

Staff Paper

**NOTES ON THE USE OF SUBSECTOR ANALYSIS
AS A DIAGNOSTIC TOOL FOR LINKING
INDUSTRY AND AGRICULTURE**

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SUBSECTOR ANALYSIS AS A DIAGNOSTIC TOOL FOR LINKING INDUSTRY AND AGRICULTURE¹

I. Conceptualizing the Links between Agriculture and Industry

An early version of the concept paper for the Alliance for Africa's Industrialization (April 3, 1996, p. 3) notes that "for the past four decades, industrial policy in many African economies has been pursued as an alternative (rather than a complement) to agricultural policy." Industrialization was often pursued within an import-substitution strategy that ignored comparative advantage. The paper goes on to argue that in order to be successful, future industrialization strategy needs to be built firmly upon the links between agriculture and industry, exploit comparative advantage, and be conceived of in a systems context to take advantage of the synergies between agricultural and industrial development.

A first step in conceptualizing the links between agriculture and industry is to abandon the view that agriculture and industry are distinct activities. Rather, let's think about a series of productive activities (where production is defined as the creation of value to consumers) that takes place throughout the economy. At very low levels of income, most of these activities take place within the household. As the economy begins to exploit the gains from specialization and trade, more of the activities shift outside of the household (e.g., farmers begin to purchase more inputs rather than produce them themselves, and processing and storage increasingly take place off the farm). Thus, the separation between agriculture and industry begins.

One way of visualizing these relationships for food and fiber products is through a simple tool called the food systems matrix (fig. 1). The columns of this matrix represent different commodities, and the rows represent different production and distribution functions. Each cell in the matrix represents a production activity (physical transformation of inputs into outputs). Increasing productivity (and hence incomes) in the economy occurs either by either raising the productivity of the individual physical transformations (e.g., through the introduction of new technologies) or by improving the coordination among the various productive activities. Obviously, the two options are closely interrelated, as exploiting improved technologies usually requires improved coordination among the various stages of the economy. For example, it is difficult to exploit new fertilizer-responsive agricultural varieties if one can't get the fertilizer produced and delivered to the farm in a timely way.

¹This presentation draws heavily on the ideas of a number of current and former colleagues at Michigan State University, including James Shaffer, Don Mead, James Boomgard, Steve Davies, and Steve Haggblade. Although I borrow heavily from their ideas, the responsibility for any errors of fact or interpretation are entirely my own.

II. Basic Elements of the Subsector Approach

The subsector approach is simply a way of viewing a “vertical slice” within the food systems matrix. In other words, the subsector approach examines how production and distribution activities for a commodity or closely related group of commodities are organized within the economy and asks how the productivity of those activities can be increased, either through improved technologies or better institutions and policies to coordinate the various stages of the production and distribution.²

A subsector has been defined as:

"The vertical set of activities in the production and distribution of a closely related set of commodities." (Shaffer, 1968).

and

"An interdependent array of organizations, resources, laws, and institutions involved in producing, processing and distributing an agricultural commodity." (Marion et al., 1986.)

Thus, a subsector can thus be viewed both as: (a) a set of activities and actors and (b) the rules governing those activities. The latter gives the subsector approach a strongly institutional flavor. The boundaries of a subsector are defined pragmatically, depending on the problem being analyzed. See figures 2 and 3 for examples of subsector diagrams.

The basic descriptive and analytic tasks involved in subsector analysis include:

1. Describing the current structure of the subsector, in terms of the activities, actors, and rules involved.
2. Explaining why and how this structure arose.
3. Analyzing the implications of this structure for economic performance of the subsector (in terms of efficiency, equity, progressiveness, and other dimensions of performance that may be of interest to those carrying out the analysis). This analysis should concern not only the current performance of the subsector, but likely future performance as well. Predictions about future performance will take into account what the analysts know about the evolving supply and demand conditions facing the subsector (e.g., the need to meet increasingly strict standards to compete in the export market).

²The subsector approach goes by several names and has been developed independently by analysts working in different countries and disciplines. Other frequently used terms are sub-systems approach, channel mapping, commodity systems approach, and, in francophone countries, the *filière* approach.

4. Analyzing possible forces of change affecting the subsector and their implications for subsector performance. These are the forces that will modify the supply and demand conditions facing the subsector. They include, among others, changes in government policies, institutions, technologies, shifts in the sources of supply of competing products, and the evolution of demand, both nationally and internationally.

Subsector analysis is guided by five key concepts:

1. **Verticality.** This is a basic systems notion that means that the conditions at one stage in the subsector are likely to be strongly influenced by conditions in other stages in the vertical chain, often in indirect and unexpected ways. For example, small-scale manufacturers may view lack of working capital as their main constraint. However, that constraint may arise because of the poor functioning of the system that supplies inputs to these firms. Because inputs are available irregularly, firms are forced to stockpile inputs when they are available, greatly increasing their working capital needs. Resolving the “upstream” input supply problems in the subsector may therefore reduce the credit constraints downstream.
2. **Effective Demand.** Subsector analysis views effective demand as the pump that pulls goods and services through the vertical system. Therefore, the approach emphasizes:
 - a. Understanding the dynamics of how demand is changing at both the domestic and international levels (including the evolution of different niche markets) and the implications of that evolution for subsector organization and performance. For example, tighter product specifications to compete in export markets may imply a need to shift from reliance on spot markets to more precisely specified contracts between farmers and exporters.
 - b. Examining possible barriers to the transmission of information on the changing nature of demand back to producers at various levels of the subsector. For example, do current price differentials by grade really reflect how much processors value different qualities of raw product?
3. **Coordination within Channels.** Much of subsector analysis involves analyzing how well current market, contract, vertical integration, or other types of arrangements harmonize and coordinate the activities of different actors within the subsector. Among other things, this analysis involves examining the implications for how these arrangements affect who bears risk in the system and what the incentives are for the different actors in the subsector to invest in improving the productivity of the system. This concern with coordination gives subsector analysis a strongly institutional flavor, as changing the basic institutions of exchange strongly influence subsector performance.
4. **Competition between Channels.** A given subsector may often involve more than one

marketing channel. For example, some proportion of a product (say bananas) may be destined for export, involving a certain set of actors and institutional arrangements, while the rest may be destined for the domestic market. Or one channel for a given product (e.g., sorghum beer in Botswana) may involve large-scale firms and another may involve small and medium enterprises (SMEs), using very different technologies. Yet the two different channels may compete with each other for inputs or for clients in the output market. Subsector analysis attempts to understand that competition and examine how it might be modified to achieve better economic performance. (E.g., what are the possibilities for the larger firms to subcontract part of their production through SMEs?)

5. **Leverage.** Particularly where a large number of small firms are involved, it may be very costly to develop public actions that seek to help each firm individually. Therefore, subsector analysis seeks to identify key nodes in the production-marketing sequence where actions can help a large number of firms at once. Often this involves working with producers of a key input sold to a large number of firms (e.g., improved malt in the case of small-scale brewers in Botswana) or at wholesale markets where a large number of small sellers converge.

III. SUMMARY AND CONCLUSIONS

The subsector approach represents one tool for analyzing agriculture-industry links and for operationalizing some of the objectives of the Alliance for Africa's Industrialization. In particular, subsectors can be viewed as:

1. A set of economic activities, actors, and the rules governing them. This may give insight into how policy changes (e.g., via liberalization packages) may affect the links between industry and agriculture.
2. A conceptual way of analyzing economic performance (which makes more explicit the debate about what goals a country seeks from its economy).
3. A way of organizing research and action plans. For example, some success has been achieved in many countries by organizing ad-hoc subsector task forces, which combine actors and policy makers from all stages of the subsector to help diagnose constraints to improved subsector performance and design action plans to overcome those constraints. Mali has instituted such a task force in recent years to address development challenges in the maize subsector.

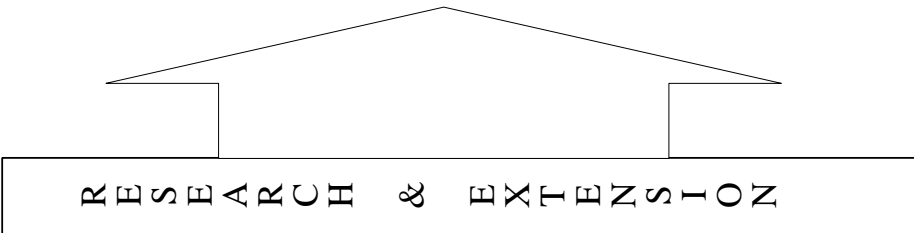
The subsector approach is not suited to address all the problems of agriculture-industry linkages. For example, it is not designed to analyze constraints within the firm to improved performance, nor is it well-suited to address certain issues, such as financing, that may cut across several subsectors. It is, however, one way of beginning to come to grips with how to coordinate better aimed at improving the performance of both agriculture and industry.

IV. Selected References

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Figure 1. Food System (Agricultural Sector) Matrix

PRODUCTION AND DISTRIBUTION FUNCTIONS	SUBSECTORS						
	Millet	Sorghum	Maize	Cotton	Rice	Peanuts	...
Input Distribution							
Farm-Level Production							
Processing							
Storage							
Assembly							
Transportation							
Wholesaling							
Retailing							
Financing							
Consumption							



▲ ——— FARMING SYSTEMS APPROACH ——— ▼
 S U B S E C T O R A P P R O A C H

SOURCE: Boughton et al. (1995)

**COORDINATION/
EXCHANGE**

FUNCTIONAL STAGES

**TYPICAL
COMBINATIONS**

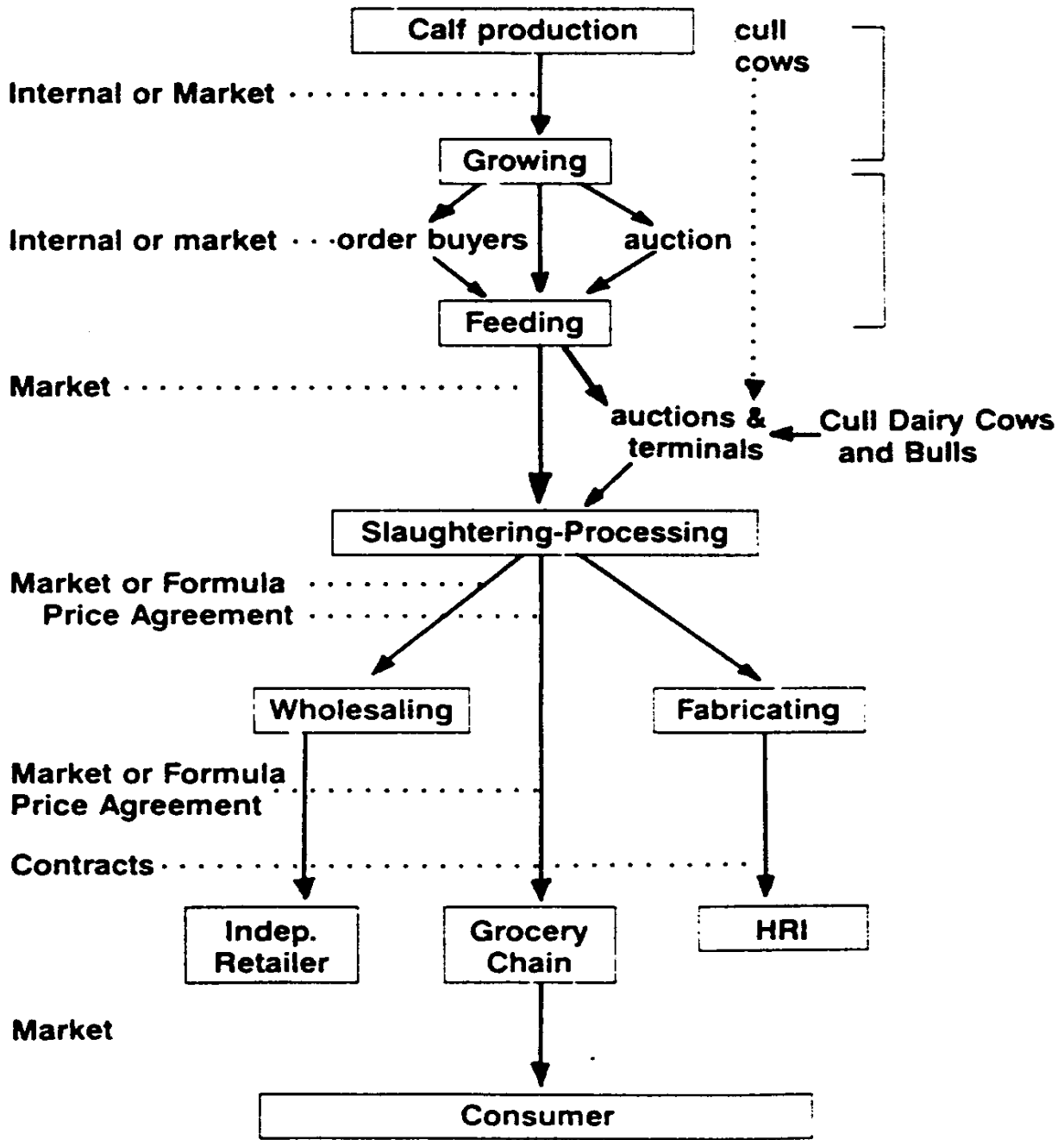


Figure 2. Organization of the U.S. Beef Subsector
Source: Marion et al. (1986), p. 125

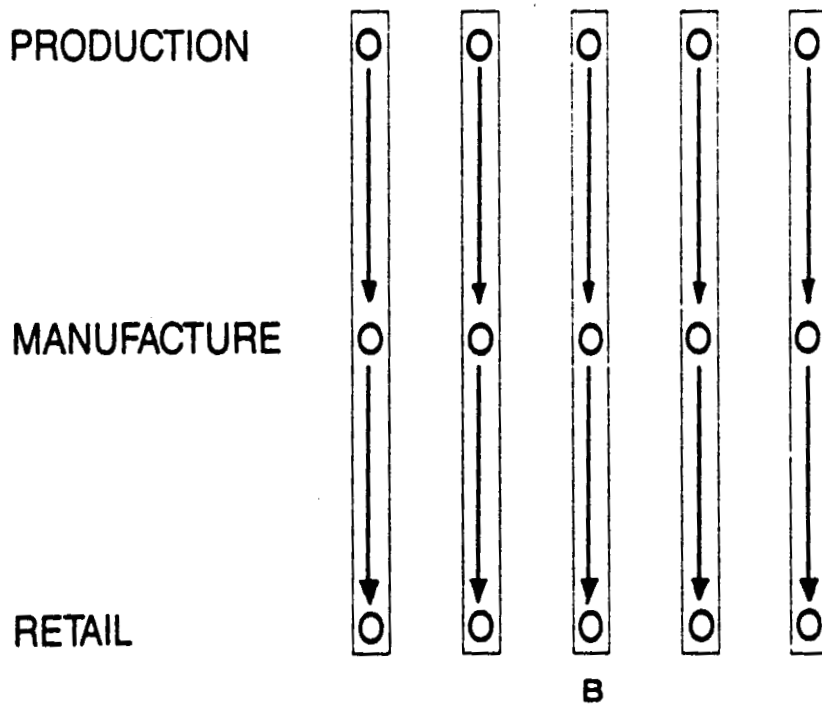
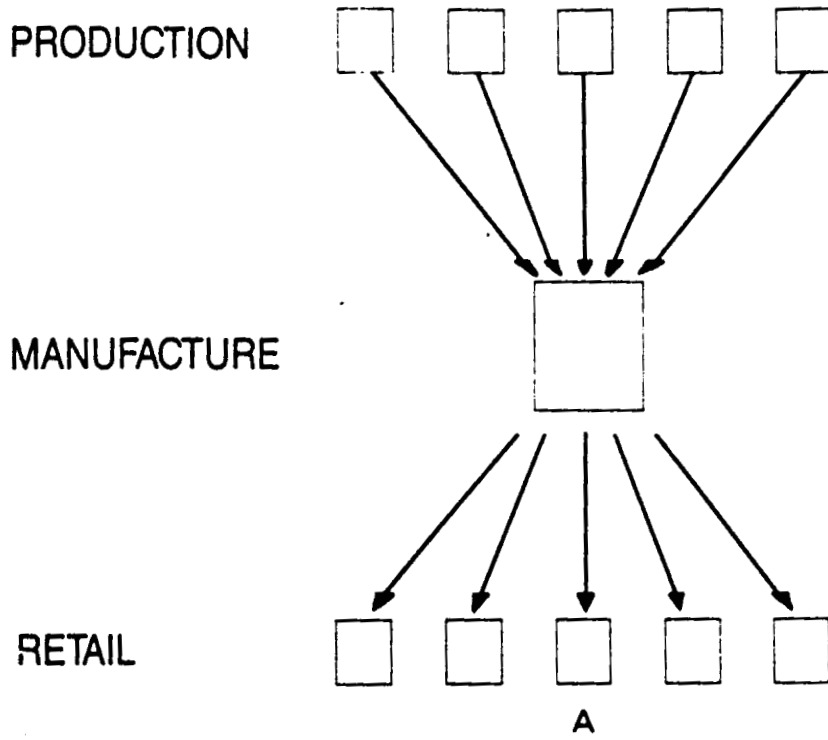


Figure 3. Illustration of Three-Stage Subsector with Two Alternative Organization:
Source: Marion et al. (1986), p. 57

Botswana's sorghum beer subsector, 1982.

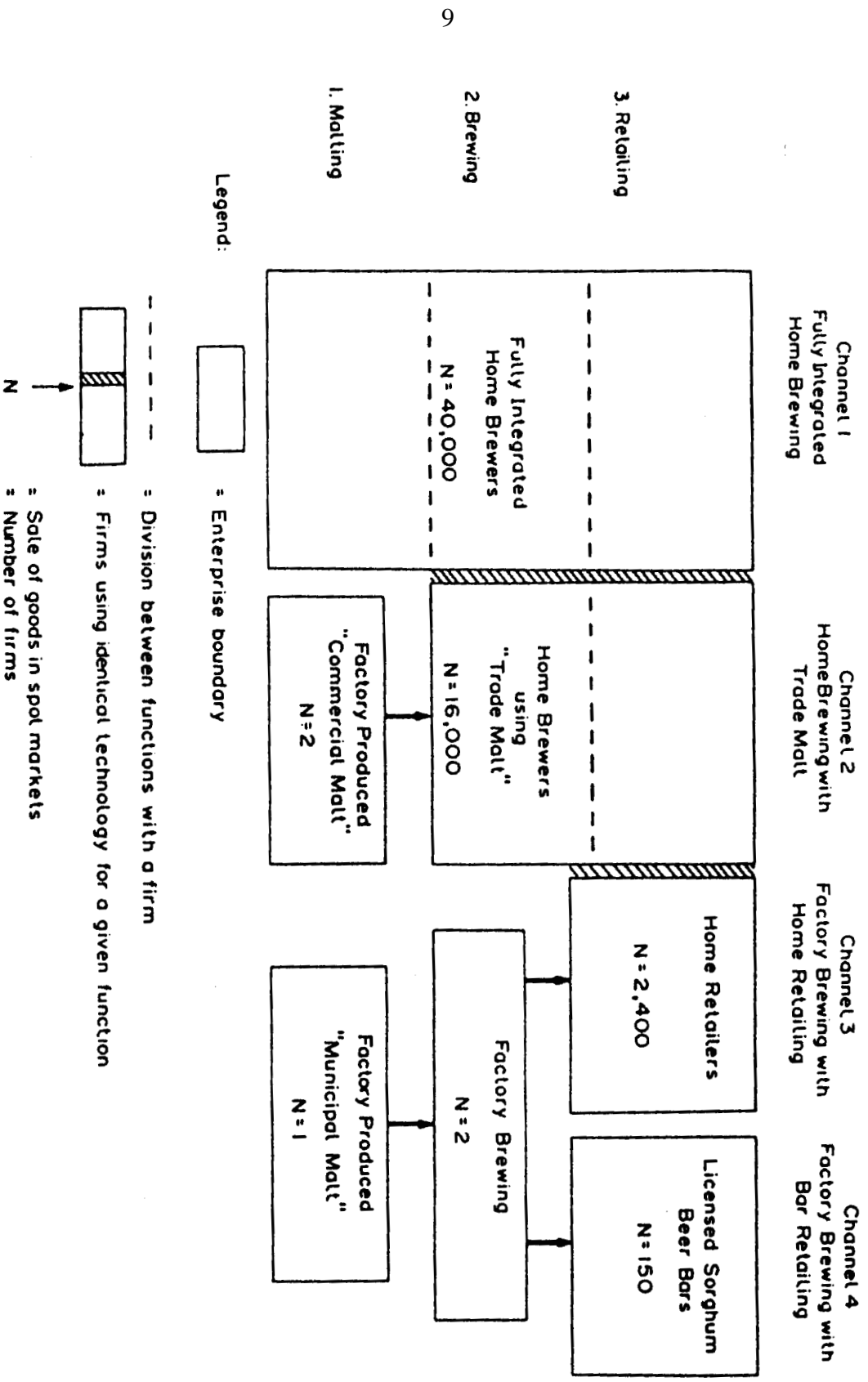


Figure 4. Botswana's sorghum beer subsector, 1982.
Source: Boomgard et al. (1992), p. 203