



International Institute of Tropical Agriculture (IITA)  
Institut international d'agriculture tropicale (IITA)  
Instituto Internacional de Agricultura Tropical (IITA)

# Labor requirement in assessment of technologies

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IITA Research Guide 27

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## Labor requirement in assessment of technologies

**Objectives.** This guide is intended to enable you to:

- describe the importance of labor requirement;
- determine cost of labor;
- discuss the effect of labor requirement on adoption of technologies;
- determine seasonal demand for labor;
- explain the implications of gender distribution of labor.

### Study materials

- Data on labor requirement for different farm operations, separated by gender distribution and seasonal demand.
- Data on cost of labor.

### Practicals

- Assess cost of labor.
- Study seasonal demand for labor.
- Study gender distribution of labor.

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## Questions

- 1 What is the proportion of cost of labor in relation to total cost of production?
- 2 What is the cost of hired labor in your area?
- 3 What monetary value may you have to add to obtain total cost of hired labor?
- 4 Why is determination of price for family labor not so straightforward?
- 5 How can you estimate cost of family labor?
- 6 What is the concept of *opportunity cost*?
- 7 What input could be considered to be costless?
- 8 Under what conditions may the market price **not** reflect the true opportunity cost?
- 9 Why is understanding of labor requirements particularly important in indigenous and improved technologies in many farming systems in Africa?
- 10 What are the conditions under which a farmer will be more likely to adopt technologies that save labor?
- 11 What do you have to be aware of when proposing techniques that conserve natural resources?
- 12 Why does labor requirements at different times of the year have different opportunity costs?
- 13 What are periods of high labor demand?
- 14 Why should you evaluate the opportunity cost of male and female labor separately?

## Labor requirement in assessment of technologies

- 1 Importance of labor requirement
- 2 Cost of labor
- 3 Effect of labor requirement
- 4 Seasonal demand for labor
- 5 Gender distribution of labor
- 6 Bibliography
- 7 Suggestions for trainers

**Abstract.** Family labor is a valuable and "scarce" resource. It is through the application of labor that the farming family is able to use natural resources such as soil, water, vegetation and climate and purchased inputs such as fertilizer, chemicals, and tools. In developing an improved technology to increase productivity or enhance sustainability, the labor requirements must be evaluated.

For full understanding of the labor requirement for an indigenous or improved technology, seasonality and specialization of labor must be considered as well as the total labor requirement.

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## 1 Importance of labor requirement

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Even though there may be no cash market for family labor, family labor is a valuable and scarce resource. The use of labor to implement techniques that conserve the natural resource base imposes a cost on the farm family.

Labor is a valuable resource of the farm family in agricultural production. It is through the application of labor and knowledge that the farming family is able to make use of natural resources such as soils, water, vegetation and climate and purchased inputs such as fertilizer, chemicals, and tools.

The availability of labor cannot be overlooked in describing and understanding indigenous farming practices. In many farming systems in Africa, labor makes up 90 % of the costs of production. Similarly, in developing or recommending an improved technology to increase productivity or enhance sustainability, the labor requirements must be evaluated.

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## 2 Cost of labor

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When a farmer goes to the market to purchase a bag of fertilizer, it is not difficult to determine the cost. The farmer has paid N 40 or CFA ... for a 50 kg bag of fertilizer. We can add the cost of transportation (N 3 or CFA ... ) to obtain the total cost of the fertilizer.

Similarly, it is not too difficult to determine the cost of hired labor. The farmer may pay N 9 or Kwacha 18 for a day for an adult male to clear bush, or for an adult female to harvest and peel cassava tubers. To obtain the total cost of hired labor, it may be necessary to add the monetary value of a meal if this is part of the labor agreement.

For family labor, the determination of price is not so straightforward, because cash or meals are generally not directly dispensed for a day of labor; that is, we can see no cash market for family labor. This has led some analyst to treat family labor as if it has no value, or is essentially free. Such a practice can give false impressions of resource availability in the farmer's system, and result in misleading conclusions.

The value of family labor can be estimated by its *opportunity cost*. Economists use the concept of *opportunity cost* to estimate the value of an input (factor of production) that has no clear market price. The opportunity cost is the return to the factor in the best alternative use. Any input that has an alternative use has an opportunity cost. The only input that could be costless would be one which cannot be productively employed under the existing technology.

In fact, the concept is useful even for some inputs that are bought and sold in markets. When markets are "distorted" or "imperfect" because of policy interven-

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tions or failures in market institutions, the market price may not reflect the true opportunity cost of a factor. In these cases, the correct opportunity cost is the return to the factor in its best alternative use.

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### 3 Effect of labor requirement

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Suppose we are evaluating the potential of a farming practice that could improve sustainability, such as planting grass strips on contours to control erosion in a sloppy field. This may involve very little purchased inputs, and so be designated as "low input." Nevertheless, labor will be required to plant and maintain the strips. The labor required to plant and maintain the strips could be used in other farm activities, such as clearing or weeding an additional plot of cassava elsewhere on the farm.

To plant and maintain the grass strips, the farm family must forego the output that could have been obtained from the additional plot of cassava. The value of the cassava foregone (less the costs of production) represents the *opportunity cost* of diverting labor to installing and maintaining grass strips for erosion control.

Understanding the labor requirements in indigenous and improved technologies is particularly important because in many farming systems in Africa, labor is the limiting factor of production. In systems where labor is the limiting factor of production, the farmer will be much more likely to adopt technologies that save labor, or make labor more productive. This has clear implications for technologies designed to conserve natural resources.

Production techniques that conserve natural resources, but have high labor requirements, may not be appealing to farmers; they appear to the farmer as "high cost." They may be difficult for the farmer to adopt. This does not mean that we can make no progress on technologies that conserve natural resources, but it is necessary to be aware of the labor requirements and realistically assess how the technology might fit in with the demands on the time available to the farm family.

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## 4 Seasonal demand for labor

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Labor use for agricultural production is seasonal. Labor requirements at different times of the year have different costs.

In almost all farming systems, the use of labor is seasonal; that is, it is not constant over the course of a year. The times of greatest labor demand are termed "peak" periods; those of less demand are termed "slack" periods.

Labor during peak periods has a higher opportunity cost than labor during slack periods. Thus, not only must the total labor requirements of improved technologies be considered, but also the timing of requirements for labor. For example, in many cropping systems, weeding is a major "bottleneck".

Depending on the cropping system, planting or harvesting may also be periods of high labor demand. New technologies which use labor in "slack" periods have a relatively higher adoption potential than those that increase labor use during "peak" periods.

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## 5 Gender distribution of labor

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Agricultural operations may place different demands on different family members. Some operations are specialized in that men, women or children are the primary source of labor.

It is common for agricultural labor to be "specialized"; that is, particular operations or activities are undertaken by particular family members. For example, men may be responsible for clearing or heaping while women are primarily responsible for weeding or harvesting.

In such a situation, a technology that decreases labor for clearing and increases the labor for weeding will shift labor demands from male to female household members. Such a technology may be impossible to implement if female household members are fully occupied and unable to take on the additional labor required.

To analyze such a situation, the opportunity costs of male and female labor must be evaluated separately, as well as the peak and slack seasons for each type of labor.

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## 6 Bibliography

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Chuta, E.; Liedholm, C. 1984. Rural small-scale industry: Empirical evidence and policy issues. Pages 296-314. In: Eicher, C.K.; Staatz, J.M. (eds.). Agricultural development in the third world. The Johns Hopkins University Press, Baltimore, M.D., USA. 491 p.

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## 7 Suggestions for trainers

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If you use this Research Guide in training ...

### Generally:

- Distribute handouts (including this Research Guide) to trainees one or several days before your presentation, or distribute them at the end of the presentation.
- Do not distribute handouts at the beginning of a presentation, otherwise trainees will read instead of listen to you.
- Ask trainees not to take notes, but to pay full attention to the training activity. Assure them that your handouts (and this Research Guide) contain all relevant information.
- Keep your training activities practical. Reduce theory to the minimum that is necessary to understand the practical exercises.
- Use the questions on page 4 (or a selection of questions) for examinations (quizzes, periodical tests, and so on). Allow consultation of handouts and books during examinations.
- Promote interaction of trainees. Allow questions, but do not deviate from the subject.
- Respect the time allotted.

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**Specifically:**

- Discuss with trainees their experiences and problems of labor cost in their region/country (10 minutes).
- Present and discuss the content of this Research Guide, considering the study materials listed on page 3 (45 minutes). Describe real examples of labor cost.
- In plenary discussion, or in group work, ask trainees to design questions for assessment of labor demand and labor cost for certain technologies (30 minutes).
- In a field visit, ask trainees to interview farmers with the help of the questions ( $\frac{1}{2}$  day).
- Discuss results and draw conclusions (1 hour).
- Conduct the practicals suggested on page 3 in groups (3-4 trainees per group; 2 hours). Make sure that each trainee has the opportunity to practice. Have resource persons available for each group and practical.



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