

Paper 1

INTRODUCTION

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Summary:

The Forestry Commission of Great Britain introduced formal work study in 1956. The first tasks were to improve harvesting and weeding operations by way of method study and the selection, after testing, of the best hand tools; techniques for work measurement in forest conditions were also established. From the early 1960's interest increasingly turned towards mechanisation and in 1966 the Work Study Branch became responsible for machinery research and development. The main concern is the development of improved methods but about 20% of our resources are spent in establishing output standards in the form of either tables of standard times or output guides. The nett effect of method improvement has been that total productivity in the Commission has risen by 64% compound annually in the period 1960-1970. Over the same period costs have been held constant in real terms. These productivity increases are by no means solely attributable to work study but are joint with Management, Research Division, Training Branch and men. We believe that this rate of productivity increase is sustainable for the next few years simply by installing the best and already known systems where they do not currently exist. Meanwhile we intend to turn our attention to highly mechanised harvesting systems and these should start to make a further impact on productivity in the mid 1970's.

1. The object of this course is to show something of the way in which Work Study has developed and is used in the United Kingdom. We have not reached the end of the development stage, nor do we suggest that our ways are necessarily the best ways. All we would claim is that we have evolved an organisation which appears to work reasonably well in practice and that we have selected those study techniques which, at the present time, seem most likely to give results.

2. Speaking generally, it is quite obvious that the study of work is a human activity which preceded by several millenia what we now call "Work Study". As in other fields of human endeavour the formal recognition of a technique or discipline—call it what you will—was preceded by centuries of intuitive probing, enlightened now and again by flashes of detached reasoning. We

have progressed to the stage where work is examined in accordance with certain principles. In other words the ways of studying work have themselves been studied and are, to a large degree, formalised. However, anyone who believes that this process has replaced, or is likely to replace, imaginative reasoning is deluding himself. Work Study is best regarded as a valuable aid to the inventive mind.

3. Before getting down to recognised fact it may be worth spending a little time considering, more controversially, the broad objectives of Work Study. The British Standard Definition¹ suggests that it aims "to effect improvement". This seemingly incontrovertible statement begs many questions; and to ask these questions is to enter the realms of philosophy. It would be tempting to do so but we have not the time. Perhaps we may grant *pro tem* that "improvement" is something we think we recognise when we see it. Nevertheless one must beware of the secondary effects of "improvement". In particular, job satisfaction should only give way slowly—if at all—to the pressures of, say, enhanced productivity. It is easier for us in the forest industry to say that, than for our colleagues in the manufacturing industries. Our environment, though tougher than most, is fundamentally interesting and varied. The challenge is always there.

4. So much for generalities and turning now to the history of Work Study in this country; After appropriate Headquarters discussions the Forestry Commission of Great Britain set about recruiting and training a number of work study men in 1956. The initial investigations were undertaken jointly by Commission staff and a firm of consulting engineers. Their first aim was to establish which of the commonly used industrial work study techniques fitted our particular problems. From the outset it was accepted that method study came first and that work measurement was a valuable bonus. We have not changed our views about this. Only rarely have we been inveigled into doing time studies without preliminary method study and the results have been something less than impressive. This is not to say that we are able to up-end existing methods completely (those who wait for complete answers wait for a long time) but nearly always useful changes can be made, and until these are made there is no point in doing detailed time studies.

5. Back in 1956-57 harvesting operations came first under scrutiny; this was in recognition of the ever-increasing quantities of wood becoming available from plantations reaching the thinning stage. Method improvements were largely concerned with the selection of better hand tools and their maintenance, together with work on horse extraction. Work measurement followed and tables of standard times were produced for a variety of felling and horse extraction situations. In the case of felling and branch removal the average volume of the trees in particular stands was demonstrated as the main parameter affecting the time for the job. This together with a tree shape factor (tariff number²) provided the best predictions of time for the job, but rarely did the data have the benefit of statistical analysis. Nevertheless it took us forward a stage.

6. As the work study effort expanded attention was given to two important silvicultural operations: weeding by hand and brashing (the removal of branches from standing trees up to about 2 m from the ground to give access to plantations). Again method study preceded work measurement and recommendations were made on tool selection and maintenance. Work measurement was tricky in both cases but, eventually, the important parameters were isolated and then used to provide numerical indices of difficulty; these, in turn, were associated with the time for the job.

7. At about this time the chainsaw began to enter our lives and, relatively slowly, replaced hand saws for the felling of larger trees. As the designers reduced the weight of chainsaws so their use spread to smaller and smaller trees, until today they are used everywhere. Snedding (debranching) by axe remained with us until the mid-sixties but then the light chainsaws began to replace axes. At the present time most snedding is by chainsaw.

8. Meanwhile the advent of double drum winches for ground skidding and cable cranes, resulted in major changes to harvesting systems. Associated with these changes were the developments in tractors—particularly forwarders and frame-steering machines but also improved agricultural tractors.

9. On the silvicultural front hand weeding began to give way to chemical control over large areas; tubed seedlings began to show promise and drainage and cultivation ploughs were improved.

10. Thus by the mid-sixties we were grappling with technological change on all fronts. Mechanisa-

tion became the order of the day and, whilst ad hoc improvements were not spurned, one thought more and more of total working systems.

11. In order not to be left behind by these changes the Commission decided to expand its work study branch. In 1964 there were four teams; by 1966 there were ten and, in recognition of the close association between method development and mechanisation, machinery research and development was placed under the control of the work study branch. We now feel that we have made substantial progress and require less staff to keep abreast of and initiate developments. Accordingly we are reducing our number of teams to five or six over the next year or two. Our present organisation is given in the charts appended to this paper.

12. Teams have been of two sorts: regional and special purpose. The former give a general service to a specific region but also have particular continuing lines of inquiry. Thus our Welsh team pays attention to deep drainage problems whilst giving a general service to Wales. Other teams have been recruited to answer specified problems and then disband. An example of this is our Roads team which has completed its work in about three years. The teams which remain are each located to cover a particular terrain type—and we have huge variations from flat, firm ground, through soft wet peats to mountains. The changes will result in the following approximate pattern:

Location	Main Team Functions
Northern Scotland	Mountain logging—especially cable cranes. Cultivation ploughing. Planting.
Borders between England and Scotland	Non-mountain logging—especially tractors. Restocking after felling.
Wales	Deep drainage. Mountain logging.
Southern England	Weeding and cleaning. Lowland logging.

13. Additionally we have an Experimental team whose task, in close association with our Research and Development staff, is to evaluate and modify machinery and develop harvesting systems.

14. The typical team consists of a leader who is normally a District Officer (forestry graduate) together with two to four team members who are usually Foresters. However officers from other disciplines have joined the branch in some numbers and have made most valuable contributions.

15. Potential team leaders now attend a ten-week course at a work study college and this is followed up by several months of practical work before they take charge of a team. Team members, who in the past had little more than internal

training, will have four-week courses at a work study college. Additionally we support and encourage attendance at appropriate short courses and seminars during an officer's work study career.

16. The effects on labour productivity of the work study effort are not easily separable from those of managers, research staff, economists and others but the following figures show what has happened²—

Index of Labour Productivity

Year:	1962	63	64	65	66	67	68	69-70
	100	98.2	100.5	106.1	110.1	117.0	138.1	160.1

This averages at 6½% compound improvement in labour productivity over the period reviewed, with some particularly large increases in the last years. Meanwhile costs per unit of output have increased at almost exactly the same rate as prices in the British economy as a whole. Thus the *real costs* of Forestry Commission output have remained constant.

17. In considering increases in productivity one must attempt to make some allowances for changes in specification which themselves result in less work, eg. widening planting spacings³. Evidence to date suggests that such changes may account for about 1% of the annual rise in productivity, indicating that the really fundamental changes have been due to the application of new techniques.

18. So far as we are concerned we do not think we have yet had the full benefit of the recent improvements. As they are increasingly applied by managers (aided by training officers) we feel that productivity will continue to rise at about the same rate for a few more years. At the same time

we hope to continue further to improve methods. In particular the virtually complete mechanisation of harvesting in fairly level terrain is a prospect which may come to pass over the next decade.

19. Not surprisingly the somewhat frantic period of change we have lived through has turned much of our thought towards the effect upon the worker of advancing mechanisation. In a word we have accepted the importance of ergonomics. You will read later about the ways in which we have tackled noise and vibration problems.

20. Finally in these days we are all very conscious of the environment. We believe that this is a matter of supreme importance but that, in most cases, forests are large enough and flexible enough to give multiple land use. Whilst nobody is ever likely to get all he thinks he wants, it seems that forests can fulfil commercial as well as recreational, amenity and conservation functions. It seems to us then by no means incompatible with environmental interests that we should continue to improve our operational efficiency.

References

1. British Standard 3138: 1969 No. 10001

Work Study is defined as:

"A management service based on those techniques, particularly method study and work measurement, which are used in the examination of human work in all its contexts, and which lead to the systematic investigation of all the resources and factors which affect the efficiency and economy of the situation being reviewed, in order to effect improvement."

2. Forestry Commission: Forest Record No 31. Tariff Tables by F. C. Hummel, G. M. Locke and J. P. Verel. HMSO, 1962.

3. FAO/ECE/ILO Joint Committee, Log/WP.1./60 March 1971: "Labour Productivity", by A. J. Grayson.