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REQUIREMENTS FOR CONTRIBUTIONS

Articles in the field of agricultural economics, suitable for publication in the journal, will be welcomed.

Articles should have a maximum length of 10 folio pages (including tables, graphs, etc.) typed in double spacing. Contributions, in the language preferred by the writer, should be submitted in triplicate to the Editor, c/o Department of Agricultural Economics and Marketing, Pretoria, and should reach him at least one month prior to date of publication.

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Contents

ENTREPRENEURSHIP AND THE UTILISATION OF LABOUR IN AGRICULTURE

by

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Tongaat Sugar Company Limited

INTRODUCTION

One of the problems facing world agriculture today is the low income of farmers. This, and other problems have led to a migration of farm workers to the cities, with a resultant increase in farm size[1 2 3].

This move towards larger agricultural operations will result in farmers playing the role of *manager* rather than *owner-operater*. It is suggested that herein lies the danger of further economic decline in agriculture, something that is already noticeable in the general lack of economies of scale now being exhibited on many large farms[4].

The writer feels that this situation could be due to:

1. The lesser motivation or degree of entrepreneurial spirit of the farm worker and manager compared to the owner-operator.

2. The serious lack of management skills on the part of most farmers, who are generally poorly educated.

Recent work conducted in the agricultural division of Tongaat Sugar Co. Limited suggests that both the motivation and managerial skills of managers of large agricultural sections can be significantly improved. This paper summarises the results obtained when a participative management style, in the form of management by objectives (MBO), was introduced to a sugar-cane agricultural enterprise. An attempt will be made to illustrate the improvement in motivation of section managers with the adoption of MBO to agriculture, by reference to reduced tractor operating costs. The development of managerial skills of section managers will be illustrated by reference to greatly improved utilisation of labour resulting directly from the application of the management principles of planning, organising, motivating and controlling.

1. Entrepreneurship or motivation in agriculture

1.1 Entrepreneurial spirit

The Oxford Concise Dictionary defines an entrepreneur as "a person in effective control of a commercial undertaking; or a contractor acting as an intermediary". However, this definition ignores the risk element in business, which is considered by many writers to be a fundamental part of entrepreneurship[5 6 7 8].

McClelland[9] summarised fifteen years of research into the human motives responsible for economic growth, and concluded that economic success and technological advancement depend on *achievement motivation*. He found that people with a high need for achievement (nAch) pursued challenging goals involving moderate risks and that their reward was a job well done. However, people with low nAch tended to be interested in peer acceptance, security, money and material possessions, and tended to avoid risks. There is much common ground in the findings of McClelland

1. Hofer, Charles W. (1965). Business policy: Text and cases: A note on the farm equipment industry. Irwin Inc., Homewood, 111. 184-219.
2. Marsh, J.S. (1971). The Mansholt plan, Farm Management, 1:11, 1-10.
3. Cubitt, G. (1973). Leaving the land — a world problem. Farmer's Weekly, Feb. 14, 28-31.
4. Department of Agricultural Economics and Marketing (1971). Economic advantages of large-scale production and size of units in agriculture.. (Editorial). Agrekon, 10 :4, 1 - 5.
5. Bradford, L.A. and Johnson, Glenn (1953). Farm management analysis. John Wiley & Sons, New York, 7-8.
6. Groenewald, J.A. and Burger, P.J. (1971). The measurement of managerial inputs in agriculture- I:Historical review. Agrekon, 10:2, 23-26.
7. Schumpeter, Joseph A. (1961). The theory of economics development, Translated by Redvers Opie. Oxford University Press, New York. Quoted by Groenewald and Burger (see 6 above).
8. Knight, Frank H. (1957). Risk, uncertainty and profit. (Eighth impression). Kelly and Millman, Inc., New York, 26-27.
9. McClelland, D.C. (1962). Business drive and national achievement. Harvard Business Review, 40:4, 99-112.

with other social scientists such as Maslow[10], whose well-known *hierarchy of needs* has been useful in explaining motivational forces of subordinates, and Herzberg[11] now famous for his work on *motivation – hygiene theory.*

According to Ardrey[12] the entrepreneurial spirit in agriculture is fostered in a system of private enterprise. In the USA one farm worker produces food for himself and almost 12 more people in the city; 92% of all Americans are fed by a rural 8% who also produce a food surplus of politically embarrassing dimensions. On the other hand, in the Soviet Union one worker in the field feeds one worker in the factory, whilst in China, under even more extreme Communist direction, it takes six men in the field to feed one man in industry. Ardrey also points out that the small remnants of private property remaining in Russia, which today average only one half of an acre in size, and which comprise only 3% of the total cultivated land in the USSR, nevertheless produce nearly half of the meat, milk and cheese, three quarters of the eggs and two thirds of the Russian staple food, potatoes. Ardrey also describes the kibbutz in Isreal as the only successful collective farm in the history of modern agriculture. However, he point out that a private farm only a few miles from one of the oldest and most respected of Israeli kibbutzim produced the same yields per acre with less than half the labour — and attributed the differences to the greater efforts by the *owners.*

Thus the formation of larger farm units may result in suboptimum levels of efficiency because they can lead to loss of personal ownership and also require high managerial skill. This can be expected because first, farm managers will probably be less motivated than owner-operators, and secondly, larger farms will require greater management skills; which are already lacking in the general farming population[13] [14].

1.2 Motivation by participative management

It is well-known that farmers exhibit particularly strong desires for independence. The farmer is almost notorious for his need to "do his own thing". It has been pointed out that workers who exhibit strong tendencies towards independence or who are themselves strongly autocratic, will respond well to participative management[15] [16] The particular characteristics of the participative management style have been noted by Greiner[17]. These include participative setting of objectives, decentralisation of authority, intermediate job reviews and rewards based on performance.

In the agricultural division of Tongaat Sugar Co. Limited, section managers have a particularly strong desire for independence. For this reason, a participative management style in the form of management by objectives (MBO) was introduced as a strategy to improve poor agricultural profits. Now in its third year of operation, signs of the success of MBO are clearly visible.

Perhaps the best example of success is the recent reduction in tractor operating costs. Prior to the introduction of MBO in the agricultural division, section managers would send their tractors to a central garage, where highly skilled mechanics carried out preventative maintenance servicing and all repairs. All actual tractor operating costs were charged to a "tractor pool account". A "recovery rate" was debited to each section account on the basis of a standard cost per litre of fuel used by tractors on the section. The recovery rate was calculated each year to balance the actual costs of the tractor pool account. The identity of each section was therefore concealed in the "pool". In Figure 1, the actual increase in tractor operating costs and the projected increase for the season 1973/74 is presented.

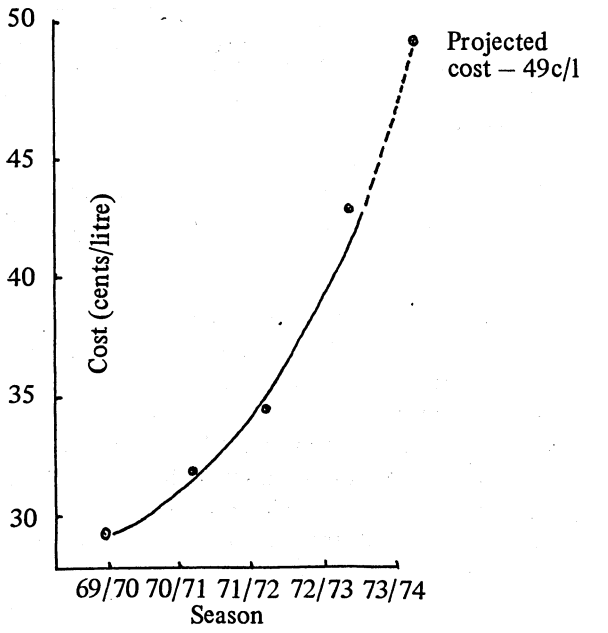


FIG. 1 – Actual and projected tractor operating costs at Tongaat

10. Maslow, A.H. (1954). Motivation and personality. Harper and Row, New York.
11. Herzberg, F. (1968). One more time: How do you motivate employees? Harvard Business Review, 46 : Jan/Feb. 53-62
12. Ardrey, Robert (1967). The territorial imperative. Collins, 128-132.
13. Groenewald, J.A. (1971). The state of South African agriculture a diagnosis. Agrekon, 10:, 12-26
14. Groenewald, J.A. (1973). A review of the quality of management in South African agriculture. Agrekon, 12:2, 38-46.
15. Tannenbaum, A.S. (1954). The relationship between personality and group structure. Unpub. Ph.D. thesis, Syracuse Univ.
16. Vroom, V.H. (1960). Some personality determinants of the effects of participation. Prentice-Hall Inc., Englewood Cliffs, New Jersey.
17. Greiner, Larry E. (1973). What managers think of participative leadership. Harvard Business Review, Mar/Apl. 111-117.

With the introduction of MBO, the concept of responsibility accounting was introduced on sections. The central tractor pool account was eliminated and each section manager became responsible for his own tractor operating costs which were charged to a section tractor pool account. In addition, servicing facilities were installed on each section, so that each manager then became responsible for his maintenance and servicing system. Section managers were given budget guidelines for the 1973/74 season and, through complete participation in the setting of their budgets, committed themselves to an average tractor operating rate of 43 cents per litre. This rate was equal to the previous season's actual operating cost. This new target was set in spite of warnings that the most severe inflation was expected.

At the end of the 1973/74 season, the average actual rate for all sections was 35 cents per litre. Since approximately one million litres of fuel were consumed, this reduction amounted to R80 000 on the *budgeted* cost (43c — 35c) and perhaps could be viewed as a reduction of R140 000 on the *expected* cost (49c — 35c). This reduction was achieved with very little capital expenditure. Only R12 000 was spent to equip the service bays on all sections. In addition, a qualified trainer mechanic was employed to train and upgrade the service mechanics. The total cost of training staff and equipping service bays amounted to less than R30 000. Thus it is evident that MBO, by the decentralisation of authority and by participative goal setting, *has resulted in a positive saving of more than R50 000 in one year.* This outstanding improvement in tractor operating costs is illustrated in Figure 2.

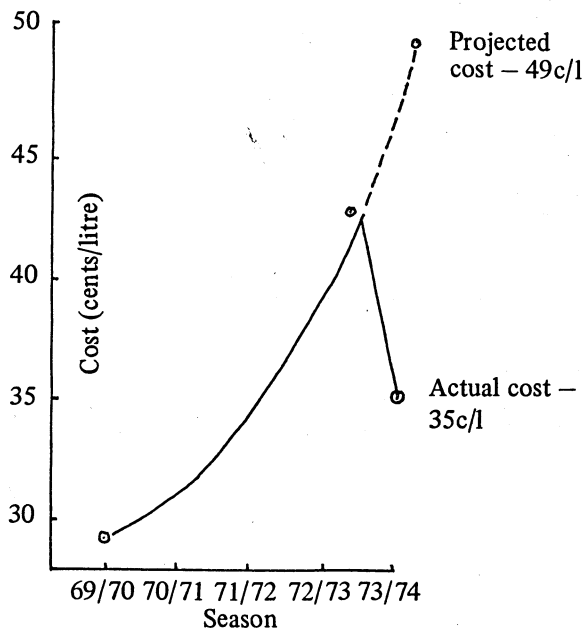


FIG. 2 – Saving in tractor operating costs

2. Managerial skills for effective utilisation of labour

If an entrepreneur is a person in effective control of a commercial undertaking, then another aspect of entrepreneurship is *managerial skill.* Burger[18] constructed and evaluated a scale to measure managerial aptitude. He concluded that competent farmers could be recognised by their ability for long-term projection and conceptual planning, and for short-term organisation. In a review of the quality of farm management in South Africa, Groenewald[19] concluded that farm management ability was low, and that the average formal education level of South African farmers was also low — two thirds having less than a standard 8 qualification. At Tongaat, the average formal education level of the 18 section and department managers in the agricultural division was standard 9, which equalled the average found by Cownie[20] for the sugar industry. However, these managers have been successfully trained to understand and apply the management processes of planning, organising, motivation and control. The improvement in management skill of section managers at Tongaat is illustrated in management skill of section managers at Tongaat is illustrated by the success with which they have implemented modern management processes to improve the utilisation of labour for their sugar-cane operations.

2.1 Planning labour utilisation

Labour constitutes the major resource in sugar-cane farming, accounting for almost half of total expenditure. By far the greatest difficulty experienced by farmers has been the matching of the seasonal workload with labour availability. Traditionally, the planting of sugar-cane commences in the spring and every effort is made to complete the planting programme by the end of November. However, during this period, weed competition, not only in the replanted fields, but also in all the harvested ratoon fields, becomes a very serious limiting factor and hence reduces crop yields. Nevertheless, the sugar farmer gives priority to his planting operation, turning a "blind eye" to the very serious weed infestation problem. Once the harvesting season is completed in January, he will direct all labour previously occupied on harvesting, to weed control in very heavily infested ratoon fields. The loss of yield has occurred and labour output in heavily infested fields is now ridiculously low. However, by the middle of the following winter, his weeds are well under control and his *overall* labour utilisation has been fairly reason-

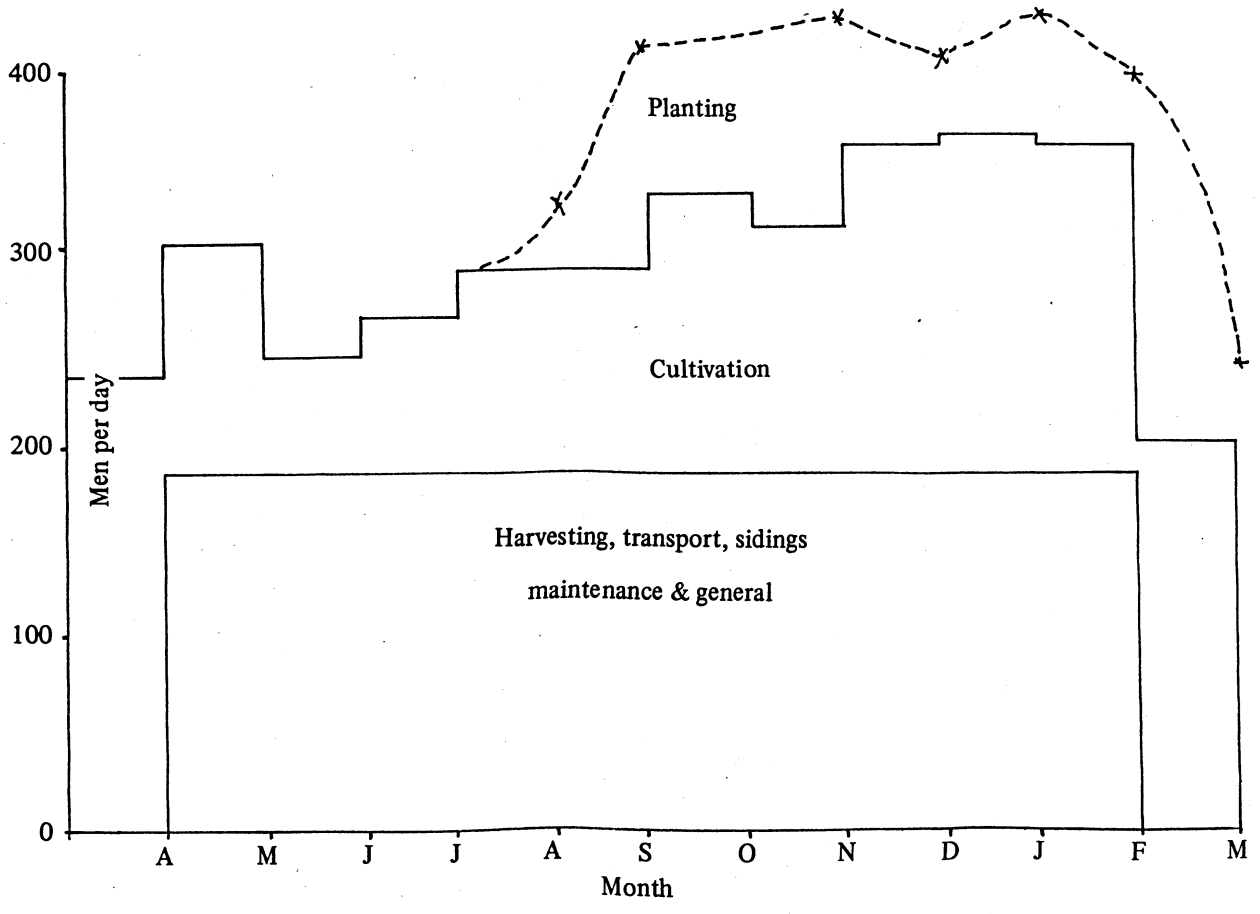
18. Burger, P.J. (1971). The measurement of managerial inputs in agriculture — III: The constuction and evaluation of a scale. Agrekon, 10:4, 5-11.
19. Groenewald, J.A. (1973). *op. cit.*
20. Cownie, P.J. (1965). The adoption of approved practices by sugar-cane farmers, Unpub. M.Agric. (Inst. Agrar) thesis. University of Pretoria.

able. Little cognisance, however, is taken of the effects of weed competition on the growth of sugar-cane and the large yield losses which have resulted. An illustration of this traditional workload pattern is presented in Figure 3. It is only when actual crop production is compared with the potential, that the consequences of this pattern are revealed.

Once section managers at Tongaat understood the concept of planning as it applied to their operations, and once they appreciated the usefulness of planning in their everyday work situation, attempts to match the seasonal workload with labour availability were very successful. By the use of filtercake as a seed-covering medium for "out-of-season" planting, and the judicious programming of irrigated or sandy fields to be planted in the winter season, managers found that they were able to complete the bulk of their planting programme before the onset of the spring rains and higher temperatures. The remainder of the planting programme was then postponed until the end of the harvesting season, in order to occupy labour which was previously weeding infested fields. This planning for improved crop management and utilisation of labour, is illustrated in Figure 4. Previously, only 50% of all labour mandays utilised for cultivation operations was available for weed control in the spring and in summer, half of the year. This percentage has rapidly changed so that 66% of the labour usage is now allocated to this vital time of the growing season. The result is less weed competition, lower weed control costs and higher yields, which in turn lead to improved profit. These improvements outweigh by far the extra cost of planting with filtercake, as a covering medium to ensure good crop establishment in winter.

In addition to the illustration (Fig. 4) of planning labour utilisation through the season, the section manager is also required to plan his total labour requirements, his tractor operating costs and his materials such as fertilizer, herbicides and general stores. Furthermore, he is responsible for planning his long-term operating and capital requirements, based on definite strategies and action plans to counter escalating costs of labour, machines and materials and to maintain section profits.

FIG. 3 – Traditional seasonal labour requirements for sugar-cane farming



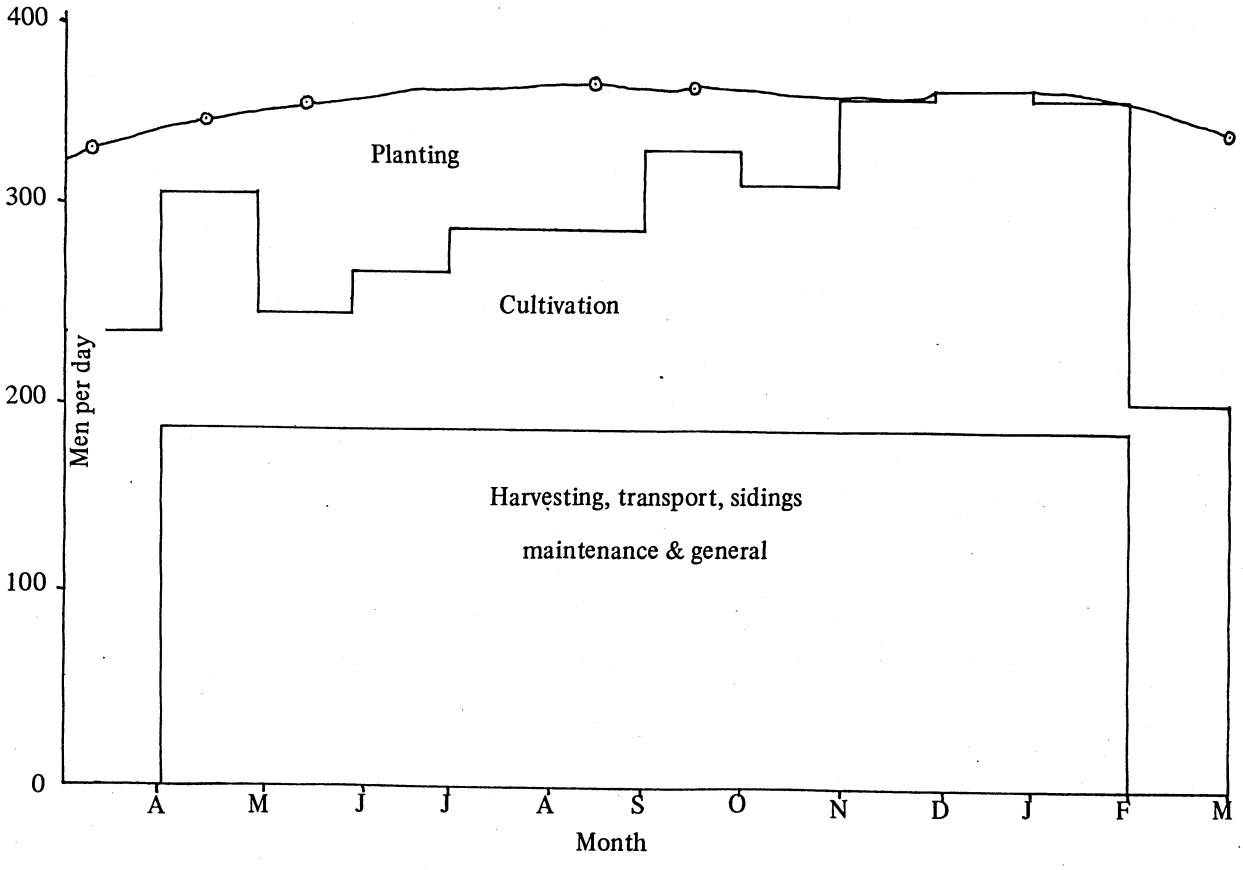


FIG. 4 – Readjusted seasonal labour requirements on the sugarfarm

2.2 Organising farm work

Parsons[21] recently defined organisation as "determining which activities are necessary for any purpose or plan and arranging them in groups which may be assigned to individuals". Tongaat section managers are now familiar with the basic theory of organisation, communication, job instruction and the delegation of responsibilities. Once managers appreciated the technique of drawing organisation charts "from the bottom upwards", commencing with grouping of operations for optimum supervision, success was rapidly obtained. Managers were then able to delegate responsibility and therefore hold subordinates directly accountable for groups of operations. A typical section organisation chart, developed by a section manager, is presented in Figure 5. This section, with 1 200 hectares under cane, is managed by a section manager, who is assisted by a section supervisor, a maintenance foreman and a field assistant. The manager has a semi-skilled staff of thirty and a labour force of three hundred men.

Having grouped activities and assigned these to supervisors, delegating authority and communicating instructions at the same time, the manager has almost completed the process of organising. It remains however, to ensure that the size of any particular group of workers is within the capabilities of those given responsibility to complete the job. There is a limit to the supervisory capacity of any one person, and if this is exceeded, quality and progress checks by that person become superficial and hence unreliable.

In supervising labour on the sugar farm, limitations to supervisory capacity will change with the complexity of the operation as follows:

1. If the task is simple and repetitive, a supervisor can handle a large number of labourers, perhaps as many as fifty. This applies in particular to work that is easily measurable, and in which quality control is either unimportant relative to output (quantity), or is comparatively easily checked. An example is cane harvesting, where the daily output of each cutter is measured and quality controls are relatively simple to apply.

21. Parsons, S.D. (1972). Farm management — the dynamic approach. Agrekon 11:1, 12-16

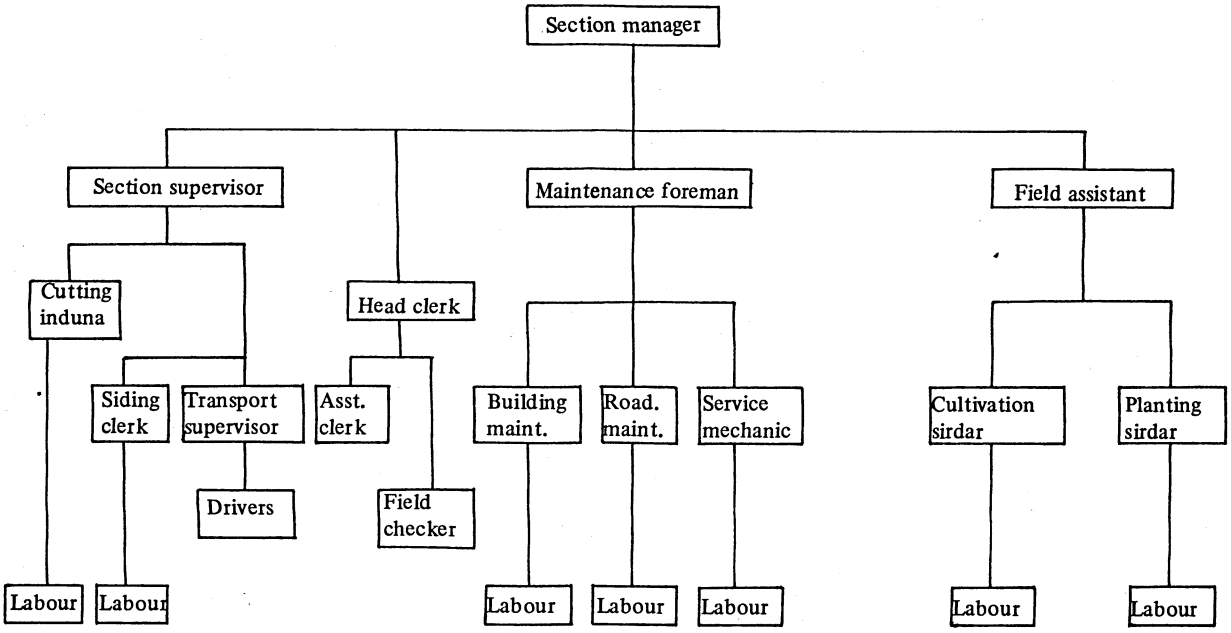


FIG. 5 – Section organisation chart at Tongaat

2. If quality control is important, then even though the operation might be simple, it becomes increasingly difficult for the supervisor to effectively control larger gangs of labourers. An example is hand weeding, where optimum gang size varies between 10 and 20 labourers depending on conditions, such as size of crop, density of weeds, etc.

3. When the operation is more sophisticated and it involves the use of expensive materials or specialised equipment, the supervisor can effectively control only small numbers of workers. Typical examples are fertilizer application by hand and chemical weed control using knapsack sprayers. At Tongaat, it has been found that the optimum ratio of supervisor to operators for these operations is approximately 1:6.

It is the section manager's responsibility to ensure that supervisory staff also follow these guidelines. Generally, the manager trains his section supervisor and field assistant in the skill of assessing optimum gang size for various operations and for differing conditions. The supervisor usually proposes the size of gangs and work priorities required the following day and the section manager either approves or alters the arrangements.

2.3 *Motivation of labour*

Although section managers have received formal training in the principles of motivation, it has not been feasible to measure any tangible improvements in this management skill. The motivation of labour remains the one management process urgently requiring much closer study. At Tongaat, motivational systems directed towards satisfying labourers' identity, stimulation, or security needs, are used either separately or in combination. Motivational systems include job and pay grades, incentive bonuses, induction, selection, training, correct feeding and incentives for leisure time.

2.4 *Control of labour*

The most important written control system developed at Tongaat is known as the Tongaat daily diary, which has been described by the writer[22]. On each day, the utilisation of labour and tractors is recorded and submitted to the data processing centre. One copy remains on the section as a record of daily activities. At the central data processing department, the daily data are processed by computer and performance reports on resources utilised and monthly cost reports are generated for management information purposes. By means of computer programmes, comprehensive fields records and fields performance history files are kept up to date. Exception reports and more detailed analysis of resources utilised are also possible. Unfortunately, these reports only become available in the last week of the following month. For timely control of performance, supplementary control systems are used.

22. Hill, J.N.S. (1970). The Tongaat field dairy — a useful management tool. Proc. S.A. Sug. Tech. Assoc., 144-147.

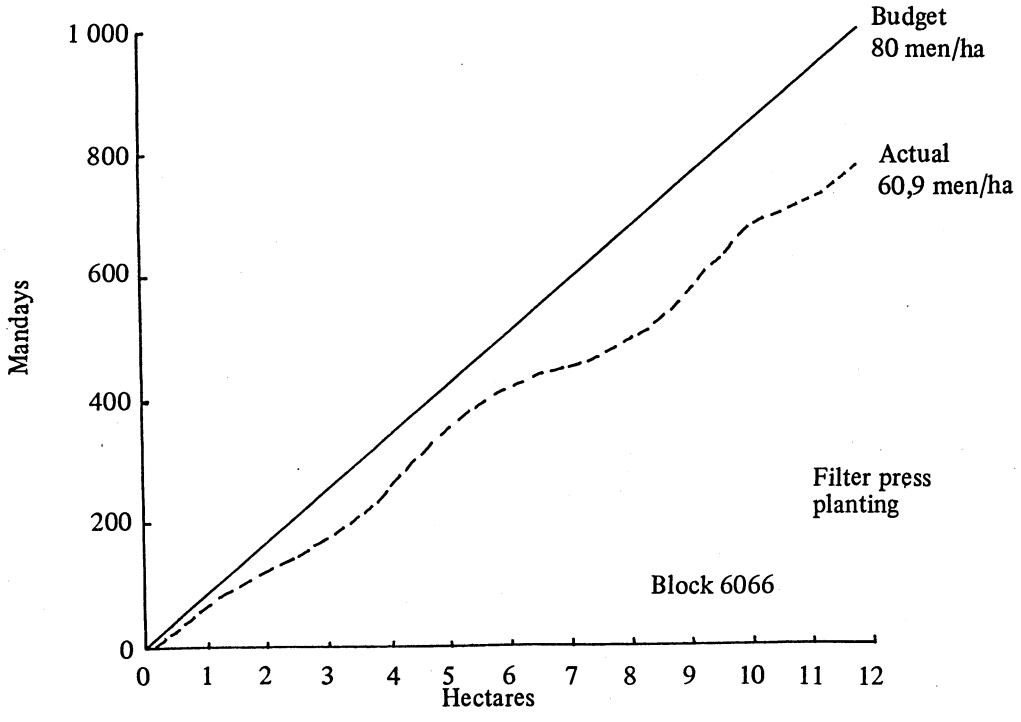


FIG. 6 – A labour utilisation graph for a particular field showing the target or budget allowance and the actual labour utilisation monitored

In addition to the standard procedure of recording resource utilisation and activities in the daily diary, the section manager obtains factual reports from his subordinates, either on a daily basis, or when a particular operation is completed. One example is the daily record of individual cane cutter performance, together with total tonnage harvested, tonnage delivered to the trans-shipment siding (loading zone) and tonnage delivered to the factory. Another example is the completion of a performance graph when a field is being planted. Here the supervisor responsible for planting, graphically monitors acutal labour utilisation each day against the standard agreed with his manager, for a particular field. An example of such a planting performance graph is presented in Figure 6.

The section manager also monitors performance of major resources used on each main operation by means of "control graphs". These are displayed in each section manager's office and depict at a glance the state of each operation on the section. However, the "vital few" principle is adhered to; that is to say, only major resource utilisation is monitored. Generally this includes the monitoring of labour usage against hectares or tons or time, depending on the type of operation concerned.

These control systems have enabled section managers to take timely corrective action in order to meet their objectives. At the same time supervisors, in submitting regular reports, have benefited because they have committed themselves to achieving clearly understood and attainable targets.

3. CONCLUSIONS

It is now the third year since the introduction of MBO to the agricultural division of Tongaat Sugar Co. Limited. It is believed that this participative management style has resulted in an improvement in the motivation of section managers. MBO when used in the appropriate managerial situation, is a useful technique for obtaining commitment to purpose, and for providing directed and controlled action towards specific targets. If MBO is used in conjunction with managerial development programmes, positive improvements to farm business results can be obtained.

At Tongaat, after MBO had been implemented for only two years, agricultural performance showed unmistakable signs of improvement. Improved motivation of section managers led to a great improvement in the management of machines. Development of managerial skills, on the other hand, has led to the solution of a common labour-management problem. The management principles of planning, organising, motivating and controlling have been successfully used to evolve systems for the effective management of large sugar farms.