

# What is Value Added?

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## THE AGRI-FOOD SYSTEM

Today's **agri-food system** extends well beyond the farmgate. It includes manufacturers of farm inputs (such as fertilizer and tractors), food processors, transportation companies, and wholesalers and retailers of food and other farm products. The farmers' share of the retail dollar has fallen over the years with continued industrialization, new technology, and consumer demands for more varied and convenient products.

With the growth in the complexity of the agri-food system, the concept of value added is increasingly important to fully understand the role of agriculture (as well as other sectors) in a modern economy. But there is often confusion, and sometimes misunderstanding, about what "value added" really means. The purpose of this fact sheet is to clarify the definition of value added and illustrate its proper uses.

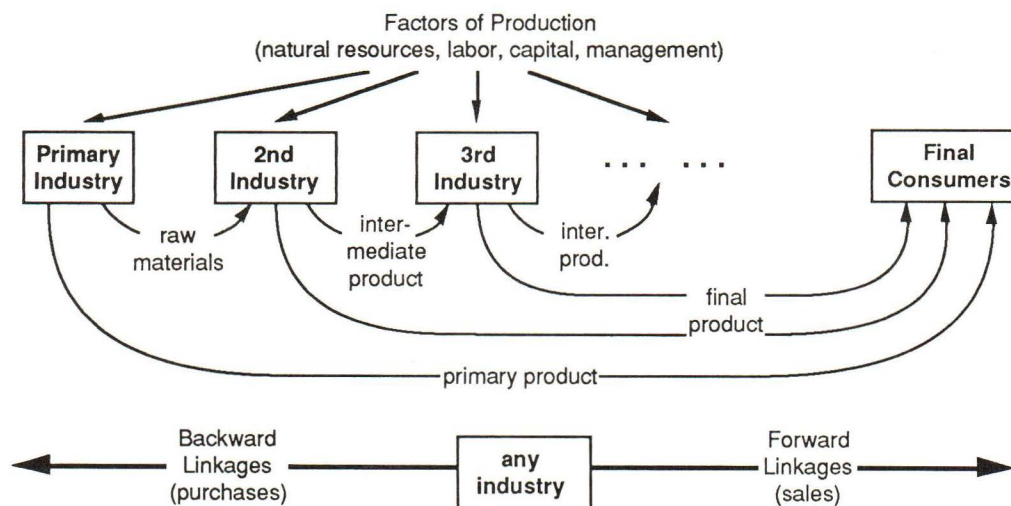
## SOURCES OF VALUE

**Value added** is an economic accounting concept that traces the final value of goods and services purchased by consumers back through the economy to where the value was created. Thus, the value added approach can identify sources of economic value or well-being. Value added also accounts for sources of income by tracing payments for the final goods and services.

In a productive activity, value is ultimately created using primary inputs, also called **factors of production**. These are commonly grouped into four categories:

- land and other natural resources, such as water;
- labor of workers;
- capital, such as machinery and buildings;
- management and entrepreneurship.

Figure 1. Some Value Added Concepts



Land, labor, capital, and management are the fundamental sources of economic value.

Figure 1 illustrates several concepts. A **primary industry** such as agriculture or mining creates value from natural resources and other factors of production. The products created are sold to final consumers as **primary products**, or to a second industry as **raw materials**. The second industry uses factors of production plus other purchased inputs to add value to the raw material. This creates a **final product** for consumers, or an **intermediate product** for a third industry. There may be several more intermediaries before the product reaches the final consumers. Each adds value by combining factors of production with intermediate products or materials. The relationships between an industry and its suppliers (usually purchases made by the industry) are called **backward linkages**. Relationships with buyers (usually sales by the industry) are **forward linkages**.

Thus, in a modern economy, a typical product passes through several value-adding activities before reaching the final consumer. There are five general ways by which value may be added. Value is added by physically changing the (1) **form** of raw materials or intermediate products. Milling sugarcane into sugar and canning pineapple slices are examples. Value is added by affecting the (2) **location** or (3) **time** in which a product is available. Transportation, scheduling, storage, and inventory are some examples. (4) **Possession value** is added by wholesalers, retailers, and others who facilitate the trade in goods. Activities here include providing credit and the transfer of ownership rights. Finally, value is added by providing (5) **information** about products. Advertising and promotion, grades and standards, trademarks, and labels are typical examples. Possession and information value are also associated with status and the image of a product as is found in Mercedes cars, Gucci handbags, and Kona Coffee.

### MEASURES OF VALUE ADDED

The value added to the economy by the agri-food system can be measured in many different ways, but there are two basic measures, gross value added and net value added.

**Gross value added** recognizes that each step creates and adds value as agri-food products move forward through the marketing chain. The cost of agri-food (raw or intermediate) products used as inputs is subtracted from sales to avoid

double-counting the value added earlier by other agri-food businesses. Thus, in the agri-food system,

$$\text{GROSS VALUE ADDED} = \text{PRODUCT SALES} \\ - \text{COST OF GOODS \& SERVICES PURCHASED} \\ \text{FROM AGRI-FOOD SYSTEM.}$$

An agri-food business usually must use inputs from industries that are not part of the system. Office supplies, electricity, and legal services are some examples. Since the cost of these goods and services was not subtracted, a portion of agri-food gross value added is actually contributed by other sectors of the economy. This outside value added can be deducted to get **net value added** in the agri-food system, where

$$\text{NET VALUE ADDED} = \text{GROSS VALUE ADDED} \\ - \text{COST OF GOODS \& SERVICES PURCHASED} \\ \text{FROM SUPPLIERS OUTSIDE THE AGRI-FOOD} \\ \text{SYSTEM.}$$

Since net value added deducts the cost of all purchased inputs except an industry's own factors of production, it represents the total returns to all factors employed by the industry. Net value added should not be confused with producer profits, which deduct the cost of factors of production. Net value added is a legitimate and, from economists' perspective, the preferred measure of an industry's contribution to the economy. Net value added is comparable to the figures given in national or state domestic product and income accounts.

The value added by the agri-food system can be estimated for different

- products or product groupings;
- firms, industries, groups of industries, or the entire economy;
- number of intermediaries or levels separating the primary industry, agriculture, from the final consumer.

The scope of interest must be clearly defined, since it will affect value added calculations. The "correct" measure for any given case depends on the purpose and ways in which the information will be used.

Gross and net value added can be computed for all the goods produced and sold by an industry. It can also be computed on a per unit basis. On-farm value added can be found from farm cost of production data. Off-farm measurements usually emphasize forward linkages after the farmgate.

These gross value added measures include the aggregate marketing bill and per unit price spreads. Off-farm value added is often broken down by marketing function such as processing, transportation, wholesaling, and retailing. Other common breakdowns are gross value added by input cost category (e.g., packaging materials or energy), and the shares of net value added contributed by different factors of production.

assessing the productivity of different inputs. At the level of entire economies, value added can be an important policy-making tool. It can help allocate resources among user groups as in the appropriate levels of economic development or promotion for export products, or in evaluating different options to expand a sector. These examples show that value added places the cost of producing goods and services in perspective by comparing the cost to what is received for that cost.

### USES OF VALUE ADDED INFORMATION



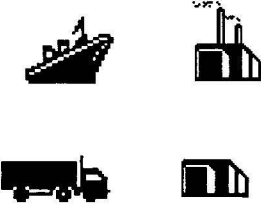

Value added provides a yardstick for measuring the economic contribution of a factor of production, a product, a firm, an industry, or the overall economy. Such comparisons can be made over time, or the value added by one entity can be compared to others as a gauge of relative importance in the same time period.

Value added data can be used to improve the efficiency of companies or industries by monitoring and evaluating their performance. It can help explain the difference between retail prices and what the producer receives. The data are useful for

### AN ILLUSTRATED EXAMPLE

Kona Coffee is used as a Hawaii example of the value added approach. Figure 2 gives "rough" mid-1980s estimates of the gross value added in supplying one pound of pure Kona Coffee to retail store customers. Unfortunately, most of the information needed to calculate net value added is not readily available. The example covers most Hawaii value-adding activities in the agri-food system, including farm production and forward-linked agribusinesses. The forward-linked activities are presented for several levels where the product

Figure 2. Value Added in Kona Coffee\*

	VALUE-ADDING ACTIVITY	COFFEE PRODUCT FORM	SALES			Gross Value Added (\$)	Net Value Added (\$)
			Quantity (lb)	Price (\$/lb)	Value (\$)		
FARM PRODUCTION		cherry	6	0.60	3.60	3.38	3.19
PROCESSING		parchment	1.5	2.55	3.83	0.23	?
		green	1.2	3.50	4.20	0.37	?
DISTRIBUTION		roasted	1	6.00	6.00	1.80	?
		wholesale roasted	1	7.00	7.00	1.00	?
FINAL CONSUMPTION		retail roasted	1	14.00	14.00	7.00	?

\*Estimates based on Nakamoto and Halloran, "The Markets and Marketing Issues of the Kona Coffee Industry," HITAHR Information Text No. 034, and Marutani, et al., "Costs and Return of Kona Coffee Production: 1984-1985," CTAHR Farm Management Report No. 18.



undergoes a significant change in form or is traded between marketing intermediaries.

Value-added activities begin on the farm, where the farmer must grow six pounds of **coffee cherries** to produce one pound of the retail product. To grow coffee, the farmer will use farm machinery, equipment, fertilizer, and pesticides supplied by backward-linked agri-food firms. If the farmer receives \$3.60 from selling the six pounds of cherries, the 22-cent cost of purchased agricultural inputs<sup>1</sup> is subtracted from farmgate value to obtain the \$3.38 gross value added. For on-farm activities, net value added can also be computed by subtracting another 19 cents for nonagricultural inputs purchased, which equals \$3.19. The on-farm net value added was created by various factors of production used to grow coffee. The income generated is shared by the farmer with hired workers (as wages), landowner (as rent) if the farmer leases his land, and the bank (as interest) for any loans of capital. Note that these would be subtracted to calculate profit.

Coffee cherries are the raw materials for forward-linked coffee firms. Form value is added in four processing stages to create intermediate and final coffee products. The two initial processing activities are usually performed in Kona. The coffee beans are first extracted from the cherries, washed, and dried to produce **parchment coffee**. While this causes a large reduction in product weight, the higher price for parchment offsets the loss. Gross value added at this stage is 23 cents, equal to the value of the parchment produced minus the value of the cherries used as an input. Parchment coffee is next milled to remove the skin, which results in lower weight but higher valued **green coffee**. Green coffee is the most commonly traded product form, so the coffee is graded after milling. This adds information value to the product, as well. Gross value added from

<sup>1</sup>Farm input costs can be obtained from a cost of production enterprise budget. Deductions for on-farm gross value added include chemical purchases, plus machinery and equipment operations and ownership (maintenance, taxes, and insurance) costs. For net value added, ownership cost of buildings and overhead expenses are also subtracted.

producing green coffee is therefore larger at 37 cents.

Roasting and grinding are the last processing stages for coffee. While there are some roasters on the Big Island, much of Kona's green coffee is shipped to roasting firms in Honolulu. Gross value added to **roasted coffee** is much higher than at earlier stages, reflecting several value-adding activities. The green coffee is first traded, then transported, which adds both possession and location value to the product. Roasting itself can be a highly specialized activity. Individual firms may produce distinct roasts suited to their customers' tastes, while packaging and labelling adds information values. Gross value added by all these activities is \$1.80 per pound of roasted coffee.

The last two value-adding activities involve the delivery of roasted coffee to the retail consumer. After roasting and grinding, coffee does not change product form, although location, time, and possession value are added through transport, storage, and trading. Neither do wholesaling and retailing of roasted coffee require other agri-food system inputs. Thus, gross value added is simply the price spread or the marketing margin, the difference between a marketing agent's sales price and his purchase price for coffee. At the wholesale level, gross value added is \$1 per pound, compared to \$7 per pound for the retailer. The larger price mark-up at the retail level in part reflects the information value added for special brands and Kona Coffee's gourmet image. The retailer would also incur higher nonfood input costs, such as advertising. These costs would have to be deducted from gross value added to get net value added, but data are not available.

In Hawaii, net value added would be considerably lower than the gross figures, since the cost of purchased inputs, such as packaging materials and energy for processing and transportation, are relatively high. Since Hawaii imports many of the inputs, any economic value created in producing these intermediate products would be gained by the economy that exported the goods to Hawaii. That is, value added has "leaked out" of the state economy. This and other more advanced concepts in value added accounting and some applications will be discussed in upcoming publications.

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