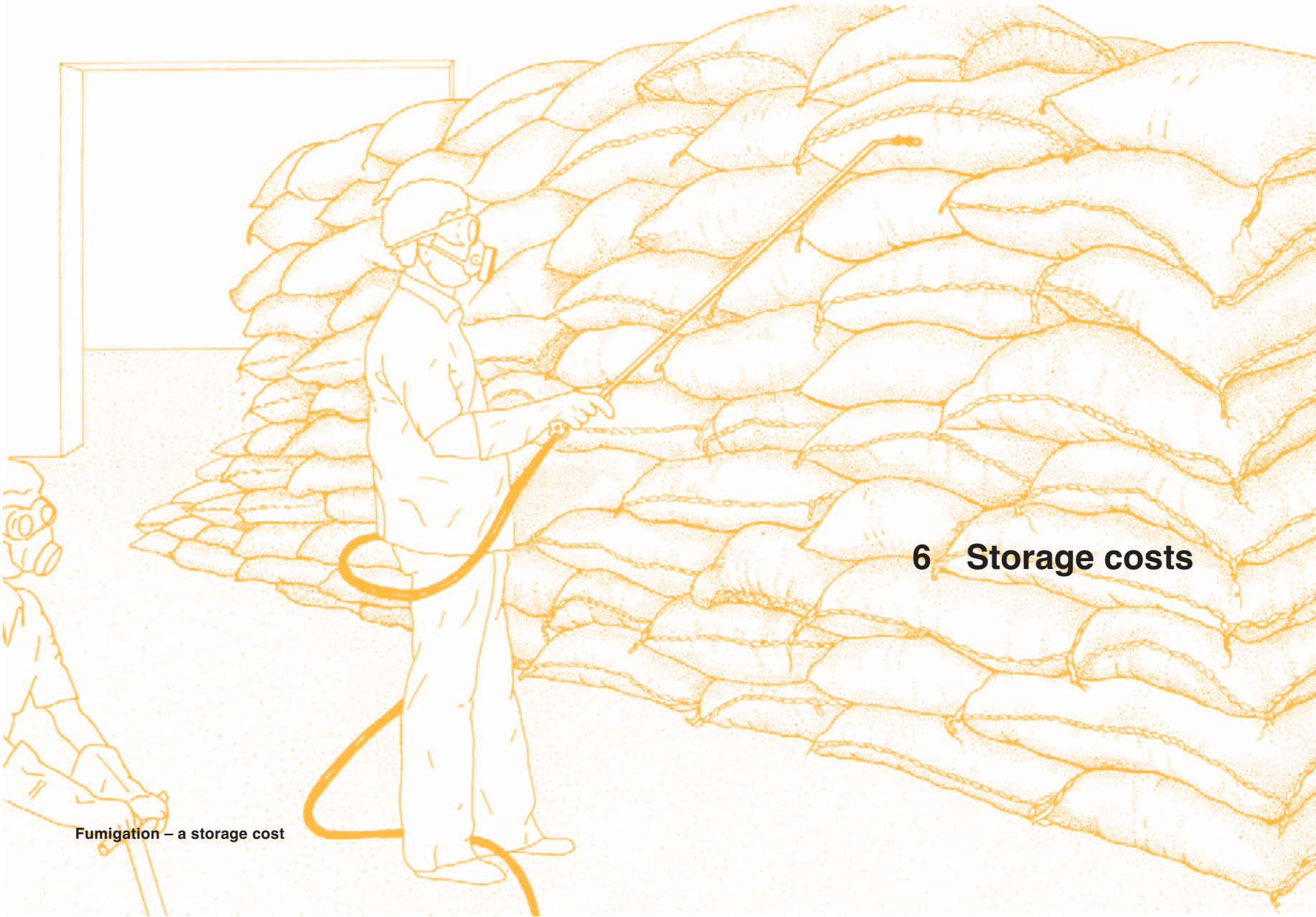


6 Storage costs

Fumigation – a storage cost

Storage is carried out in order to extend the period of availability of a crop to a consumer. In the case of staple food crops long-term storage is, of course, essential. The harvest period may be just a few months but the staple has to be consumed throughout the year. Storage can be carried out by the farmer, the trader, the mill or the consumer. With regard to more perishable crops, storage can be used to extend what is often a short period of availability. However, this is only viable when the produce can be sold after storage at a price higher than the into-store price, with the difference *fully covering the costs of storage, as well as offering an incentive to take the risk that a loss may result.*

Storage costs fall into four categories:

- costs associated with the physical operation of the stores; that is the actual cost per kilogram which must be paid to place the produce in the warehouse or cool store. Such costs are made up of factors such as depreciation on the building, security costs, electricity and other utility costs and maintenance;
- costs associated with the maintenance of the product quality while it is in store… for example, the cost of chemicals;
- costs associated with loss of quality and quantity while the produce is in store;
- the financial cost to the owner of the produce while it is in store.

The biggest single factor affecting storage costs is capacity utilisation. Where a store is used frequently to full capacity costs per unit will be low. Where one is kept empty for much of the time costs will be high.

Where commercial storage facilities are used it is relatively simple to work out physical storage costs incurred by traders as they will be charged on a basis such as kilogram/days, box/weeks or tonne/months. The costs per kilogram for the period the produce is in store can then be worked out. Where the trader hires an entire warehouse and moves produce in and out you need to have an idea of the average number of containers/kilograms in store during the period for which the store is hired. An example of this calculation is shown in Figure 5.

There will usually be quantity losses while produce is in store. This may be deliberate (for example, when

Figure 5
Calculating storage costs

Assume that a warehouse is hired for **120 days** of the year at a total cost of **$600** and that the weighted average contents are **250 bags** of potatoes.

Then the storage cost is ...

$600 ÷ 120 days	=	$5.00 per day
$5 ÷ **250 bags**	=	$0.02 per bag/day

grain is dried so that it will store better) or accidental, due to bad storage. With fresh produce some quantity loss is almost inevitable, however efficiently it is stored. Physical losses in storage need to be treated as costs in the way outlined in Chapter 5. Quality losses are also inevitable and for the trader these are reflected in the prices he or she receives. As shown in Chapter 5, it is important to get an accurate estimate of the *weighted* average price stored produce is eventually sold at.

It is easy to ignore the fact that produce while in store incurs a financial cost for the trader. To do so, however, would give a totally inaccurate impression of marketing costs. An example of a realistic calculation of storage costs including additional costs such as bank interest is shown in Figure 6. This example assumes that there is no loss. However, a four-month period of storage will almost certainly lead to some losses and these need to be built into the calculations.

Long-term storage

Short-term storage

Figure 6
Calculating storage costs over time

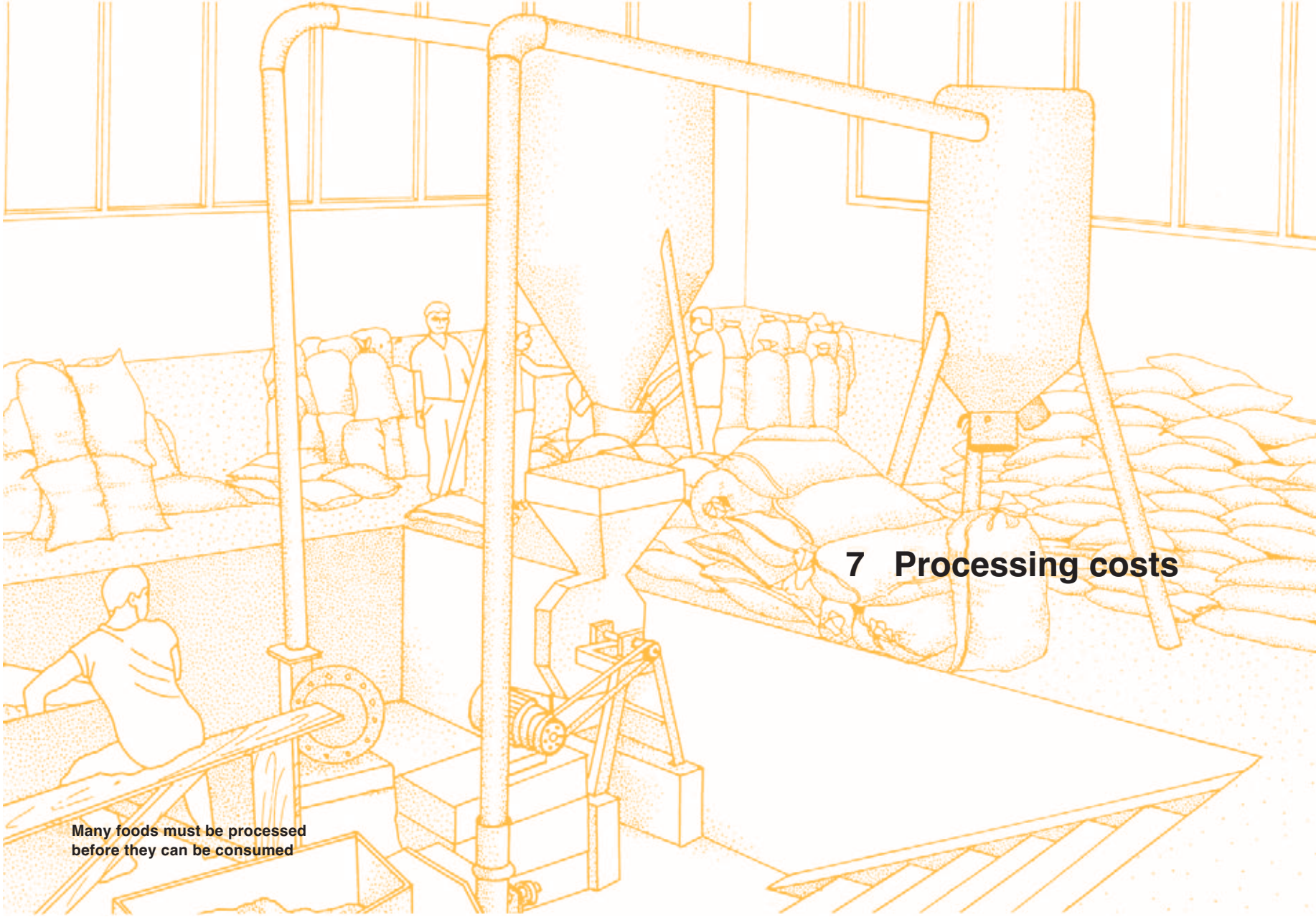
Assume that a trader buys potatoes at **$10 per bag** and keeps them in store for **4 months.** To do this he or she has to borrow money at **12 percent per year.**

Then the cost of bank interest is ...

$10 x 0.04 (12% p.a. over 4 months) = $0.40 per bag

Thus a realistic calculation
of storage costs per bag
for our consignment of potatoes is ...

Storage charge for 120 days at $0.02 per day	**=**	**$2.40**
Interest charge of $0.40 per bag	**=**	**0.40**
Total cost per bag	**=**	**$2.80**



7 Processing costs

Many foods must be processed before they can be consumed

The transformation of a product from one form to another clearly involves costs associated with the operation of the processing facility. In calculating marketing costs, however, we need to consider two other important aspects of processing costs. Firstly, as with product losses, one kilogram of product purchased from the farmer cannot be compared with one kilogram of processed product sold to the consumer. We therefore need to ask, "how much will be sold to the consumer if one kilogram is bought from the farmer?" Secondly, there may be a by-product as a result of the processing and this by-product can often be sold. The value of the by-product must therefore be included in the calculations.

The costs of the food in very sophisticated processed food products sold in supermarkets (for example "ready-to-eat" meals) can be a very small proportion of the retail selling price, sometimes less than ten percent. Processing, packaging and other marketing costs absorb the rest. However, in this Guide we shall concentrate on the cost of primary processing.

Some examples of primary processing are:

- paddy into milled rice (conversion at 65-70 percent; by-product bran);
- maize into maize meal (conversion at 65-85 percent depending on quality of meal; by-product bran);
- green tea into black tea (conversion rate 28-32 percent; no by-product);
- cotton into lint (conversion rate 30-35 percent; by-product cotton seed);
- cherry coffee into green bean (conversion rate approximately 18 percent; no by-product);
- copra into coconut oil (conversion rate 60-65 percent; by-product copra cake);
- soybeans into oil (conversion rate around 18 percent; by-product soya meal);
- oil palm into palm oil (conversion rate 18-24 percent; by-products palm kernels and oil cake).

In calculating processing costs we need to know the *conversion rate,* the *quantity of by-product,* the *value of that by-product* and the *costs of processing.* An example of this calculation is shown in Figure 7.

Figure 7
Calculating processing costs

Assume that a rice milling operation converts paddy at the rate of **70 percent** (0.7) and has saleable by-products equal to **25 percent** of the paddy weight. Processing costs per kilogram of paddy have been calculated at **$0.20 per kilogram** on the basis of the mill's total annual costs divided by the number of kilograms of paddy processed. The buying price of the paddy was **$1.50 per kilogram** and the by-products have a value of **$0.50 per kilogram.**

Then the processing cost per kilogram of paddy is ...

One kilogram of paddy purchased	=	$1.50
Processing costs or **1 kg** x **$0.20**		0.20
Total Costs	=	$1.70
Less the by-product revenue of **1 kg** x **0.25** x **$0.50**	=	0.12
Break even selling price per kilogram of paddy	=	$1.58

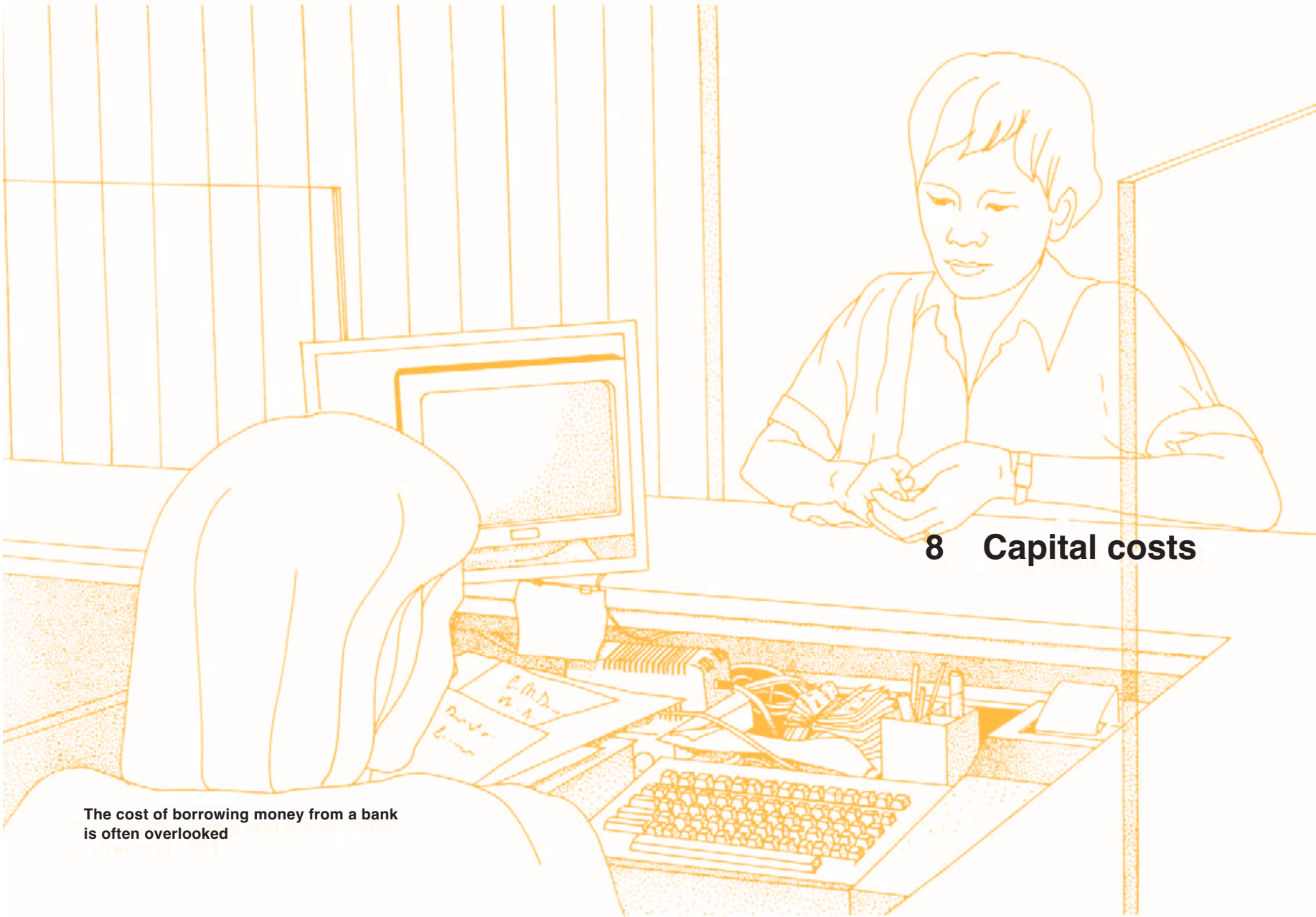
Thus the break even selling price per kilogram of milled rice is ...

$1.58 ÷ **0.7** = $2.25

Of course, it will not always be possible to obtain reliable information on a miller's costs. These will include not only operating costs such as fuel, maintenance and repair but also labour costs, the cost of the capital investment in the mill and its premises, and the *opportunity* cost of the owner's time. Calculating total costs from all these individual costs cannot be realistically done by an extension worker. However, you can perhaps get information about milling costs. Ministries of Agriculture may have model budgets for mills, according to their size, as may banks that lend money to mill owners. These budgets can be modified according to circumstances and throughput of the particular mill.

Calculating processing costs is just as important for small operations as for large factories

Village processing in West Africa



8 Capital costs

The cost of borrowing money from a bank is often overlooked

We have already hinted that capital costs are a major component of marketing costs. Such costs will vary from country to country depending on the level of interest rates. They include:

- The cost of money needed to buy produce and keep it in store. Many small traders buy produce, sell it and use the proceeds to buy more, so their needs for operating capital are limited. Traders who buy produce and store it for lengthy periods will, on the other hand, have sizeable operating capital requirements. In some countries traders buy from farmers in advance of the harvest, that is they buy the "field" or the "tree". Thus they will have to finance the produce they buy for even longer periods and their marketing costs will, consequently, be higher;
- The capital cost of a warehouse or a truck if the trader owns them;
- The capital cost of other buildings or of equipment, such as office space, weighing scales, grain drying equipment;
- The depreciation (or loss of value) of the vehicle, warehouse or equipment owned by the trader, miller, or others.

The calculation of capital costs for a small consignment of produce is far too complex an operation when the aim of the exercise is simply to work out marketing costs of vegetables from a group of farmers to a nearby urban market. As noted in other chapters it is best to use commercial rates for the hire of services, such as transport rates, storage rates or contract milling charges, even if traders are using their own vehicle or other facilities. These commercial rates will already have capital costs built in by the trucker, warehouse owner, or others.

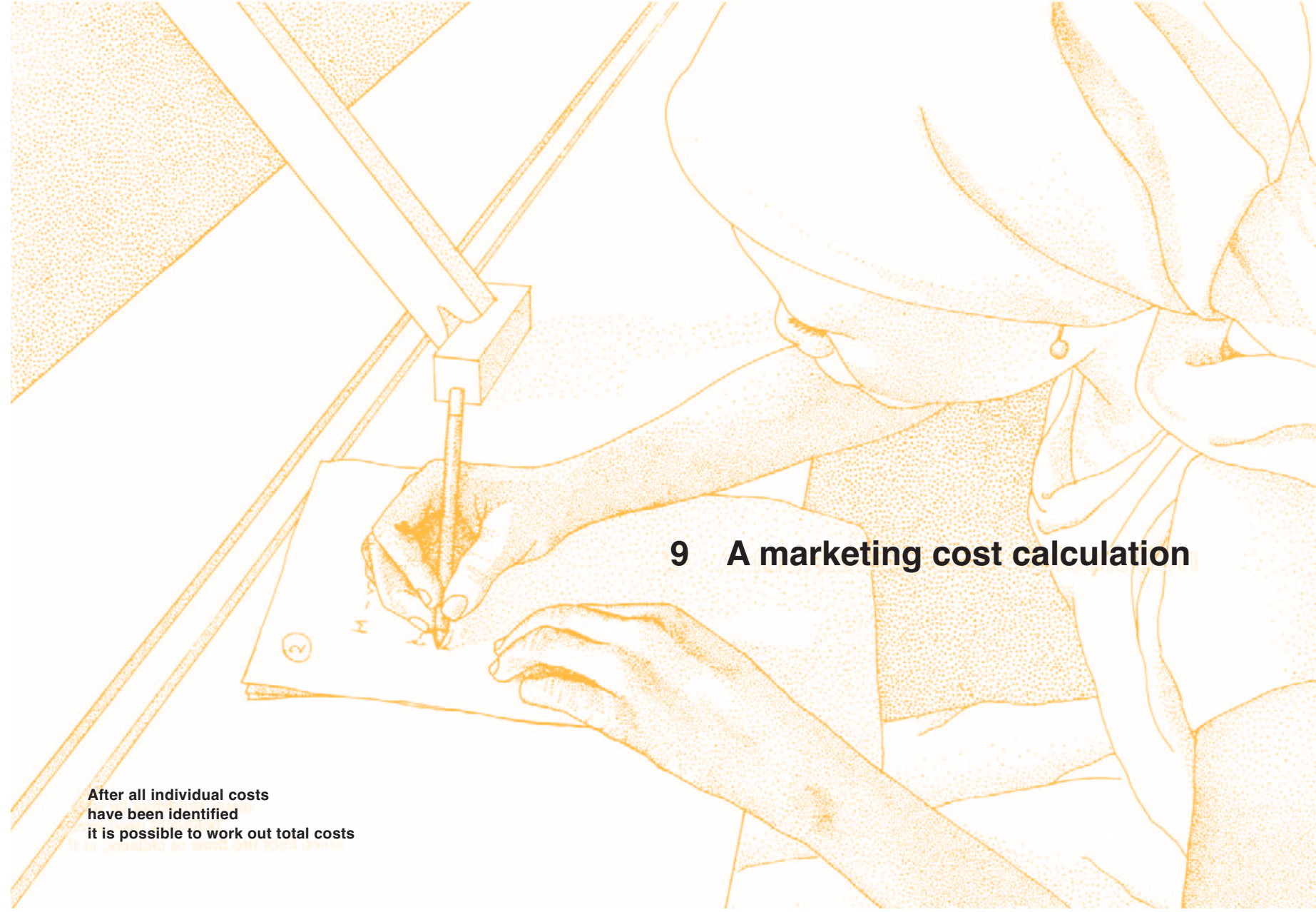
However, extension workers may be asked to advise a Cooperative on whether to build a store, construct a maize mill or purchase a truck. Under these circumstances it is necessary to compare the capital and depreciation costs with the expected annual return from the Cooperative's activities after the direct operating cost have been covered. Capital costs are the interest paid to the bank on the loan. Assuming interest rates stay constant, this interest can be estimated in advance on a yearly basis if you know how much of the "principal" (that is, the total amount borrowed) is paid back every year.

Depreciation can be calculated on a "straight line" basis. Here, the life of the vehicle or building is estimated and its cost, minus its "salvage" or "scrap" value

at the end of its working life, is divided by the number of years of its life to get the annual depreciation. An alternative, and more accurate, approach is to assume depreciation at a fixed percentage per year. In this way the value goes down more rapidly in the early years than later. If, for example, a $10 000 truck is depreciated at 10 percent then the depreciation in the first year is $1 000 and in the second year $900 (that is 10% of $10 000 - $1 000).

Even if depreciation is taken into account, a calculation could still give a misleading impression of an organization's profitability. This is particularly the case in countries with high inflation levels. If an asset is depreciated on the basis of its purchase price this will underestimate the funds needed to replace the asset when it can no longer be used. For instance, a truck costing $10 000 now will cost more than $60 000 to replace after ten years if inflation is 20 percent per year. In this case the truck should be revalued at its assumed replacement value and the revalued figure should be depreciated as above.

Interest payments and depreciation on a truck are often significant costs faced by a trader



9 A marketing cost calculation

**After all individual costs
have been identified
it is possible to work out total costs**

Once all the costs have been calculated it is then necessary to put them together to work out total marketing costs. The calculation will vary according to the complexity of the marketing channel, whether there is processing or not, and how many intermediaries there are. Figure 8 shows one of many possibilities.

The *gross profit* of the wholesaler and retailer has, of course, to cover all costs which cannot be calculated on a per kilogram basis. These occur over a year and can only be apportioned with great difficulty to individual commodities. Operating capital and licence fees would be incurred by the wholesaler, while, among other things, the retailer would have the expenses associated with renting and running a shop. Thus the *net profit* made by both would be much less.

Figure 8
A cost calculation

Assume that farmers growing tomatoes wait at the side of the road for traders to come and buy from them. They carry the tomatoes to the road in baskets and sell to traders at $0.50 per kilogram. Traders repackage the tomatoes in reusable wooden boxes containing 10 kg. The traders then take the tomatoes to a wholesale market where they are bought by retailers at an average price of $0.90 per kg. These retailers supply their own boxes to transport the tomatoes to their shop or stall and sell tomatoes to consumers in plastic bags each containing 500 grams. Losses are considerable. While with the traders they amount to 10 percent so traders sell only 0.9 kg of every kilogram purchased. The retailers lose a further 10 percent of what they purchase so they sell 0.81 kg of every kilogram purchased by the trader from the farmer. The average retail selling price is $1.17 per kg.

Figure 8, continued

	Per kg purchased from farmer
Purchase of tomatoes from farmers (1 kg x $0.50)	$0.50
Packaging ($0.50 ÷ 10 kg box)	0.05
Labour employed by wholesaler to pack, load and unload	0.02
Transport to wholesale market ($1.50 per box ÷ 10 kg)	0.15
Costs en route such as road blocks	0.01
Market fees	0.01
Market agent's fees	0.02
Total costs	$0.76
Quantity sold (0.9 kg x weighted average selling price of $0.90 per kg)	0.81
Trader's gross profit	$0.05
Retailer's buying price ($0.90 x 0.9 kg)	$0.81
Market fees	0.01
Packaging from market to shop	0.02
Porter's fees in market	0.01
Transport to shop (0.9 kg x $0.50 per 10 kg box)	0.04
Weighing, cost of plastic bags, and retail packaging (for 0.81 kg)	0.02
Total costs for retailer	$0.91
Revenue from sale of 0.81 kg (0.9 kg x 0.9) at a weighted average selling price of $1.17 per kg	0.95
Retailer's gross profit	$0.04