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Investigating the True Cost of Conventional Harvesting Tools *

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Given that present fields cannot be modified to meet the demands of harvesting (i.e: palms shortened or paths graded), oil palm harvesting then consists of two interdependent inputs, labour and tools, of which tools are the only component man can develop without limit. If labour cannot be substantially improved, the use of inadequate tools can result in serious losses to potential earnings while maintaining acceptable costs on realised earnings, as accounted under auditing practices. Yet unaccounted losses could pay for performance tools costing several times the cost of conventional tools and earn substantial additional profits.

To quote John Ruskin – (English writer, artist & critic 1819-1900). "It's unwise to pay too much, but it's also unwise to pay too little. When you pay too much, all you lose is a little money. But when you pay too little, you stand a chance of losing everything because the thing you bought is incapable of doing what you bought it to do. The common law of business balance prohibits paying a little and getting a lot – it just can't be done. So, when you deal with the low bidder it's wise to put a little something aside to take care of the risk you run. And if you can do that, you can afford something better!"

The following paper is an insight to deductive analysis used to investigate the economics of Engineering solutions to productivity.

The oil palm estate industry has but one product, fresh fruit bunches on the stock, on the palm, at the correct stage of ripeness. Of all expenditures to harvest the product, none will enhance its value, and at best only hope to retard further degradation.

To give meaning to the deduction, a hypothetical example will be used. In reality, analysis for a particular problem is a lengthy and detailed undertaking, but the methodology is the same. Our example could be real in specific areas of an estate, or particular geographical locations but since the variety of problems is infinite, it is suggested the reader insert respective values for his own problems and draw his own unique conclusions using the methodology.

For our example, tall palm are yielding 20 tonnes per hectare on the palm with a potential mill price of RM200 per tonne. After harvest, 16 tonnes per hectare rest in the palm circle worth RM190 per tonne. Following loose fruit collection and transport, 15 tonnes per hectare reach the mill with a value of RM180 per tonne. The difference in price from palm, to circle, to mill reflects discounts for respective levels of fruit degradation. Loss in crop is from failure to harvest, transport, *etc.* Cost of harvest and transport *etc.* are accounted for in 'cost of production on realised crop'.

Engineering accounting must trace losses between 'potential earnings' and 'realised earnings', and attach them to respective inputs before recommendations can be made to improve productivity. Financial accounting of 'cost of production on realised crop' is for auditing purposes and cannot be used alone to guide decisions on productivity.

* Paper presented at the Eastern Plantation Agency Bhd. Seminar in June 1993.

This brief paper will investigate in general terms, harvesting losses from the palm stock, to the circle, only. The above sample conditions will be used. Other conditions will give results specific to the problem, but similar methodology can be used. Transport, including loose fruit collection, account for some degradation and loss, but should be treated as a study by themselves.

Productivity in harvesting is the ratio of 'realised earnings' divided by 'potential earnings', expressed as a percentage.

In this example:

$$\text{Productivity} = \frac{\text{realised earning}}{\text{potential earning}} \times 100\% = \frac{16\text{t/ha} \times \text{RM}190\text{/t}}{20\text{t/ha} \times \text{RM}200\text{/t}} \times 100\% = \frac{\text{RM}3040}{\text{RM}4000} = 76\%,$$

with the difference in 'realised earning', and 'potential earning', amounting to = (RM4000 – RM3040) = RM960 loss per hectare per year!

Loss distributed over 'realised crop' is

$$= \frac{\text{RM}960\text{/ha/yr.}}{16\text{t/ha/yr.}} = \text{RM}60 \text{ discount per}$$

tonne harvested!

Harvesting is composed of two inter-dependant inputs. They are:

- Labour
- Tools

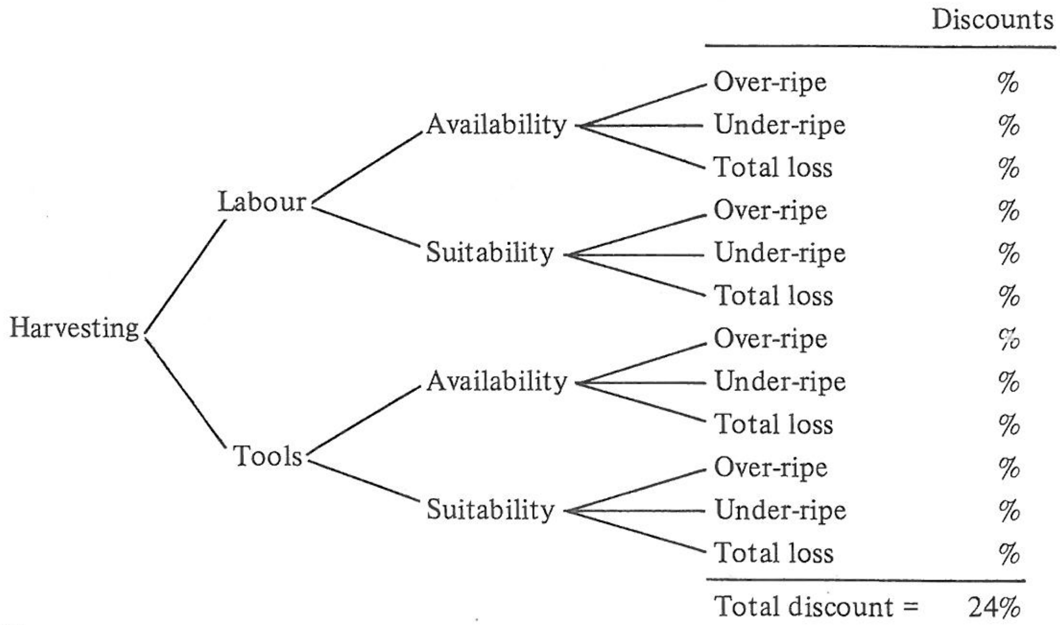
Which must be:

- Available
- Suitable

With the resultant effect on harvest being:

- Over-ripe fruit
- Under-ripe fruit
- Total loss

Tracing harvest through its components will reveal their separate contributions to discounts, the sum of which is equal to the loss in productivity, or 100 per cent – 76 per cent = 24 per cent.



To assign respective discounts is at best an educated guess as there is no yardstick with which to measure. Obviously the more consideration given, the more accurate the results and the more effective the conclusions. Each may be argued, but in the end, the sum of their contributions must equal the total discount of 24 per cent.

To assign discounts to the components of harvesting, our example estate will be 10 per cent short of labour. Due to this labour shortage, we are retaining poor workers which has resulted in average worker productivity being lower than national average. Twenty per cent of the crop is over-ripe due to extended harvest rounds resulting in 2.5 per cent discount at the mill for FFA content. Ten per cent is harvested under-ripe due to poor worker judgement resulting in an additional 2.5 per cent discount due to poor extraction rates. Five per cent of the crop is left on the palm because average harvester skills are less than national average, and an additional 15 per cent is abandoned or trunk injected because it is beyond the reach of conventional tools, using national average skills.

Labour – availability – over-ripe

Labour shortage has contributed directly to over-ripe fruit causing a 2.5 per cent discount to mill price. This is a price on realised crop and therefore contributes (16t/20t) x 2.5 per cent = 2.0 per cent discount.

Labour – availability – under-ripe

Labour shortage causes over-ripe conditions, not under-ripe, so 0 per cent discount.

Labour – availability – total loss

Realistically fruit may be abandoned due to lack of labour, but oversupply of fruit or unsuitability of tools should also be considered. If tools can be developed to double the productivity of labour, then labour availability is not the fault. So, 0 per cent discount.

Labour – suitability – over-ripe

Poor judgement by poor labour is not a contributing factor, as all fruit is over-ripe due to late harvesting rounds caused by labour shortage. 0 per cent discount.

Labour – suitability – under-ripe

Poor judgement by poor labour accounts for 10 per cent under-ripe fruit resulting in 2.5 per cent discount on price paid for realised crop. This is equivalent to (16t/20t) x 2.5 per cent = 2.0 per cent discount.

Labour – suitability – total loss

Lack of suitable skills in tall palm has caused 5 per cent of crop to be abandoned. This is 5 per cent discount.

Tools – availability – over-ripe
Tools – availability – under-ripe
Tools – availability – total loss

There is an ample supply of tools available, but damaged and broken tools are our of service and cause reduction in worker productivity. Some discount may be attributable and is accounted in shortage of labour. Therefore 0 per cent discount.

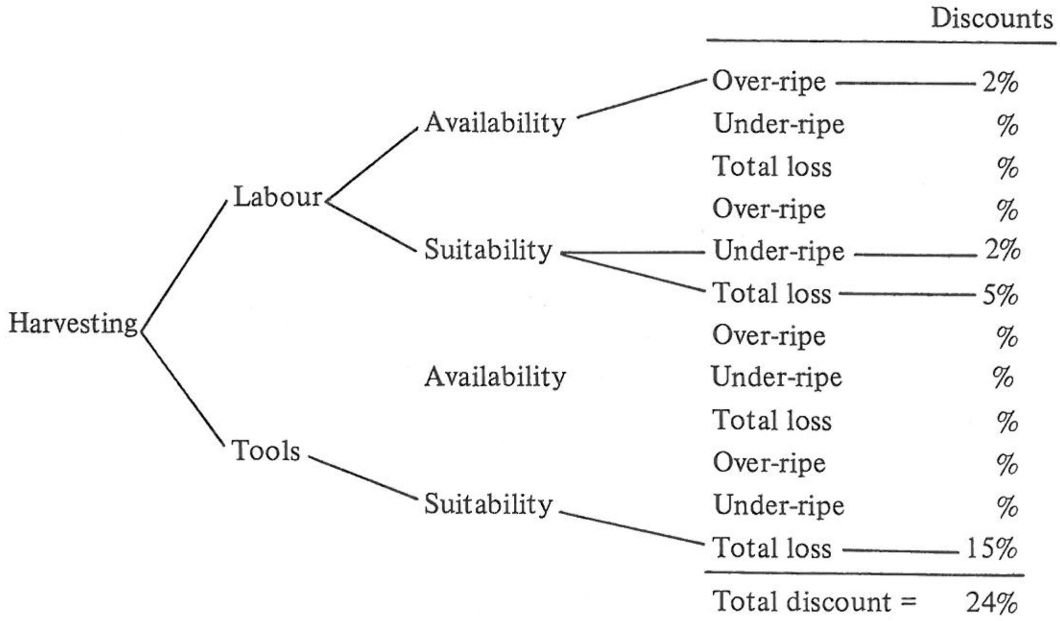
Tools – suitable – over-ripe
Tools – suitable – under-ripe

Tools cannot themselves be blamed for state of ripeness, but inefficient tools will account for poor worker productivity which will result in losses. These are accounted for in labour, therefore 0 per cent discount.

Tools – suitability – total loss

Conventional tools are at their limit of productivity when operated by average skills resulting in 15 per cent of crop having to be abandoned or trunk injected due to inability to reach. A harvester may in fact be able to harvest all tall fruit with conventional tools, but the time required and damage to tools becomes unacceptable. Fifteen per cent discount.

Summarised we have:



All losses have now been accounted, and though accuracy seems wide, potential losses are more difficult to assess than realised gains. Degree of allocation to a particular fault may be argued in more detail, but as in this example all have been accounted for and total the 24 per cent discount on potential cropping.

CONCLUSIONS

Referring to the summary, the following are discounts which can be corrected by labour alone.

Labour – availability – over-ripe – 2%
Labour – suitability – under-ripe – 2%
Labour – suitability – total loss – 5%
Total discount = 9 per cent, or (9%/24%) of RM60 per tonne loss = RM22.50 per tonne.

If contract harvesting rates in tall palm are RM22.50 per tonne, there is RM22.50 per tonne from discounts available to elevate labour to the point of 100 per cent productivity keeping profits equal to previous. This represents (RM22.50/t/RM22.50/t) = 100 per cent increase in 'cost of labour' to overcome just 9 per cent lack in human skills.

However, the following are discounts which can be corrected by tools alone:

Labour – availability – over-ripe – 2%
Labour – suitability – under-ripe – 2%
Labour – suitability – total loss – 5%

Tools – suitability – total loss – 15%

Total discount = 24 per cent, or (24%/24%) of RM60 per tonne = RM60 per tonne.

If write-off for conventional tools is RM0.50 per tonne, there is RM60 per tonne available to purchase tools which improve harvesting productivity to 100 per cent while keeping profits as previous. For conventional tools costing RM150 this would allow purchase of tools worth (RM60/t/RM0.50/t) x RM150 = RM18 000, assuming they last as long as conventional tools.

We acknowledge that manpower is suitable for the job when it represents the 'average' skill of that labour which is available for the wages paid. Wages being those set by established 'cost of production for realised crop'. Average productivity of labour may at best be improved by 5 per cent through increasing pay, training or increased supervision, but long term retention is nebulous in field jobs such as harvesting, where labour acts independently, and over a broad territory, and will return to its 'status quo'.

Tools, on the other hand, can improve productivity without limit, can be designed to reach all palm, and if maintained, will continue to deliver improved productivity.

Tools obviously show the greatest prospect of highest improvement in productivity, with the least risk, longest security, lowest investment, and highest returns.

In reality 100 per cent productivity is not achievable, but let us say 90 per cent is! In this case, tools account for only (90%–76%) - 14 per cent of losses, or (14%/24%) x RM60 per tonne = RM35 per tonne for tools. Let us also assume such a tool would cost ten times the present conventional tools, or RM1500. This would be written off at 10 x RM0.50 per tonne = RM5 per tonne, but would bring in (RM35/tonne – RM5/tonne) = RM30 per tonne. This RM30 per tonne is the lost potential on every tonne harvested by conventional tools.

Therefore, the true cost of conventional tools is RM30 per tonne for the conditions used in our example and not RM0.50 per tonne as normally accounted in 'Cost of production on realised crop'.