by keeping them fully abreast with the latest trends in development of methods and techniques of proper used and control of modern sophisticated equipment.

It is encouraging to observe that the need for formalised training of Operators and Mechanics has been admitted by all; and some of the major sectors have expressed their desire to establish T.T.Cs., under their own control. Whereas, it would be more beneficial to continue such training programmes as a joint venture, in the event of others establishing such institutes individually, exclusive consideration has to be given to the

running and maintenance of the T.T.Cs. of the CW&PC. Unfortunately, questions have been raised in the past about the need for continuance of our T.T.Cs. These have mainly involved the financial expenditure aspect, specially when the river valley projects have shown some reluctance in sponsoring the trainees for such training. Exclusive consideration has, therefore, been given to establish active association and partnership of all the river valley projects in the country, so that running and maintenance of the T.T.Cs. and organising a continuous training programme could get a firm footing.

Besides suggesting replacement of present equipment in the Training Centres by equipment models of more recent origin, a recommendation has been made to provide for the expenditure on training of Operators and Mechanics, as well as supervisors and other executive staff, by making a provision in the project estimates at the rate of one-fourth to one-half of one per cent of the estimated cost of the project, 50% of this provision may be utilised by the project authorities for in-service-training expenditure while the balance amount of provision may accommodate the expenditure on training through the Technical Training Centres and the training facilities to be organised by CW&PC for training of supervisors and executives.

On the training aspect, we would also suggest that six model projects/work sites of production unit making large scale use of equipment in different sectors, should be selected for deputing officers to take training in mechanised construction methods and management of operations with equipment. This may be on the same pattern as that of training abroad in the past of some of the engineers in this field.

We are also convinced that the skill and technical know-how of the Indian Engineers matches their counterparts in foreign countries in relation to modern methods and techniques of construction/production with construction plant and equipment. What is required is more meticulous planning of work with equipment and better efficiency in management thereof, which alone can entail economy in construction/production costs. Emphasis is therefore, to be laid on creating proper organisation for equipment management and administration. Organisation is the machine of management, and unless it function properly, it may be difficult to achieve the required efficiency. The present pattern of such organisation indicates divided responsibility, delegation of authority not commensurate with responsibility, not too effective coordination of activities and lesser emphasis on specialisation. For equipment management and administration to be successful, it is necessary to reorient its pattern on unitary control basis, so that functionally the entire process of equipment planning, operation, maintenance, repair etc., to the point of discarding the equipment at the end of its economic life, may be assigned to a well-knit equipment organisation. What is required is frictionless inter-divisional activities within the organisation, and the assignment of responsibility with commensurate authority to competent persons who have specialised in the work with equipment.

This assumes much greater importance in the context of the envisaged programme of development in the country in future. The working paper on 'Approach to the Fifth Plan' underlines the need for more concerted action in achieving the targets in various fields of production, when the outlay is expected to be twice as much as for the 4th plant Schemes. The growth in population of equipment in the country in the next five years

may, therefore, be expected to be greater than ever before. It is, therefore, more important now to strengthen the organisations managing the equipment in different sectors, so that their efforts are properly directed to reduce investments, ensure greater productivity from the machines by more meticulous planning of equipment operations and better availability through proper operation, maintenance preventive maintenance and repair of equipment. We have accordingly, made suggestions in our report for evolving a proper pattern of the equipment organisation.

In substance and in essence, the recommendations made by the first Construction Plant and Machinery Committee and our Committee, are similar. The difference is in the details and text of the subjects covered by them. As already stated, our report has been made more elaborate than the previous one, so that individual recommendations are better understood in proper context by an average user of equipment. Even so, unless an average user of equipment implements the recommendations in actual practice, it may be difficult to expect much of improvement in performance and utilisation of equipment. We consider it necessary that every major sector using equipment should create a top level equipment management and coordination organisation for this purposes.

It is also necessary that for ensuring greater awareness in the minds of equipment users regarding cost evaluation and cost effectiveness, the accounting system relating to ownership and operating costs of equipment should be suitably modified. The old PWD system of accounting should undergo a change to accommodate partially the commercial pattern which affords the convenience of "Ready at a Glance Reckoning" and evaluation of costs in different segments of work with equipment. The notional approach to balance the actual costs with estimated costs by apportioning a part of the expenditure not incurred to the cost of work, has to be dispensed with. Moreover, better control has to be exercised in preparing financial budgets and control estimates in respect of spare parts which account for expenditure equivalent to 100% to 300% of the cost of the machine, in their life-time in service. Simple apportioning of the cost of spare parts to the works through estimated hourly rates of use of the equipment does not afford the convenience of exercising proper control in expenditure.

Undoubtedly, accounting is a means of keeping a watch on economy in expenditure. In relation to equipment the main item of expenditure is the maintenance materials including spare parts. Investments can be reduced by regulating the size of stocks of spare parts by introducing the inventory control system, establishing a scale for provision of spare parts and scaling out requirements for procurement based on pattern of consumption. Unfortunately, the inventory control system has not been put to use properly, except by a very few users of equipment. Regarding the scale of provision of spare parts, the Committee have attempted to furnish guide lines based on evaluation of data and information collected from the users of equipment. As for the scale of consumption of spare parts, this can be better assessed by accumulating data and information relative to consumption of spare parts on given items of machines. Proper scaling of requirements of spare parts for forward planning of procurement thereof, can be as sound as the record indicating scale of consumption of individual items—atleast those of high value. It is gratifying to note that, in response to the few suggestions, the Committee could give in



this respect to the various users of equipment during the visits to their work sites in different sectors, some of them have already developed record keeping systems to establish a scale of consumption of items. Further action has to be taken on 'campaign basis' for effective introduction of this system in all equipment organisations.

There has been unanimity in the thinking on part of all Members of the Committee in the matter of establishing a Coordination Cell in the CW&PC for creating a central record of data and information on all aspects incidental to use of equipment working in different sectors in the country. Emphasis has also been laid on early establishment of a Plant Planning Directorate in the CW&PC. The Coordination Cell and the Plant Planning Directorate would provide the main support for technical examination of proposals and other items for consideration by the Standing Committee on Equipment Planning. Even otherwise, for economy in investment costs in equipment and its supporting facilities required for any project in the I&P Sector, proper functioning of the Plant Planning Directorate in the CW&PC is very essential. Unless this is done immediately, we will continue to face the rather disturbing position of underutilisation of equipment, disproportionately large investments in equipment, facilities and stocks of spare parts on the projects.

In conclusion, it may be stated that if we have to get wiser by the past experience in facing the realities of the present and fulfilling our aspirations of the future, we must admit the need for enforcement of measures to evaluate economy relative to every task in different segments of work with equipment and create a sound organisation for planning, execution and review of the tasks to be performed within its environments. Planning would need the prime attention in all its facets. Execution would involve work improvement methods and techniques with the main support of proper records. The defect analysis made from a well maintained record would enable proper cost evaluation and the consequent identification of measures for cost effectiveness. We are of strong conviction that even if thorough planning of the work at the inception of a project results in a small delay in execution, the resultant initial handicap in time will be made good by the expedition in work later. In any case, the total investment in expenditure will be comparatively reduced.

All this, of course, is subject to availability and allotment of adequate funds and foreign exchange which shall have to be provided in a sustained manner.

Great stress has been accordingly laid in the report and in the summary of recommendations, on following certain standard practices on planning, execution, and record keeping etc., in the relation to work with equipment.

It is piously hoped that suitable steps will be taken to implement the recommendations that have been made by this Committee. This will cause better utilisation of equipment in the country and reduce future investments in equipment, spare parts and other facilities. Generally required for proper operation and upkeep thereof. This would also help in avoiding further probe of the type made by our Committee—more so when the CW&PC through their central Coordination Cell, the Plant Planning Directorate and the Ministry of Irrigation and Power through the Standing Committee on Equipment

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Planning, would cause continuous updating of all information relating to equipment available in the country.

We foresee much brighter prospects even in the matter of identification of items of construction plant and Equipment to be indigenously manufactured in the country, as the Equipment Standing Committee would be able to give proper technical guidance necessary for the purpose, in selection of items of quality and proper standard for manufacture.

Normally, the Committee should have finalised their report only after their findings and observations had been discussed in a Seminar in which the representatives of major users of equipment, in different sectors, would have participated. This is what was done before the report of the First Committee was finalised. However, since a colossal amount of work was involved in relation to the terms of reference of the Committee, deliberations of the Committee continued upto the middle of June, 1972; and this delayed the finalisation of the draft report. Accordingly, it was not possible to arrange for a Seminar to be held.

All the same, the Members of the Committee individually and collectively discussed most of the important points of observations and recommendations in meetings with a large number of Engineers/Managers/Supervisors, controlling operations/management of equipment in different sectors. The observations and recommendations as now made are in general agreement with their views.

It may perhaps help in avoiding a bulk of correspondence work, which may arise from the references from users of equipment in different sectors (seeking clarifications or communicating their comments on the text or the recommendations in the report), if the report is discussed in a Seminar. The advisability of holding a Seminar may, therefore, be considered by the Government, before the report is accepted and got printed. The Members of the Committee would be very happy to participate in such a Seminar, if held.

I am grateful to you for the opportunity given to discuss the views of the Committee in certain policy matters of technical importance. This has been of immense help and gave us lot of encouragement in finalisation of our recommendations.

With regards,

Yours sincerely,

Sd/-

(S.P. CHUGH)

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