A COUNTY ECONOMIC BASE STUDY: AN INPUT-OUTPUT APPROACH

by

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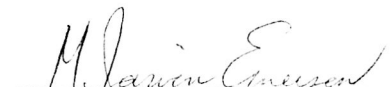

Major Professor

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CHAPTER I

INTRODUCTION

"The economic base of a community consists of those activities which provide the basic employment and income on which the rest of the local economy depends."[1] This often-quoted statement presents an important concept in the field of regional economic analysis. An economic base study examines the sources of income and employment within the local community.

During the past three decades, this concept has been widely applied to various communities across the United States. Efforts have been made to determine the structure of the communities from such a study.

The purpose of this thesis is to attempt to adapt the economic base methodology to the county unit in a basically agricultural environment. The methods employed will differ somewhat from the traditional base analysis. In recent years, economic analysis of the subnational or regional areas, has become extremely popular. The use of Walter Isard's regional input-output techniques[2] can easily be

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[1] Charles M. Tiebout, The Community Edonomic Base Study, (New York: Committee for Economic Development, 1962), p. 9.

[2] Wassily W. Leontief, et al. Studies in the Structure of the American Economy, (New York: Oxford University Press, 1953), pp. 116-181.

adapted to the traditional analysis. The model employed by Isard is an adaptation of the general equilibrium framework developed by Wassily W. Leontief.[3]

The analytical procedures herein devised were applied to Finney County, Kansas. Finney County is located in Southwestern Kansas approximately 225 miles south of Denver, Colorado, 350 miles southwest of Kansas City, Missouri, and 220 miles northwest of Oklahoma City, Oklahoma. Such a location places Finney County in the heart of one of the most important dryland farming areas in the United States.

The county is primarily an agricultural and oil producing area. Agriculturally it produces wheat, milo, and cattle. Due to its geographic location, being situated on the Hugoton gas field, it is a large supplier of natural gasoline.

The urban structure of the area was desirable for such a study. Finney County itself has but one city of any size, that being Garden City with a population of 11,811. Thus considering the size and structure of the area, it was compatible with the time and resources available for this study.

Table I presents the population of Finney County and its county seat, Garden City in the years 1940, 1950, and

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[3] Wassily W. Leontief. The Structure of the American Economy, 1919-1939 (2nd ed.; New York: The Oxford University Press, 1951).

TABLE 1

POPULATION IN GARDEN CITY AND FINNEY COUNTY IN 1940, 1950, AND 1960[4]

	1940	1950	1960
Garden City	6,285	10,905	11,811
Finney County	10,092	15,092	16,093

[4]U. S. Department of Commerce, Bureau of the Census, U. S. Census of Population, 1960, Number of Inhabitants, Kansas. Washington, D. C.: U. S. Government Printing Office, 1961, p. 18-18.

1960. The data shows that both the city and the county grew in terms of population during the war decade of the 1940's, a situation typical of many Kansas areas. During the 1950's, the population growth tapered off.

It is important to stress at the outset of this study that there is no most appropriate area for such analyses. It is convenient to follow the boundaries of governmental units as public information is usually made available on that basis. Such a methodology, however, can and has been applied to metropolitan areas, shopping areas, river basin areas, market areas, and to nations as a whole.

The objective of this analysis was to determine the quantitative strength of economic forces which give rise to Finney County income and employment. In addition to mere delineation, an attempt was made to show the flows and interactions that take place within the sectors of the Finney County economy.

In Chapter II, the historical development of the economic base concept will be examined. Chapter III will outline the detailed methodology employed in this study. Chapter IV will compare the Finney County methods with alternatives that might have been used. That chapter will give definite justifications for the procedures employed.

In Chapter V, the results of the Finney County study will be presented. The findings will be put forward in several different manners for clarification. In Chapter VI,

a detailed interpretation of the results will be made. This analysis will lead to a number of conclusions concerning the Finney County economy. These will include conclusions of interdependence, the possibility of production bottlenecks, potentials for economic stability, the state of development of the economy and several others. Chapter VII will summarize the methodology and the empirical results.

CHAPTER II

THE DEVELOPMENT OF THE ECONOMIC BASE CONCEPT

Historic Background of the Traditional Economic Base Analysis

The evolutionary growth of the theory of the economic base represents a varied mixture with many different sources. Contributions to this growth have come from such diverse origins as urban geographers, land economists, city and regional planners, businessmen, and more recently, regional economists.

As early as 1921, the basic and non-basic differentiation of the community was acknowledged. The first expression of the dualistic nature of the local economy appears to originate with a geographer by the name of Aurousseau.

> The primary occupations are those directly concerned with the function of the town, the secondary occupations are those concerned with the maintenance of the well-being of the people engaged in those of primary industries.[1]

The concept then appears to have laid relatively dormant until recovery began after the Great Depression. The Federal Housing Administration used data concerning the economic base in developing its mortgage risk rating

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[1]M. Aurousseau, "The Distribution of Population: A Constructive Problem," Geographical Review, XI (October, 1921), 574.

system. Economist Homer Hoyt was hired to make a number of different economic base studies.[2]

Under Hoyt's initiative, Aurousseau's "primary" and "secondary" occupations became "basic" and "service" occupations. Hoyt elaborated his views in cooperation with Arthur M. Weimer in their book, Principles of Real Estate.[3] Here for the first time, a theory of the economic base was presented in the literature. Hoyt pointed out that the local community is in no position to be self-sufficient. The community must produce goods which can be sent out of the local area in exchange for money which is used to buy necessary items it cannot produce. Business establishments which produce goods or services for use by people outside its boundaries are termed "basic industries."[4]

Every person employed in a basic industry supports about one other person in the "service industries."[5] Service employment includes such jobs as retail sales, professional services, construction, local transportation, local schools, i.e. jobs which are primarily locally oriented for markets.

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[2]Federal Housing Administration, Basic Data on Northern New Jersey Housing Market (July, 1937); Hartford, Connecticut Housing Market Analysis (March, 1938); Akron, Ohio Housing Market Analysis (November, 1938); Indianapolis, Indiana Housing Market Analysis (August, 1939).

[3]Arthur M. Weimer and Homer Hoyt, Principles of Real Estate (Rev. ed.; New York: The Ronald Press Company, 1948).

[4]Ibid., p. 109.

[5]Ibid.

Originally Hoyt thought the basic-service job ratio was 1:1. Later, however, he modified his views and stated that the ratio varied from community to community.

Just prior to the publication of Weimer and Hoyt's book, the business world made a meaningful contribution to the theory and analysis of the economic base. In 1938, Fortune published an article entitled "Oskaloosa vs. The United States."[6] The researchers treated the city of Oskaloosa, Iowa, as a nation, and applied the international trade concept of "balance of trade" to the city.

The balance of trade concept is used to compare an economy's exports with its imports. If the value of the exports exceed the value of the imports, this balance is said to be favorable. In Oskaloosa, it was found that the Iowa city had a favorable balance of trade for 1937 of $339,000.[7] This means that the value of the Oskaloosa economy's exports were responsible for adding $339,000 to the city's wealth after deduction for imports.

Great detail was used to examine the various sources of income and disbursement.[8] This study is of particular interest in the present context as it represents the first and one of the few attempts to apply a comprehensive base

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[6]"Oskaloosa vs. The United States," Fortune, XVII (April, 1938), 54-62. 124-132.

[7]Ibid., p. 56.

[8]Ibid., pp. 58b-58c.

analysis to a rural area.

The use of the foreign trade concept then became an integral part of many of the economic base studies that followed. It has been applied to larger urban areas with varying degrees of success.

During the 1940's, little was added to the analytical methods of theory of the economic base. It was primarily a period of review and verification of existing theories. The economic base studies that were produced followed traditional patterns.

Beginning in 1953, a new interest was shown in the economic base concept. Richard B. Andrews of the University of Wisconsin, published a series of articles on all aspects of the idea in Land Economics.[9]

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[9]Richard B. Andrews, "Mechanics of the Urban Economic Base: Historical Development of the Base Concept," (May, 1953), 161-167; "Mechanics of the Urban Economic Base: The Problem of Terminology," (August, 1953), 263-268; "Mechanics of the Urban Economic Base: A Classification of Base Types," (November, 1953), 343-350; "Mechanics of the Urban Economic Base: The Problem of Base Measurement," (February, 1954), 52-60; "Mechanics of the Urban Economic Base: General Problems of the Base Identification," (May, 1954), 164-172; "Mechanics of the Urban Economic Base: Special Problems of Base Identification," (August, 1954), 260-269; "Mechanics of the Urban Economic Base: The Problem of Base Area Delimitation," (November, 1954), 309-319; "Mechanics of the Urban Economic Base: The Concept of Base Ratios," (February, 1955), 47-53; "Mechanics of the Urban Economic Base: Causes and Effects of Change in the Base Ratios and the Ratio Elements (I)," (May, 1955), 144-155; "Mechanics of the Urban Economic Base: Causes and Effects of Changes in the Base Ratios and the Base Ratio Elements (II)," (August, 1955), 245-256; "Mechanics of the Urban Economic Base: Causes and Effects of Change in the Base Ratios and the Base Ratio Elements (III)," (November, 1955), 361-371. All articles appear in Land Economics, volumes XXIX-XXXI.

Andrews stated at the outset of his series that he planned to present a "comprehensive description, analysis, and criticism of the mechanics of the urban economic base."[10] Although original thought is lacking in Andrew's work, he did make a significant contribution with his meticulous examination of the concept's development. It is an extremely comprehensive review, and in that context, a landmark.

In 1953, an urban geographer, also from the University of Wisconsin, published an article in the journal, Economic Geography.[11] Alexander presented a thorough examination of the employment ratios between basic and non-basic industries.

As will be remembered, Hoyt felt originally the basic-nonbasic ratio was 1:1.[12] Alexander found in two studies that he had conducted in Oshkosh and Madison, Wisconsin, that the basic-nonbasic ratio were 100:60 and 100:82 respectively.[13] In concluding, Alexander questioned the usefulness of any generalization in the use of basic-nonbasic ratios.

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[10] Richard B. Andrews, "Mechanics of the Urban Economic Base: Historical Development of the Base Concept," Land Economics, XXIX (May, 1953), 161.

[11] John W. Alexander, "The Basic-Nonbasic Concept of Urban Economic Functions," Economic Geography, XXX (July, 1954), 246-261.

[12] Hoyt, op. cit.

[13] Alexander, op. cit., p. 258.

Before proceeding further, it might be advantageous to summarize the development of the economic base concept to 1955. Emphasis was primarily placed upon the dualistic nature of a community's economy. Basic industries were considered to be those which brought money into the community from beyond its own borders, and thus were felt to a large degree to be responsible for economic growth. Gunnar Alexandersson has aptly renamed these basic activities "city-forming industries."[14]

Those activities which were locally oriented, and whose existence were dependent upon the city-forming industries were termed "city-serving producers."[15] All writers agreed that the city-forming industries constituted the raison d'etre of the city. Emphasis in study has been placed upon this sector.

The exact ratio of basic-nonbasic employment was examined. The general conclusion, although unstated in the literature, appears to be that wide variation exists. Therefore one can conclude that the basic-nonbasic ratio cannot be used for comparison, but only for use in examining the individual local community.

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[14] Gunnar Alexandersson, The Industrial Structure of American Cities (Lincoln, Nebraska: University of Nebraska Press, 1956), p. 15.

[15] Ibid.

Modern Developments in the Economic Base Concept

In the 1950's, the emphasis placed on traditional base analysis began to change somewhat. This appears to have been due to two primary reasons.

The first reason was the speculation that perhaps the community economic base was too small to be a determinate of national economic progress. This was expressed as early as 1949 in papers presented in the annual proceedings of the American Economic Association.[16] The broader territorial view of economic problems appeared to be gaining importance relative to the community studies.

The second reason was the development of a tool of economic research: regional input-output analysis. The theoretical base for input-output analysis was far from new, as the general equilibrium framework had been laid as early as 1889 by Walras.[17] The concept was empirically implemented by Wassily Leontief and today input-output and the name Leontief are practically synonymous. Two authoritative works

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[16]Rutledge Vining, "The Region as an Economic Entity and Certain Variations to be Observed in the Study of Systems of Regions," American Economic Review, Papers and Proceedings of the American Economic Association, XXXIX (May, 1949), 89-104, and Phillip Neff, "Interregional Cyclical Differentials: Causes, Measurements, and Significance," 105-119.

[17]Leon Walras, Elements of Pure Economics or the Theory of Social Wealth (Royal Economic Society, ed.; Norwich, England: Jarrold and Sons, Ltd., 1954).

on input-output appeared during this period, The Structure of the American Economy, 1919-1939[18] and Studies in the Structure of the American Economy.[19]

Input-output analysis is basically a method of studying the flows of goods and services that pass through an economy. It is well known that the outputs of some industries become the inputs or raw materials of other industries. Perhaps their outputs will also become the materials used to make still another item. Input-output analysis follows this process through from its inception (mining a mineral or growing a crop) to the time when a good is sold to a consumer. Even then the process does not actually end, as industries located at the beginning of this chain use inputs (for instance, drills in mining and tractors in agriculture), and the final consumer has an output (labor).

At the outset of The Structure of the American Economy, 1919-1939, Leontief states the purpose of input-output analysis as being "an empirical study of inter-relations among the different parts of a national economy."[20]

Input-output analysis capitalizes on the economic fact that there is a relatively stable pattern of flows of goods and services among the elements of an economy.

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[18] Leontief. Structure of the American Economy, 1919-1939.

[19] Leontief et al. Studies in the Structure of the American Economy.

[20] Leontief. Structure of the American Economy, 1919-1939, p. 3.

The application of input-output analysis to sub-national or regional areas provides the potential for a study of a segment of a national economy. In dealing with regional areas in contrast to the nation as a whole, it is possible to put greater emphasis upon the leading industries of an area.

When input-output analysis is applied on the regional level, it is discovered that a larger number of regional outputs leave the area than is the case for a national study. Yet, if every area were to construct an input-output matrix, it would be discovered that all regional outputs either become inputs within that region, become inputs for some other region within the country, or become inputs for some foreign nation's economy. The essential point is that every output becomes an input somewhere.

The region itself can be as large or as small as the researcher desires. In the case under study, this methodology was applied to a Kansas county. The county herein examined, is what economists call an "open economy," meaning that the county is relatively dependent upon exports and imports, and trades extensively with other areas. There is a constant and unrestricted flow of goods in and out of the county. In this particular county, exports are an important means of livelihood for its citizens.

With this in mind, it can be seen how the input-output analysis can be fused with the basic concepts of the traditional economic base analysis. Input-output analysis can be

used as a method of studying the industries which export goods from the area. Input-output goes one step further, however, and can be used to study the economic interrelations that exist within the economic base itself.

Two examples employing this joint methodology are worthy of note: Hirsch's study, "An Application of Area Input-Output Analysis,"[21] and the Hansen-Tiebout study, "An Intersectoral Flows Analysis of the California Economy."[22] One of these studies examines a city, the other a state economic unit.

Hirsch's study of the St. Louis, Missouri economy, was designed fundamentally to show the interrelationships among the sectors of that economy. He presents hypothetical data showing the increases in final demand of various sectors if there were an increase in the final demand for transportation equipment (other than motor vehicles) of $100 million. The data gained concerning the economic base must be made relatively indirectly, as the traditional emphasis on exports is omitted.

The Hansen-Tiebout study of the California economy adds an export column to the input-output matrix. Thus by

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[21] Werner Z. Hirsch, "An Application of Area Input-Output Analysis," Papers and Proceedings of the Regional Science Association, V (1959), 79-92.

[22] W. Lee Hansen and Charles M. Tiebout, "An Intersectoral Flows Analysis of the California Economy," The Review of Economics and Statistics, XLV (November, 1963), 409-418.

use of the Hansen-Tiebout transactions matrix, measured in terms of employment, one can see the 40.1 per cent of the employment in the apparel industry provides goods to be consumed by the public outside the state boundaries of California.[23] Likewise, in the chemical industry, 26.8 per cent of the total employment in that industry provides goods consumed within the state, while the remainder is exported from California.[24] Returning to Hoyt's terminology, 26.8 per cent of the California chemical industry is of the "service" classification, while the remainder is "basic."

Both the Hirsch study and the Hansen-Tiebout study present a wealth of information beyond the traditional basic-nonbasic division of industries. Transactions within the economic base can be exposed. Planning for industrial expansion is facilitated, as sectors composed of unprocessed goods enter directly into the export column.

Summary

Thus, the development and sophistication of the traditional economic base analysis has been traced from its early conception to the present. Many notable contributions have been omitted from this review as they failed to contribute directly to the present study. Some, which

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[23] Ibid., p. 412.

[24] Ibid.

might be considered contributory to this analysis, have also been omitted if their contributions were paralleled by those studies cited.

In the analysis to follow, this writer has drawn heavily upon the contributions of Hoyt, Isard, Hirsch, and Tiebout. The primary problem encountered has been one of adapting a theory and methodology that was created for and tested in the urban environments to an area that is primarily agricultural. The data concerning industry is presented, but is not complete without the important agricultural sectors.

CHAPTER III

DEVELOPMENT OF METHODOLOGY

Objectives

The technique employed in this study constitute a union of the traditional base study approach and the input-output approach. Results from the study will be presented in both forms.

The specific objectives of the study can be enumerated as follows:

1. To determine what enterprises comprise the economic base of Finney County;
2. To determine to what degree interaction takes place within the Finney County economy;
3. To determine what constitutes the major sources of income and employment within the economy; and
4. To determine what peculiar characteristics the county's economy possesses.

Theoretical Background of Input-Output Analysis

In order to demonstrate the input-output technique employed, consider the following hypothetical economy. Suppose there are three parts or sectors in the economy: agriculture, mining, and manufacturing.

The transactions among these three major sectors are then set up in a transactions matrix of horizontal rows and vertical columns. For simplification, assume that all output of one sector becomes the input or is consumed by these three industries.

Table 2 presents the matrix that has been described.

If it is assumed that the numerical data presented in Table 2 are expressed in thousands of dollars, then it would be evident that in this hypothetical economy, the total output of agriculture was $44 thousand, of mining, $37 thousand, and of manufacturing, $41 thousand. Of the manufacturing output, $11 thousand in sales output became an input for the agricultural sector. In other words, the agricultural sector purchased $11 thousand worth of items from the manufacturing sector in order to produce $44 thousand in output. The mining industry consumed $9 thousand of manufacturing outputs to create a mining output of $37 thousand. Finally, manufacturing enterprises used $21 thousand of output from other manufacturing enterprises to turn out $41 thousand of manufacturing output.

It will be noted that the total sum of the columns must equal the total sum for the rows in this closed economy. Under the conditions of this most simple model, all outputs become an input for one of the three sectors shown.

This demonstrative model can easily be transposed into algebraic terms to verify the logic involved. Assume that the capital letter "A" represents the total output of the

TABLE 2

HYPOTHETICAL INPUT-OUTPUT MATRIC OF
AN ECONOMY WITH THREE SECTORS
(In Thousands of Dollars)

Purchsing sectors: Processing sectors:	Agriculture	Mining	Manufacturing	Total
Agriculture	8	1	35	44
Mining	7	2	28	37
Manufacturing	11	9	21	41
Total	26	12	84	122

agricultural sector, the output of which is used by all three sectors. The capital letter "B" represents the total output of the mining sector, the output of which is used by all three sectors. Finally, the capital letter "C" represents the total output of the manufacturing sector, the output of which is also used by all three sectors. Likewise assume that the small letter "a" represents the total inputs of the agricultural sector (including inputs from its own output). In the same manner, the small letter "b" represents the total inputs of the mining sector and the small letter "c" represents the total inputs of the manufacturing industry. Assume further that there is no capital accumulation, no changes in inventories, and that all outputs are used. This yields the following set of equations:

(1)
$$+ A - a - b - c = 0$$
$$- a + B - b - c = 0$$
$$- a - b + C - c = 0.$$

This of course means that the entire output of each of the three industries is used by the three industries as inputs.

Substituting in the figures used in the demonstrative model, a second set of numerical equations are obtained:

(2)
$$+ 44 - 8 - 1 - 35 = 0$$
$$- 7 + 37 - 2 - 28 = 0$$
$$- 11 - 9 + 41 - 21 = 0.$$

To this point, a tightly closed economy has been visualized. There were no exports from the economy, only

the three sectors: agriculture, mining, and manufacturing.

The difference between an "open" and "closed" economy hinges on the interaction of products from the area under study and other areas. In the hypothetical example visualized above, all outputs became an input for some sector in the three sector economy. There were no exports and no change in inventories.

Such an example is unrealistic. No area in a modern economy is completely self-sufficient, but it must import goods from outside the area, and pays for these imports by exporting the goods it produces. In order to create a model that is open, exports must be taken into account.

The process of allowing for exports is equally simple. The problem can be visualized most easily if it is assumed that external trade constitutes an industry. Goods shipped from the country become the inputs of the "export industry."

At this point two steps will be taken simultaneously. If it is assumed that what is left over from output of the three original sectors, after inputs of the three sectors are taken into account, is exported, then exports are treated as a residual.

With this step, recalling that basic industries are those enterprises within the community that sell their outputs beyond the boundaries of the local community, the traditional base analysis is brought into perspective. By employing a third set of equations, with the small letter "e" representing inputs into the export sector, the following is obtained:

(3)
$$+A - a - b - c = e_1$$
$$-a + B - b - c = e_2$$
$$-a - b + C - c = e_3$$

Equation 3 could be translated into words. Taking the first line of Equation 3 for an example, the capital letter "A" represents the total agricultural output of the economic unit under consideration. The small letters "a", "b", and "c" represent the input of agriculture, mining, and manufacturing as before. These inputs are assumed to come from within the local economy, and are subtracted directly from the local economy's output of agricultural commodities. After the need for inputs is filled, some of output "A" is left over. This residual is exported from the local economy, and becomes an input in some other economy. In other words, the small letters, representing inputs, in each line of the equation have the same total value as the value of the capital letters, which represents the economy's output of that commodity. The small letters then are uses for which that output is employed.

The same holds true for outputs "B" and "C" in the second and third line of Equation 3. Some of these outputs become local inputs, the remainder is exported.

The local agricultural, mining and manufacturing industries may have need of other inputs that are not produced in the local economy. The sum of these additional inputs represents the total imports into the economy. Since exports are used to pay for imports, the conclusion follows that the

value of the quantity ($e_1 + e_2 + e_3$) is equal in the long run to the value of these imports. If inventories are assumed to be constant, and deficit financing is not allowed, then imports equal exports in the short time period as well.

The sum of the quantity ($e_1 + e_2 + e_3$) represents the total exports of the economy. Consequently, they are the basic sector of the economy.

Items to the left of the equality signs represent the service sectors of the local economy, as these outputs are used for local consumption.

It should be clear at this point that the basic sector is somewhat understated. Suppose there are two firms in the local community. Firm I manufactures galvanized steel that is used in the canning industry. Firm I sells its entire output to Firm II, located next door, which is engaged in canning. In turn, Firm II sells its entire output outside the local community. In this scheme then, Firm I is a 100 per cent service industry, while Firm II is 100 per cent basic. In reality it is evident that Firm I, although indirectly, is equally of the basic category.[1]

In a case where the matrix cells are all filled, this could lead to an infinite progression. Fortunately in the area under consideration,[2] such was not the case. Due to

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[1]Despite this apparent complication, this all or none approach is the basis of computing exports in current national income accounts.

[2]See Table 7.

the small indirect percentages involved, the export sector could be limited to direct exports.

Returning now to the original three sector economy, it can be seen that the system of equations is indeterminate in its present state. Obviously there are twelve unknowns and only three equations. Input-output analysis solves this problem by assuming constant productivity coefficients for the hypothetical closed economy, as in Table 3.

These coefficients were attained by the following processes: .182 equals the ratio of $8 thousand of inputs from agriculture to produce an agricultural output of $44 thousand; .159 equals the ratio of $7 thousand of inputs from mining to produce an agricultural output of $44 thousand; .250 equals the ratio of $11 thousand of inputs from manufacturing to produce an agricultural output of $44 thousand.

To interpret these productivity coefficients, one could say that for every dollar in agricultural output from the agricultural sector, $0.182 in inputs from the agricultural sector, $0.159 in inputs from the mining sector, and $0.250 in inputs from the manufacturing sector.

Turning to the manufacturing sector, one finds a sector that would not long survive in an open competitive condition. In order to produce one dollar in manufacturing output, the firm must use $2,049 in inputs from the three sectors.

TABLE 3

PRODUCTIVITY COEFFICIENTS FOR HYPOTHETICAL THREE-SECTOR ECONOMY

Purchasing Sectors: Processing Sectors:	Agriculture	Mining	Manufacturing
Agriculture	.182	.027	.854
Mining	.159	.054	.683
Manufacturing	.250	.243	.512

The model employed for the Finney County economy is an open model, which includes interaction with the outside world. This is primarily of the type shown in Equation 3. Simplified hypothetical data could also be substituted into this model for illustrative purposes.

Assume again that an economy exists with three sectors, but that these sectors (agriculture, mining, and manufacturing) produce more that is needed in the local community and therefore export some of their outputs. Using the same assumptions regarding no capital accumulation or increase in inventory, the hypothetical economy is portrayed in Table 4.

The interpretation for Table 4 is the same as for Table 2, except that here $12 thousand dollars in agricultural outputs are exported, as are $14 thousand of mining outputs, and $11 thousand of manufacturing outputs.

Table 5 presents the productivity coefficients for the transactions matrix in Table 4. The interpretation is the same here as in Table 3.

At this point, the model is approaching a model that can be solved algebraically and is thus of some value. Substituting the values used in Table 4 into Equation 3 results in Equation 4.

(4)
$$\begin{aligned} +31 - 8 - 5 - 6 &= 12 \\ -10 + 32 - 6 - 2 &= 14 \\ -4 - 5 + 25 - 5 &= 11 \end{aligned}$$

TABLE 4

HYPOTHETICAL INPUT-OUTPUT MATRIX OF AN ECONOMY
WITH THREE SECTORS AND PROVISION FOR EXPORTS
(In Thousands of Dollars)

Purchasing Sectors: / Processing Sectors:	Agriculture	Mining	Manufacturing	Exports	Total
Agriculture	8	5	6	12	31
Mining	10	6	2	14	32
Manufacturing	4	5	5	11	25
Total	22	16	13	37	88

TABLE 5

PRODUCTIVITY COEFFICIENTS FOR HYPOTHETICAL THREE-SECTOR ECONOMY WITH PROVISION FOR EXPORTS

Purchasing Sector: / Processing Sectors:	Agriculture	Mining	Manufacturing
Agriculture	.258	.156	.240
Mining	.323	.188	.080
Manufacturing	.129	.156	.200

By substituting the productivity coefficients into Equation 3, one obtains the determinate Equation 5, as e_1, e_2, and e_3 are known. Thus in this simplified example, there are three equations and three unknowns. Only the outputs A, B, and C are unknown.

$$(5) \qquad + A - .258A - .156A - .240A = e_1$$
$$- .312B + B - .187B - .080B = e_2$$
$$- .128C - .156C + C - .200C = e_3$$

This is a simplified version of the model that will be applied to the Finney County economy.

The Problems of Input-Output Analysis

The question remains how the productivity coefficients are obtained? The method used in this study was to inquire of the productive units in the county as to where their outputs were sold. This information provides the basis for the construction of a transactions matrix for Finney County, which in turn provides the productivity coefficients.

With the introduction of the productivity coefficients, a problem is encountered, Recalling the productivity coefficients presented in Table 5, for one dollar in agricultural output, the agricultural sector employs as inputs $0.258 from agriculture, $0.312 from mining, and $0.128 from the manufacturing sectors. The question naturally arises that perhaps this is so if the total agricultural output is the hypothetical $31 thousand, but what if agricultural output should increase to $50 thousand? Are the productivity coefficients constant in

that the inputs remain the same per dollar of output?

Another problem encountered is one of aggregation. If the hypothetical manufacturing sector in Table 4 contains three firms, one which supplies automobiles, one which supplies apparel, and a third which supplies kitchen utensils, then the question arises, do these productivity coefficients apply to all the firms in the sector, or do they apply to any of them?

Input-output also encounters difficulty when dealing with problems of substitution. In conventional production theory, the entrepreneur continually substitutes his inputs so as to attain a position of maximum profits. This situation leads to a maximization of total revenue above total cost. In input-output analysis, the use of productivity coefficients in determining outputs omits this.

The Finney County study avoids these problems. In a national input-output study, these problems are of greater concern. In a national study, the productivity coefficients would show equal inputs for a steel mill in Pittsburgh, Pennsylvania and in Pueblo, Colorado. This is probably an unrealistic assumption although a necessary one. In the Finney County study, however, it is not unrealistic to assume that a beverage industry in east Garden City has about the same productivity coefficients as a beverage industry in west Garden City.

The problem of aggregation likewise is greater in a national input-output study. Leontief's 1939 study aggregated

the entire national economy into 46 sectors.[3] Thus Leontief's agricultural sector includes a multitude of diverse operations. In the Finney County study, however, due to the small number of industries present (in types as well as totals), it was possible to allow nine distinct sectors to the agricultural production industry.

Concerning substitution, again the problem is largely avoided in the Finney County study. Leontief feels that the substitution problem has probably been exaggerated beyond its true importance in discussion.[4] In the short run, according to Leontief, factor substitutions are unimportant.[5] The Finney County study itself pretends only to present a static picture of the economy as it existed in 1963.

In summary of these problems, it can be seen that perhaps criticism is justifiable in a national study of this type. Its proponents deny its applicability. Most certainly the smaller the unit under consideration and the more homogeneous the sources of income for the population, the less applicable this criticism becomes.

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[3]Leontief, Structure of the American Economy, 1919-1939.

[4]Ibid., p. 152.

[5]Quoted in Robert Dorfman, "The Nature and Significance of Input-Output," The Review of Economics and Statistics, XXXVI (May, 1954), 124.

Data Collection

With this general framework in mind, the actual methodology used in the Finney County study becomes more meaningful. To obtain the needed information thirty-three Finney County manufacturing establishments that were listed in the Directory of Kansas Manufacturers and Products[6] were interviewed. Due to the small number of manufacturing firms in the county, every manufacturing firm was interviewed. In addition to the thirty-three manufacturing firms, thirteen other interviews were conducted to determine the contribution to the economic base from such enterprises as petroleum, agriculture, and education.

The Directory of Kansas Manufacturers and Products listed both the firms and the various products produced by each firm. The listing of product classification was made in terms of the Standard Industrial Classification.[7] In preliminary examination of the economy, it was necessary to bear in mind the expositionary requirements of basic input-output analysis as outlined above. A questionnaire[8] was used to discover where and to whom the manufacturing firms

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[6]Kansas Department of Economic Development. Directory of Kansas Manufacturers and Products (Topeka, Kansas: Kansas State Printer, 1964).

[7]U. S. Bureau of the Budget, Standard Industrial Classification Manual (Washington, D. C.: U. S. Government Printing Office, 1957).

[8]Appendix A, page 100.

sold their products. By use of the "sales only" method, some shortcomings of data collection are encountered. Inputs from outside the county were not sought. Subsequently all input data from the firms questioned came originally from some other firm within Finney County. Imports can roughly be estimated, however. If it is known that sales beyond the boundaries of the local community are made in order to pay for the needed items the community must import, then at least in the long run, imports must be equal to exports. One can the conclude[9] that Finney County exports and imports are equal.

Due to limitations concerning time and resources available for the study, it was necessary to assume that the basic activities of Finney County would primarily be found in four areas: manufacturing, mining, agriculture, and education. To some degree this understates the economic base. Undoubtedly some retail activity is carried on beyond the Finney County boundaries. Trade area surveys of the county show, however, that trade areas roughly follow the county lines.[10] Thus as a percentage of the total economic base, retail trade appears to be a relatively minor addition.

Education might appear to be a rather unusual item to

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[9]This conclusion is strengthened by the fact that the population of the county is relatively stable.

[10]John W. Knox, Survey of Trade Areas in Southwest Kansas (MF - 112, Extension Service; Manhattan, Kansas: Kansas State University, December, 1962).

include in the economic base. Garden City is the location of the Garden City Junior College. Some students from outside the county attend the college and thus education becomes a type of export. The college brings money into the community from the students themselves, and the financial aid provided by the State of Kansas. Secondary and primary schools, however, are purely of the service industry classification, as their students are from the local area.

The tracing of agricultural production presented the greatest problem to the study. Most official agricultural data are published considerably after the actual harvest is made.[11] Various state and federal agencies attempt to estimate agricultural output, but this data is notoriously inaccurate.

The Finney County agricultural data was obtained through interviews with those firms which were agricultural focal points. Thus feed grain data was provided primarily by the grain elevators which collected the grain and shipped it out of the county. The Garden City Co-op Equity Exchange provided price data, considering both volume and time of the year. In this manner an accounting measure was added to the agricultural components of the economic base. Data on livestock

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[11]For the most recent published data, see U. S. Bureau of the Census, United States Census of Agriculture (Kansas, 1959); Farm Management Summary and Analysis Report (1962 Report, Extension Service; Manhattan, Kansas: Kansas State University, 1963); and Kansas State Board of Agriculture, Farm Facts: 1962-63 (1962 Report).

production was provided by estimates from feedlot operators and others concerned with the business.

In addition to the value of farm products, a further source of farm income originated from programs administered by the United States Department of Agriculture. These programs include subsidies for sugar beets, feed grain programs, commodity loans, and assistance for soil conservation practices. The programs are locally administered by the Agricultural Stabilization and Conservation County Committee and the United States Soil Conservation Service. The two agencies provided all the information necessary to trace the impact of governmental assistance to agriculture.[12]

Like agricultural data, mining data is also made available considerably after the calendar year is completed.[13] The data for mining was somewhat simpler to obtain, however. Finney County mining consists of production of oil, natural gasoline, and sand. Sand production is listed as a manufacturing process by the Directory of Kansas Manufacturers and Products,[14] so this data was obtained through the manufacturing interviews. The petroleum products industry is closely supervised by the Kansas Corporation Commission. The Commission is responsible for oil and gas extraction allowances in order to avoid

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[12]For details on agricultural data collection, see Appendix B, page 103.

[13]For the most recent official published report of Finney County oil and gas production, see E. D. Goebel et al., Oil and Gas Developments in Kansas During 1961 (Lawrence, Kansas: University of Kansas Publications, 1962).

[14]Op. cit., p. 122.

unnecessarily rapid depletion. Thus close estimates concerning volume and value of the extracted product could be obtained.[15]

The majority of the interviews described above were carried out during the week of March 22-28, 1964. This was considered an optimum time as Finney County entrepreneurs were in process of filing 1963 federal income tax returns, filing 1963 federal census of manufacturing questionnaires, and completing various questionnaires for the State of Kansas. At this time it was felt that data collected would probably be as accurate as could be attained.

Some problems were encountered in terms of sales accounting, as few businesses keep accounts in the method requested on the questionnaire. In using such data, it is necessary to assume that everyone told the truth. In view of the interviews that were taken, this was probably a fairly realistic assumption. Some refusals were encountered, but in these cases it was relatively simple to make fairly realistic estimates of their sales from information supplied by other sources.

An input-output transactions matrix could be described as a still photograph showing the monetary and commodity flows and transactions that take place within an economy. In order to apply some method of accounting, a specified time period

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[15] Oil and natural gas data were obtained through reconciliation of data provided by Gorden D. Farr, agent for the Kansas Corporation Commission and Paul Hiltman of the Kansas Geological survey at the University of Kansas.

must be used. In the Finney County study, the time period was designated as from January 1 to December 31, 1963. All transactions were measured in terms of 1963 dollars.

Sectorization of the Economy

As soon as the data was collected, the first major task was to sector the economy. The sectors into which the Finney County economy were to be divided were determined by the number of industries within each classification provided by the Standard Industrial Classification Manual.[16]

In some cases, three digit precision could be followed, although in most cases, due to the small number of firms involved, two digit precision was used.

In the final analysis of manufacturing firms, sectors were provided for the following:

Communications	Fabricated metal products
Grain mill products	Quarrying of nonmetallic minerals
Dairy products	Meat packing
Plastic products	Transportation equipment
Concrete products	Commercial printing
Agricultural chemicals	Beverage industries
Farm machinery and equipment	Iron and steel foundries
Structural wood products	Bakery products.

A word of explanation is necessary as to what products were included in some of these sectors. The communications

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[16] Op. cit.

sector included radio stations, television stations, and newspapers. The fabricated metal products sector included machine shops, welding shops and firms involved in rolling, drawing, and extruding of metals. The quarrying of non-metallic minerals included sand dredging. The plastic products sector included all firms manufacturing a product whose major component was plastic. Likewise the concrete products sector includes all firms manufacturing a product whose major component was concrete, including ready-mixed concrete, pipe, concrete novelties, and other concrete products. The agricultural chemicals industry is fundamentally made up of those firms which produce and distribute fertilizer for agricultural and non-agricultural purposes. The remainder of the sectors are relatively self-explanatory.

From the above explanation, it is evident that some aggregating was necessary. This was primarily due to a self-imposed non-disclosure rule. In the few cases where aggregation was not carried out, it is with the willing consent of the entrepreneurs involved.

In several cases, the individual firm has been split into several sectors. Thus if an enterprise manufactured more than one item which falls in some other sector, the volume of production in each sector is placed in that sector. For example, if a firm bottles milk and bakes bread, the sales volume of bread is placed in the bakery products sector, while the sales volume of the milk is placed in the dairy products sector.

The manufacturing enterprises were also examined in terms of the traditional base analysis methodology. However, rather than merely inquiring as to whether the firms sold products within or outside of Finney County, a more precise destination was sought. The firms were asked to divide their sales that were made within Garden City, within Finney County, within Southwestern Kansas,[17] or outside Southwestern Kansas.

The sectorization of the agricultural industry was made strictly along product lines. The sectors were determined by using those agricultural products which were harvested in Finney County during 1963 in marketable quantities and passed through organized markets. These products included alfalfa, rye, soybeans, wheat, barley, corn, sugar beets, and livestock.

Mining industries in Finney County, after the subtraction of quarrying of nonmetallic minerals, consisted of oil and gas production. These were combined in the petroleum products sector.

The next group of sectors in the transaction matrix were sectors dealing with government. Government itself is divided into local government, which is composed of county,

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[17]The definition of Southwestern Kansas follows that definition used by the Area Development Project of Kansas State University in earlier research in the area. This area includes the fifteen county area in extreme Southwestern Kansas. More precisely, this includes Finney, Grant, Greeley, Stevens, Lane, Stanton, Kearney, Wichita, Seward, Morton, Gray, Meade, Haskell, Scott, and Hamilton Counties. For more information, see Louis H. Douglas and others of the Kansas Area Development Project, Southwest Kansas Survey Highlights (Extension Service: Manhattan, Kansas: Kansas State University, 1963).

city, and township units, and the federal government.

Two input sectors remain to be explained. The first of these is the final demand sector. In the interviews taken, each entrepreneur was asked to whom his product was sold. They were told if the product was to retailers and wholesalers, to overlook this fact and estimate the product's final destination. Thus a sale by one of the firms questioned that eventually went to a householder in Finney County for final consumption, was considered a sale to the final demand sector. Final demand sales then were sales within Finney County but not sales that became components of some later product.

The export sector is also an input sector. For purposes of the Finney County transactions matrix, a sale by a firm that left the county was considered to be an export. The sale was considered to be an export regardless of whether the manufacturer shipped the product out of the county himself, or if the customer came to the plant and got it. The major criterion of this sector was that the product became the possession of someone who was not a resident of Finney County.

The end result of this sectorization was to produce a transactions matrix within twenty-seven output or processing sectors and twenty-six input or purchasing sectors. If every row were to interact with each column, there would be 702 instances of interaction.

In schematic form, the transactions matrix obtained

form the sectorization can be made as in Table 6, using the symbolic representation introduced in Equation 1 and Equation 3 above. In these examples, sector outputs were represented by capital letters (A, B, C, ... N) and sector inputs by small letters (a, b, c, ...n).

The cell in the lower right hand corner of Table 6 represents the sum of the total gross outlays and the sum of the total gross outputs. Under the assumption that there was no increase in inventories, the same must be equal.

Summary

These steps then constitute the methodology of the Finney County study. After the data were collected and the economy sectorized, the remaining steps employed only simple arithmetic. The transactions matrix is in balance if the sum of total gross outputs is equal to the sum of total gross outlays.

The transactions matrix obtained can be used for a number of different analytical purposes as will be seen below.[18] As has been seen from Equation 3, the basic-non-basic differentiation has been accomplished. The export sector provides the link of connection between the Finney County economy and the rest of the world. The remainder of the matrix displays the interactions that take place within the subject economy itself.

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[18]See Chapter VI.

TABLE 6

SCHEMATIC DIAGRAM OF THE FINNEY COUNTY INPUT-OUTPUT TRANSACTIONS MATRIX

Purchasing Sector: Processing Sectors:	a b c . . . . .n[19]	Government	Final Demand	e	Totals
A B C . . . . . N	Processing, Fabricating and Agricultural Sectors	Governmental Demand	Household Demand	Exogenous Demand	Total Gross Output
Government	Government Payments				
Totals	Total Gross Outlays				Sums

[19]Omitting 4, which of course still is equal to exports.

The following chapter to a degree will be a digression from the main thread of thought. In this chapter, alternative methods that might have been followed will be examined and compared to the methodology introduced in this chapter. The conclusion reached will be that, considering the structure of the Finney County economy, and the time and resources available for the study, the present methodology is superior to alternatives.

CHAPTER IV

THE ADVANTAGES OF THE EMPLOYED METHODOLOGY TO POSSIBLE ALTERNATIVES

Input-Output vs. Traditional Base Methods

In the history of the development of the economic base study, numerous techniques have been used. The task of comparing the methodology employed in the Finney County study and introduced in Chapter III with all of these techniques would plainly be an impossible task. The comparison to follow compares the Finney County methods with those procedures that have been most widely used.

The most widely used method of analysis has been the traditional economic base study.[1] Even in its most modern form, this method is based simply upon the dualistic nature of a community's economy. The basic-nonbasic ratio is the ultimate knowledge sought. At best, this procedure tells but little about the economic base.

Perhaps the most misunderstood part of the basic-nonbasic ratio concerns its use. Even the most advanced sophistication of this procedure does not solve this predicament. Weimer and Hoyt merely states that "the objective is to find the basic

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[1]Arthur M. Weimer and Homer Hoyt, Principles of Real Estate (4th ed., New York: The Ronald Press Company, 1960), pp. 704-6.

economic supports of the city and the urban growth sources of employment and to determine their relative importance."[2] Yet this statement of purpose is a question-begging one. An example will make this point quite clear. Community A contains four firms: M, N, O, and P. Firm M is engaged in mining. The mineral produced is transported immediately to Community B where it is processed and then to Community C for some type of fabrication. Firm M is the largest firm in Community A, hiring 200 men, with an annual payroll of $1,000,000. Its annual sales are valued at $3,000,000. This sales volume is completely within the basic sector of Community A's economy.

Firm N on the other hand manufactures some item, say item x. To manufacture x, N uses input y from Firm O and input z from Firm P. Firm N itself hires 100 men and has an annual payroll of $500,000. The sales volume of Firm N, $2,000,000, is all exported and is therefore also within the basic category.

Using Hoyt's terminology, firms M and N make up the economic base; Firms O and P are service industries. Firm M contributes 60 per cent of the sales volume of the economic base, Firm N 40 per cent. In terms of employment, a total of 300 men are engaged in basic employment, with a total payroll of $1,500,000. This is the stopping point of the traditional base analysis.

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[2] Ibid., p. 706.

The input-output technique, however, would furnish the remainder of this unfinished story, and provide more information concerning the true extent of the economic base. Remember that Firm O's output y is an input for Firm N, as is Firm P's output z. If Firm O hires 50 men, with an annual payroll of $250,000, and Firm P hires 50 men, with an annual payroll of $250,000, we see that Firm N generates as much employment and payroll as the employment of Firm M, although Firm N only contributes 40 per cent to the sales volume of the economic base in Hoyt's terminology. The traditional analysis considerably understates the importance of Firm N, as in reality, it contributes more than 40 per cent to the measurement of the economic base.

The input-output approach to the problem of measuring the economic base would reveal the above discrepancy in traditional analysis through its examination of interactions within the economic base. In the preceding statement, the economic base is assumed to be that group of activities which export their goods beyond the county's boundaries. The input-output analysis employed in this study allows for a study of the sales volume generated by the basic sector.

The use of the basic-nonbasic ratio can be stated quite simply. It gives the ratio of sales outside the economic unit to sales inside the economic unit, no more, no less. It is not a magic formula for development, nor is it even a realistic estimate of the true extent of the economic base.

Bearing this in mind, the Finney County study completely omits an examination on the nonbasic sectors. Concentration is

placed upon the elements of the base, and those activities which contribute to it. In this study, a basic-nonbasic ratio is not even attempted as it would contribute very little.

Another example of the misuse of the economic base study is found in Quandt[3] in his study of Salina, Kansas. This work contains a clear omission of a major contribution to the area's economic base. Although agriculture contributes to the city's prosperity, and is stated so by the author, the analysis does not contain this basic activity. Quandt states, "Salina was founded as an agricultural service center in 1856, and the economic life of the community focused on the evolution of agriculture and livestock industries in these two adjacent regions."[4] Beyond this introductory statement, no mention is made of the role of agriculture in providing a source of income for the community.

The fault here appears to lie again with the conceptual framework of the traditional base analysis. Agriculture itself is not a productive sector of the Salina, Kansas, urban economy. The products themselves are grown outside the urban base of the economy. If agricultural production were to disappear from the area, however, it probably would not be too extreme to say that Salina would also disappear.

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[3]Eldor C. Quandt, Jr., "A Geographic-Economic Base Study of Salina, Kansas" (Unpublished Master's thesis, Department of Geology and Geography, Kansas State University, 1963).

[4]Ibid., p. 1.

The problem encountered by the Quandt study then is one of ignoring the city's environment. The traditional base analysis was designed for the urban area. It was successfully adapted for a rural area in "Oskaloosa vs. The United States,"[5] but in many areas it is impossible to adapt it due to the local economic structure and the delineation of the area to be studied.

In the Finney County analysis, the chosen area of study was intentionally made larger than the urban unit. A study of Garden City without the inclusion of agricultural products would be far more disastrous than a study of Salina without its inclusion. The point made here is simply that the economic base analysis must include all products which are an integral part of the region.

The greatest problem in dealing with the traditional base analysis is its simplicity. It is deceptively simple. From the scant information provided by the basic-nonbasic ratio, far too many conclusions have been drawn.

The Finney County study has successfully avoided these pitfalls by adding the input-output approach. The subject area has been widened beyond the local community in an attempt to come to grips with the problems of an economic unit, rather than a mere political unit.

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[5] Fortune, op. cit.

Comparison of Procedures in Input-Output Analysis

By employing the input-output approach, a researcher is again faced by a multitude of alternative methods. The economic make-up of the region itself can alone provide the answer as to which alternative to employ.

Sectorization of the economy probably presents the greatest problem. A study area could be subdivided in many different manners. If the Standard Industrial Classification Manual is employed,[6] the sectorization could be by "divisions" such as "manufacturing,"[7] of by "major groups," such as "machinery except electrical,"[8] or "group numbers" such as "engines and turbines,"[9] or if four-digit precision is desired, the "industry numbers" could be used such as the classification "internal combustion engines not elsewhere classified."[10] The variations are obviously endless.

For the most part, four-digit classification would allow only one firm per sector in an economy as is found in Finney County. As a result some makeshift aggregation was necessary.

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[6] Op. cit.

[7] Ibid., p. 41.

[8] Ibid., p. 100.

[9] Ibid.

[10] Ibid.

Oftentimes firms with more than one product line fall into more than one sector. Two alternative procedures could be followed here: either place the entire firm in the sector of its dominant product or divide the firm.

Isard presents both possibilities, but appears to favor the former.[11] In the Finney County study, the latter was considered superior.

In the area under consideration, the number of firms was small. Thus the use of finer detail than that used in a national or even a regional study was relatively simple. Due to the non-disclosure rule, some aggregation was necessary. Often the best way to hide the source of information was found to be by dividing the firms.

The formula used by the Finney County study, then was that if a firm's sales receipts were composed half from the sale of bread and half from the sale of milk, then 50 per cent of the firm was placed in the bakery products sector, and 50 per cent in the dairy products sector.

Alternative solutions also exist for the problem of data collection. It would be possible to substitute library research for the actual interview. Published data, however, is only available considerably after it is collected. Then too, published data is not always available in the form one might wish it. If an input-output table is to be constructed,

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[11]Isard, op. cit.

difficulties are encountered as most sources fail to give the destination of the final product.

If the productivity coefficients could be attained from some other source, then it would be possible, with output data, to arrive at some estimate of the volume of the economy's inputs. Yet these borrowed productivity coefficients might well be a source of despair in themselves. National productivity coefficients are in all likelihood a very poor estimation of the productivity coefficients of any particular area. Every economic area has its own peculiarities which give it a comparative advantage in certain products. There is no reason to believe that the national average productivity coefficients make an adequate measure of this fact. Furthermore, if the coefficients are three or four years old, changes in technology might well have made them obsolete.

Engineering estimates also offer an alternative solution for attaining productivity coefficients. It is unlikely however, that the estimated coefficients from engineering and trade publications will correspond with those of the local area.

In some cases, it may be impossible to attain the coefficients by any method other than interviewing. In the Finney County study, interviewing was felt to be the most accurate way to attain them. This feeling was facilitated by the small number of firms that would have to be contacted.

Many input-output studies seek information concerning the source of inputs as well as the destination of outputs when constructing a transactions matrix. Without doubt, this

method is somewhat superior to the method employed in the Finney County study. Using this method, a type of check is made on the accuracy of the data. Such a method is considerably more complicated if the inputs do not equal the outputs, as reconciliations must be made between the conflicting sets of data.

The Finney County study was based on a "sales only" approach. It was felt that resources for the study would not allow the "input and output" approach. It was further felt that the entrepreneurs involved probably had a better knowledge of where their sales were made than the precise source of all materials used. There appears to be no reason to believe that an "input only" approach would furnish any more accurate information than the "sales only" approach. Furthermore, the "sales only" technique facilitates the identification of the economic base.

Hansen and Tiebout agree with this technique.[12] They used the "sales only" approach in their study of the California State study.

One major point of difference separates the approach used by Hansen and Tiebout[13] and the Finney County study. The transactions matrix presented by Hansen and Tiebout is presented in terms of employment.[14] By using this method, they

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[12] Hansen and Tiebout, op. cit.

[13] Ibid.

[14] Ibid., p. 412.

were concerned with the number of people employed by one sector to furnish goods for other sectors. In the Finney County economy, 1963 dollars were used as the measuring stick.

Employment measurement has the advantage of being not quite so personal as sales volume measurements. Entrepreneurs usually are more willing to submit employment data than sales data. Due to the structure of the Finney County economy, however, it was felt that the sales figures should be used in preference to the employment measure. Due to the small size of the firms, especially after being divided into sectors, the employment figure would have been extremely small in many of the sectors

Finally it was felt that due to the structure of the economy, some workers were probably considerably more productive than other workers, and thus results would have been deceptive. Another factor contributing to this choice was the extreme difficulty that would have been encountered in attempting to arrive at a precise figure of employment in the economy due to the large amount of migrant agricultural labor used in the county.

A Consideration of Constant Productivity Coefficients

The remainder of this chapter will be devoted to the input-output assumption of constant productivity coefficients. It is not the purpose of this writer to contribute to the

body of thought that exists concerning this problem,[15] but merely to review the controversy that has surrounded this concept, and to examine it in relation to the Finney County study.

The source of this problem, as has been stated earlier in Chapter III, is that without the assumption of constant productivity coefficients for the entire industry in each sector, an indeterminate algebraic solution would result. This was illustrated earlier in Equation 5. The logical approach to the problem is simply to ask, is this assumption realistic? Secondly, one should inquire, does this assumption significantly affect the Finney County study?

Abstract economic theory could be used to defend this point-of-view. Here it is assumed that the economy is composed of plants of the optimum production size when the economy is in equilibrium. With changes in demand, the number of units itself will change in the short run, rather than the optimum size of the individual unit.[16] This level of abstraction is perhaps too remote for application to the realistic county economy.

Leontief approaches the problem in rather simple manner.

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[15]Dorfman, op. cit.; Leontief, The Structure of the American Economy, 1919-1939; chapters by Chenery, Holzman, Ferguson, and Grosse in Leontief et al., Studies in the Structure of the American Economy; Hirsch, op. cit., p. 80; and Isard, op. cit., pp. 338-343.

[16]Edward H. Chamberlain, The Theory of Monopolistic Competition (8th ed., Cambridge: Harvard University Press, 1963), pp. 81-100.

He asks,

> How does the actual range of their variations affect the empirical validity of the analytical computation based on the assumption of fixed coefficients; and to what extent and on the basis of what theoretical and empirical procedures can their variability effectively be taken into account?[17]

To find the answer to this question, Leontief compared the input-output technique to other prediction procedures to see how much the input coefficients actually changed.[18] In this analysis, he employed the 1939 input coefficients from a group of thirteen grossly consolidated industrial groups, and from this data predicted the 1919 and 1929 outputs of this sector. For demonstrative purposes, the input-output method was compared with a method based on the 1939 proportion to the total output of that year and a method based on the 1939 ratio of each industry's total output to that particular industry's contribution to the total economy's output.[19] The input-output approach was found to be superior.

This theoretical discussion can perhaps best be summed up by Isard, who acknowledges that the input-output technique cannot perfectly forsee technological change, but neither can any other method. "When combined with intuition and hunch, input-output projections yield results at least as good as those based on intuition and hunch alone."[20]

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[17] Leontief, The Structure of the American Economy, 1919-1939, p. 214.

[18] Ibid., pp. 216-218.

[19] Ibid., p. 218.

[20] Isard, op. cit., p. 341.

In the Finney County study, the problem of constant productivity coefficients is a relatively minor one. Due to their proximate location in space, similar industries tend to use similar production techniques. The Finney County model was not used for predictive purposes, but such use would certainly be valid, especially in the relatively shortrun period.

With these points in mind, one can see that the controversy concerning the validity of constant productivity coefficients has minor effect upon the validity of the Finney County results. When compared to alternative methods of area analysis, the methodology used is superior. Even if constant productivity coefficients were victim of the shortcomings alleged by their critics, the input-output approach to economic base analysis would still be preferable to the traditional base study.

CHAPTER V

THE STRUCTURE OF THE FINNEY COUNTY ECONOMY

Introduction

Input-output analysis empirically displays the flow of goods that passes through an economy. The use of quantitative economics has become increasingly popular in recent years as a demonstration of economic theory in the real world.

The Finney County study is an example of economic theory as it exists in a small corner of the real world. By use of the input-output approach, an attempt has been made to analyze the basic sectors of the county's economy, and show which industries and services contribute to the base.

When examining the Finney County data it is observed that the area is primarily dependent upon agriculture. When detailed agricultural sectors are examined in the input-output methodology, several strange facts come to light that would otherwise be missed. The peculiarities of the area's economy will be examined in detail in Chapter VI.

The methodology used to attain this data has been examined in detail in Chapter III. In brief review forty-six interviews were made to attain the structure of the Finney County economy. The economy was then divided into sectors based on product lines, and arranged in the form of an input-output matrix. In this form of presentation, it is possible

to examine the interactions among the sectors of the Finney County economy.

Presentation of Input-Output Matrices

Table 7 presents the master transactions input-output matrix. In this table, the methodology outlined above comes to life. The twenty-seven rows designated "producing sectors" present the output sectors of the economy, or those groups of industries and services which produce a product or perform some economic service. The twenty-six columns designated "purchasing sectors" represent the input sectors, or those groups of industries and services[1] which use the products or services from the output sector as their own input.

The transactions matrix then shows, for example, that the communications sector, consisting of radio stations, television stations, and newspapers, sold $4,937 of their output, which is primarily advertising time, to the Finney County dairy products industries. Likewise, the concrete products sector sold $5,550 of their output to the beverage industries sector.

Conversely, Table 7 shows that the agricultural chemical sectors used $36,546 in inputs from other Finney County sectors. These inputs consisted of $21,158 from the communications sector, $9,538 from the fabricated metal

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[1]Considering "exports" and "final demand" to be services for the time being.

TABLE 7

1963 TRANSACTIONS INPUT-OUTPUT MATRIX OF THE FINNEY COUNTY, KANSAS ECONOMY
(All Figures Expressed in 1963 Dollars)

Processing Sector: / Purchasing Sector:	Export	Final Demand	Government (Local)	Dairy Products	Grain Mill Products	Beverage Industries	Farm Machinery & Equipment	Meat Packing	Agricultural Chemicals	Communications	Concrete Products	Fabricated Metal Products	Petroleum Products	Plastic Products	Bakery Products	Iron and Steel Foundries	Transportation Equipment	Livestock	Commercial Printing	Government (Federal)	Sugar Beets	Grain Sorghums	Corn	Barley	Wheat	Farm Conservation Practices	Total Sales
Communications	146,680	289,133	2,570	4,937	9,176	16,859	11,484	7,448	21,158	11,506	585	4,004	11,463	2,740	293	-	1,964	-	-	-	-	-	-	-	-	-	542,000
Fabricated Metal Products	69,010	27,274	1,065	250	250	715	715	250	9,538	1,435	-	1,530	1,015	1,908	715	715	815	-	-	-	-	-	-	-	-	-	117,200
Concrete Products	972,350	288,425	120,600	6,825	22,350	5,550	2,100	1,050	5,550	21,000	4,500	6,600	10,050	6,300	-	-	-	-	1,050	-	-	-	-	-	-	-	1,474,300
Commercial Printing	69,300	37,944	4,115	8,165	3,665	1,316	17,915	3,215	300	2,666	750	1,333	2,850	3,466	-	-	-	-	-	-	-	-	-	-	-	-	157,000
Grain Mill Products	2,387,500	629,100	-	7,600	4,500	-	-	-	-	-	-	-	-	-	-	-	-	208,000	-	162,500	-	-	-	-	-	-	3,400,000
Government (Federal)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	118,872	1,095,988	241,471	35,843	1,681,538	323,521	3,497,233
Quarrying of Nonmetallic Minerals	-	29,250	18,750	-	-	-	-	-	-	-	26,250	-	-	-	-	750	-	-	-	-	-	-	-	-	-	-	75,000
Agricultural Chemicals	325,000	673,100	-	1,900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,000,000
Beverage Industries	137,689	106,447	-	-	-	1,017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	245,153
Dairy Products	1,331,783	490,036	43,160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,864,979
Farm Machinery & Equipment	1,227,737	48,041	-	175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,275,953
Meat Packing	80,000	316,800	3,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	400,000
Iron & Steel Foundries	33,250	17	-	-	-	-	1,733	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35,000
Plastic Products	690,000	60,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	750,000
Structural Wood Products	280,000	120,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	400,000
Transportation Equipment	1,400	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,000
Livestock	7,570,000	-	-	-	-	-	-	350,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,920,000
Grain Sorghums	3,601,351	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	950,000	-	-	-	-	-	-	-	-	4,551,351
Bakery Products	-	19,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19,000
Petroleum Products	11,378,934	582,360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,961,294
Sugar Beets	655,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	655,000
Corn	71,820	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71,820
Barley	30,133	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30,133
Wheat	5,391,988	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,391,988
Soybeans	4,560	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,560
Rye	32,756	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32,756
Alfalfa	-	-	-	-	1,143,800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,143,800
Total Sales	36,488,241	3,717,527	193,460	29,852	1,183,741	25,457	33,947	361,963	36,546	36,607	32,085	13,467	25,378	14,414	1,008	1,465	2,779	1,158,800	1,050	162,500	118,872	1,095,988	241,471	35,843	1,681,538	323,521	47,017,520

products sector, $5,550 in output of the concrete products sector, and $300 from the commercial printing sector.

Two of the input sectors warrant special explanation. Final demand sales were sales within Finney County but not sales that became components for some later product. Thus it is evident that the agricultural chemicals sector sold $673,100 in products directly to the public, or to some retailer who in turn sold them to the public. Although such agricultural chemicals, or fertilizers, probably became the input of some agricultural commodity, it was impossible to measure this fact, so it was listed as final demand. The dairy products industry sector likewise, sold $490,036 in milk, cheese, butter and ice cream directly to the final demand sector.

The export sector has been defined as a sale by a Finney County firm which left the county. It is evident that the Finney County wheat industry exported $5,391,988 worth of wheat output from the county. Likewise, the farm machinery and equipment sector exported $1,227,737 in products from the county. This sector constitutes the sales volume of the economic base with one omission, that being education, which will be treated separately.

The transactions matrix gives the total sales of each output sector in the extreme right hand column. The grain mill products sector had total sales in 1963 of $3,400,000. The extreme bottom row gives the total inputs that originated from within the county for each of the sectors. It is

evident then that the total input that originated in Finney County for the beverage industries sector was $25,437.

Since the value of inputs and outputs must be equal,[2] the number in the lower right hand corner, $47,017,520, represents the sum of the columns and the sum of the rows. The two are equal.

The value $47,017,520 cannot be considered to represent the gross county product, whose components would be comparable to the concept of gross national product used in national income accounts. It does represent a large proportion of it, but service consumption, imported investment, and some governmental services are omitted. Furthermore, double counting is not eliminated. The number merely represents total sales and total inputs for the economy, and serves as a check to assure balance in the table.

Table 8 is the first of two tables obtained from the Finney County data that are expressed in terms of percentages. This table shows the percentage of total output that went to the individual demand sectors as inputs.

From Table 8, it can be seen that the output of the sector designated quarrying of nonmetallic minerals was so distributed in sales volume that 39.0 per cent of the output went to the final demand sector, 25.0 per cent went to the local government sector, 35.0 per cent of the output became inputs for the concrete products sector, while the remaining

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[2]Homer Hoyt, "The Value of Imports to an Urban Community," Land Economics, XXXVII (May, 1961), 150.

TABLE 8

1963 INPUT-OUTPUT TRANSACTIONS MATRIX OF THE FINNEY COUNTY, KANSAS ECONOMY
EXPRESSED AS PERCENTAGES OF THE TOTAL OUTPUTS
(Percentages based on 1963 Dollars)

Processing Sector \ Purchasing Sector	Export	Final Demand	Government (LOcal)	Dairy Products	Grain Mill Products	Beverage Industries	Farm Machinery & Equipment	Meat Packing	Agricultural Chemicals	Communications	Concrete Products	Fabricated Metal Products	Petroleum Products	Plastic Products	Bakery Products	Iron and Steel Foundries	Transportation Equipment	Livestock	Commercial Printing	Government (Federal)	Sugar Beets	Grain Sorghums	Corn	Barley	Wheat	Farm Conservation Practices	Total Sales
Communications	27.1	53.5	.5	.9	1.7	3.1	.7	1.4	3.9	2.1	.1	.7	2.1	.5	.1	-	.4	-	-	-	-	-	-	-	-	-	*100.0
Fabricated Metal Products	58.9	23.3	.9	.2	.2	.6	.6	.2	8.1	1.2	-	1.3	.9	1.6	.6	.6	.7	-	-	-	-	-	-	-	-	-	100.0
Concrete Products	66.0	19.6	8.2	.5	1.5	.4	.1	.1	.4	1.4	.3	.4	.7	.4	-	-	-	-	.1	-	-	-	-	-	-	-	100.0
Commercial Printing	44.1	24.2	2.6	5.2	2.3	.8	11.4	2.0	.2	1.7	.4	.8	1.8	2.2	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Grain Mill Products	70.2	18.5	-	.2	.1	-	-	-	-	-	-	-	-	-	-	-	-	6.1	-	4.8	-	-	-	-	-	-	100.0
Government (Federal)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4	31.4	6.9	1.4	48.1	9.3	100.0
Quarrying of Nonmetallic Minerals	-	39.0	25.0	-	-	-	-	-	-	-	35.0	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	100.0
Agricultural Chemicals	32.5	67.3	-	.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Beverage Industries	56.2	43.4	-	-	-	.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Dairy Products	71.4	26.4	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Farm Machinery & Equipment	96.2	3.8	-	.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Meat Packing	20.0	79.2	.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Iron and Steel Foundries	95.0	-	-	-	-	-	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Plastic Products	92.0	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Structural Wood Products	70.0	30.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Transportation Equipment	70.0	30.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Livestock	95.6	-	-	-	-	-	-	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Grain Sorghums	79.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.9	-	-	-	-	-	-	-	-	100.0
Bakery Products	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Petroleum Products	95.1	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Sugar Beets	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Corn	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Barley	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Wheat	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Soybeans	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Rye	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Alfalfa	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
Total Sales	77.6	7.9	.5	.1	2.8	.1	.1	.9	.1	.1	.1	-	.1	-	-	-	-	2.7	-	.4	.3	2.6	.6	.1	4.0	.8	100.0

*Due to rounding, percentages do not necessarily add to 100.0

1.0 per cent was used by the iron and steel foundries sector.

Table 8 was obtained directly from the transactions input-output matrix in Table 7. From Table 7 it was learned that the communications sector had total sales during 1963 of $542,000. Of this total, $16,859 was to the beverage industries sector. By division, the percentage equivalent is attained, as the 3.1 per cent figure given in Table 8 is equal to $16,859 divided by total sales, $542,000.

The bottom row puts the total gross output in percentage terms. Of the total Finney County sales of $47,017,520, 77.6 per cent was exported from the county and 7.9 per cent was sold directly to final demand. Other sizeable users of the Finney County output from within the county were the grain mill products sector using 2.8 per cent, the livestock sector using 2.7 per cent, the grain sorghums sector using 2.6 per cent and the wheat sector using 4.0 per cent.

As is noted on the table, the total percentages do not necessarily add to 100 per cent due to rounding to three places.

Table 9 displays the percentage matrix from the input side. This table shows what percentages of an sector's inputs come from other sector's outputs in Finney County. This is not quite the same thing as productivity coefficients. The difference will be made clear in Table 10.

Table 9 shows that of the inputs that originated in Finney County used by the beverage industry during the calendar year 1963, 66.2 per cent of the dollar expense came from communications, 2.8 per cent from the fabricated metal products

TABLE 9

1963 INPUT-OUTPUT TRANSACTIONS MATRIX OF THE FINNEY COUNTY ECONOMY
EXPRESSED AS PERCENTAGES OF TOTAL INPUTS
(Percentages based on 1963 dollars)

Purchasing Sector / Processing Sectors	Export	Final Demand	Government (Local)	Dairy Products	Grain Mill Products	Beverage Industries	Farm Machinery and Equipment	Meat Packing	Agricultural Chemicals	Communications	Concrete Products	Fabricated Metal Products	Petroleum Products
Communications	.4	7.8	1.3	16.5	.8	66.2	33.8	2.1	57.9	31.4	1.8	29.7	45.2
Fabricated Metal Products	.2	.7	.6	.8	-	2.8	2.1	.1	26.1	3.9	-	11.4	4.0
Concrete Products	2.7	7.8	62.3	22.9	1.9	21.8	6.2	.3	15.2	57.4	14.0	49.0	39.6
Commercial Printing	.2	1.0	2.1	27.4	.3	5.2	52.8	.9	.8	7.3	2.3	9.9	11.2
Grain Mill Products	6.5	16.9	-	25.5	.4	-	-	-	-	-	-	-	-
Government (Federal)	-	-	-	-	-	-	-	-	-	-	-	-	-
Quarrying of nonmetallic minerals	-	.8	9.7	-	-	-	-	-	-	-	-	-	-
Agricultural Chemicals	.9	18.1	-	6.4	-	-	-	-	-	-	-	-	-
Beverage Industries	.4	2.9	-	-	-	4.0	-	-	-	-	-	-	-
Dairy Products	3.6	13.2	22.3	-	-	-	-	-	-	-	-	-	-
Farm Machinery & Equipment	3.4	1.3	-	.6	-	-	-	-	-	-	-	-	-
Meat Packing	.2	8.5	1.7	-	-	-	-	-	-	-	-	-	-
Iron & Steel Foundries	.1	-	-	-	-	-	5.1	-	-	-	-	-	-
Plastic Products	1.9	1.6	-	-	-	-	-	-	-	-	-	-	-
Structural Wood Products	.8	3.2	-	-	-	-	-	-	-	-	-	-	-
Transportation Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-
Livestock	20.7	-	-	-	-	-	-	96.7	-	-	-	-	-
Grain Sorghums	9.9	-	-	-	-	-	-	-	-	-	-	-	-
Bakery Products	-	.5	-	-	-	-	-	-	-	-	-	-	-
Petroleum Products	31.2	15.7	-	-	-	-	-	-	-	-	-	-	-
Sugar Beets	1.8	-	-	-	-	-	-	-	-	-	-	-	-
Corn	.2	-	-	-	-	-	-	-	-	-	-	-	-
Barley	.1	-	-	-	-	-	-	-	-	-	-	-	-
Wheat	14.8	-	-	-	-	-	-	-	-	-	-	-	-
Soybeans	-	-	-	-	-	-	-	-	-	-	-	-	-
Rye	.1	-	-	-	-	-	-	-	-	-	-	-	-
Alfalfa	-	-	-	-	96.6	-	-	-	-	-	-	-	-
Total Sales	*100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Purchasing Sector / Processing Sectors	Plastic Products	Bakery Products	Iron and Steel Foundries	Transportation Equipment	Livestock	Commercial Printing	Government (Federal)	Sugar Beets	Grain Sorghums	Corn	Barley	Wheat	Farm Conservation Practices	Total Sales
Communications	19.0	29.1	-	70.7	-	-	-	-	-	-	-	-	-	1.2
Fabricated Metal Products	13.2	70.0	48.8	29.3	-	-	-	-	-	-	-	-	-	.2
Concrete Products	43.7	-	-	-	-	100.0	-	-	-	-	-	-	-	3.1
Commercial Printing	24.0	-	-	-	-	-	-	-	-	-	-	-	-	.3
Grain Mill Products	-	-	-	-	18.0	-	100.0	-	-	-	-	-	-	7.2
Government (Federal)	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0	7.4
Quarrying of nonmetallic minerals	-	-	51.2	-	-	-	-	-	-	-	-	-	-	.2
Agricultural Chemicals	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1
Beverage Industries	-	-	-	-	-	-	-	-	-	-	-	-	-	.5
Dairy Products	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0
Farm Machinery & Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-	2.7
Meat Packing	-	-	-	-	-	-	-	-	-	-	-	-	-	.9
Iron & Steel Foundries	-	-	-	-	-	-	-	-	-	-	-	-	-	.1
Plastic Products	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6
Structural Wood Products	-	-	-	-	-	-	-	-	-	-	-	-	-	.9
Transportation Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Livestock	-	-	-	-	-	-	-	-	-	-	-	-	-	16.8
Grain Sorghums	-	-	-	-	82.0	-	-	-	-	-	-	-	-	9.7
Bakery Products	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum Products	-	-	-	-	-	-	-	-	-	-	-	-	-	25.4
Sugar Beets	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
Corn	-	-	-	-	-	-	-	-	-	-	-	-	-	.2
Barley	-	-	-	-	-	-	-	-	-	-	-	-	-	.1
Wheat	-	-	-	-	-	-	-	-	-	-	-	-	-	11.2
Soybeans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rye	-	-	-	-	-	-	-	-	-	-	-	-	-	.1
Alfalfa	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4
Total Sales	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Due to rounding, percentages do not necessarily add to 100.0

sector, 21.8 per cent from the concrete products sector, 5.2 per cent from the commercial printing sector, and 4.0 per cent from the beverage industry itself. This excludes household outputs, which would consist of labor costs.

The agricultural sectors of this table warrant a word of explanation. As can be seen, 100 per cent of the inputs of grain sorghums, corn, barley, wheat, and farm conservation practices originated from the federal goveernment sector. Although this sector is certainly not a part of Finney County, it has been treated as such to show the extent of dependence the county has upon the federal government. Indeed 7.4 per cent of the total inputs used to produce the total output of $47,017,520 originated from the federal government.

Table 9 also shows which sectors contribute the bulk of inputs for final demand and for export. Of items which originate in Finney County, the agricultural chemical, or fertilizer, sector contributes 18.1 per cent of the total inputs. The export inputs are led by the petroleum products industry which contribute 31.2 per cent of the total exports.

These figures were obtained in much the same way as those in Table 8. It can be seen that the livestock output sector contributes 20.7 per cent of the total Finney County exports. This 20.7 per cent is equal to the sales value of livestock exports divided by the total value of exports, or $7,570,000 divided by $36,488,241.

Again as noted, the percentages do not necessarily always add to 100 per cent due to rounding.

Input-Output Productivity Coefficients

The Finney County productivity coefficients are given in Table 10. The coefficients take into account only the inputs that originated in Finney County. As no information was sought on inputs that originated outside the county, it was impossible to include all inputs.

These figures are considerably different from those percentages presented in Table 9. The productivity coefficients for each sector show the cents value of inputs necessary to produce one dollar in the sector's output. Using these coefficients, it can be seen that to produce one dollar of output in the communications sector, the required inputs are .021 from the communications sector itself, .003 in inputs from the fabricated metal products industries, .039 in inputs from the concrete products sector, and .005 in inputs from the commercial printing sector.

One obvious major omission from these productivity coefficients is the labor input which will be treated separately. Likewise export coefficients will be treated separately.

It can here be seen that the original 27 X 26 matrix hsas contracted to a matrix that is 14 X 21. This is due to several reasons. Some sectors, as already noted, will be treated later. Some output sectors created no products for

TABLE 10

1963 PRODUCTIVITY COEFFICIENTS OF PRODUCTS PRODUCED IN THE FINNEY COUNTY, KANSAS ECONOMY (Using only Inputs that Originated Locally)

Processing Sector \ Purchasing Sector	Dairy Products	Grain Mill Products	Beverage Industries	Farm Machinery & Equipment	Meat Packing	Agricultural Chemicals	Communications	Concrete Products	Fabricated Metal Products	Petroleum Products	Plastic Products	Bakery Products	Iron & Steel Foundries	Transportation Equipment	Livestock	Commercial Printing	Sugar Beets	Grain Sorghums	Corn	Barley	Wheat
Communications	.003	.003	.069	.009	.019	.021	.021	.001	.034	.001	.004	.015		.982							
Fabricated Metal Products	.001	.001	.003	.001	.001	.010	.003		.013	.001	.003	.038	.020	.041							
Concrete Products	.004	.007	.023	.002	.003	.006	.039	.003	.056	.001	.008					.006					
Commercial Printing	.004	.001	.005	.014	.008	.001	.005	.001	.001	.001	.005										
Grain Mill Products	.004	.001													.026						
Government (Federal)																	.181	.214	2.974	1.189	.312
Quarrying of Nonmetallic Minerals								.018					.021								
Agricultural Chemicals	.001																				
Beverage Industries			.004																		
Farm Machinery & Equipment																					
Iron & Steel Foundries				.001																	
Livestock					.875										.120						
Grain Sorghums																					
Alfalfa		.336																			

sectors other than final demand and the export sectors. Industries which produce for export alone will be treated when export coefficients are introduced. Finally, input sectors which had no output that was measurable in dollar terms, such as farm conservation practices, were omitted.

The productivity coefficients are attained from simple division. The numbers represent the input of one sector from other industries divided by the total output value of the sector. The livestock to meat packing productivity coefficient, .875, is equal to the total input from livestock to meat packing, $350,000, divided by the total meat packing output, $400,000.

A view of Table 10 shows some apparent discrepancies. The total inputs to the transportation sector sum to more than one dollar, and it must further be remembered that these coefficients do not take into account imported inputs. This seems to be a valid reason for the gross sales figure of the transportation sector to equal only $2,000.

In two agricultural sectors, corn and barley, federal government inputs sum to more than the total output. It must be remembered that this represents part of a nationwide federal program to curb production in an effort to raise prices. Obviously the farmers are receiving the grants to not produce a product that hardly exists in the county anyway. This accounts for the apparent discrepancy.

Table 11 adds two items of information to the study of the Finney County economy: each sector's total wage bill and the labor productivity coefficients.

In many input-output transactions tables, an additional output sector is labeled "households." The output of the households sector would of course be labor, which is used as inputs for other sectors. In the Finney County study, such a sector was impossible to construct. Due to the fine detail used in the agricultural sectors and the lack of information available concerning labor inputs in the crops grown, productivity coefficients could be attained only for the industrial sectors.

The arithmetic of the coefficients is simple. The labor productivity coefficient for the agricultural chemical sector is .428, which is equal to the total wage bill for the sector divided by the total sales value of output, or $428,236 divided by $1,000,000.

The interpretation of these labor coefficients is the same as for the coefficients listed earlier. For every dollar of agricultural chemical output, $0.428 in labor inputs is employed.

As might be expected, when measured in terms of the wage bill, some sectors are considerably more labor intensive than others. For example, contrast the labor productivity coefficients of the bakery products sector (.632) with the labor productivity coefficient of the petroleum products sector (.038).

The export coefficients are given in Table 12. It must be remembered that a sale to exports was treated as a

TABLE 11

1963 LABOR PRODUCTIVITY COEFFICIENTS FOR THE FINNEY COUNTY KANSAS ECONOMY

Industry	Total Sales Value of Outputs	Total Sector Wage Bill	Labor Productivity Coefficient
Agricultural Chemicals	$1,000,000	$428,236	.428
Bakery Products	19,000	12,000	.632
Beverage Industries	245,153	78,251	.319
Commercial Printing	157,000	67,796	.432
Communications	542,000	266,860	.492
Concrete Products	1,474,300	360,500	.245
Dairy Products	1,864,979	391,000	.210
Fabricated Metal Products	117,200	50,900	.434
Farm Machinery and Equipment	1,275,953	370,359	.290
Grain Mill Products	3,400,000	451,760	.133
Iron and Steel Foundries	35,000	24,000	.686
Meat Packing	400,000	85,000	.213
Quarrying of Non-metallic Minerals	75,000	45,000	.600
Petroleum Products	11,961,294	454,500	.038
Plastic Products	750,000	145,000	.193
Structural Wood Products	400,000	200,000	.500
Transportation Equipment	2,000	400	.200

TABLE 12

1963 EXPORT COEFFICIENTS FOR THE FINNEY COUNTY, KANSAS ECONOMY

Industry	Sales Value of Total Output	Total Sector Sales Value of Exports	Export Coeffi-cients
Agricultural Chemicals	$1,000,000	$ 325,000	.325
Beverage Industries	245,153	137,689	.562
Commercial Printing	157,000	69,300	.441
Communications	542,000	146,680	.271
Concrete Products	1,474,300	972,350	.660
Dairy Products	1,864,979	1,331,783	.714
Fabricated Metal Products	117,200	69,010	.589
Farm Machinery and Equipment	1,275,953	1,227,737	.962
Grain Mill Products	3,400,000	2,387,500	.702
Iron and Steel Foundries	35,000	33,250	.950
Meat Packing	400,000	80,000	.200
Petroleum Products	11,961,294	11,378,934	.951
Plastic Products	750,000	690,000	.920
Structural Wood Products	400,000	289,000	.700
Transportation Equipment	2,000	1,400	.700

sale to any other industrial sector. The export sales ere treated as a demand alternative open for exploitation by the Finney County entrepreneurs.

Again the arithmetic is the same as in earlier coefficients. The total sector sales value of exports was divided by the dollar value of total sales. Thus the agricultural chemical coefficient, .325 is equal to $325,000 divided by $1,000,000. It represents the dollar value of inputs sold to the export sector per dollar of the sector's sales.

Traditional Base Data

The final table in this chapter, Table 13, presents the type of information that is familiar to those interested in the traditional analysis of the economic base. Here the industrial sectors are listed, and the destination of their sales in geographical terms are shown. Added to this table is a more precise statement of their destination: within Garden City, within Finney County, within Southwestern Kansas,[3] and outside of Southwestern Kansas.

From Table 13, one can see that the agricultural chemicals industry of Finney County, listed in column 1, has total sales of $1,000,000, Column 4 shows that $7,000 of these sales were within Garden City, column 6 that

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[3]See Footnote 17 of Chapter III on page 40 of this thesis, for clarification.

TABLE 13

TRADITIONAL PRESENTATION OF INDUSTRIAL SECTORS OF THE FINNEY COUNTY, KANSAS, 1963 ECONOMIC BASE. (Expressed in 1963 Dollars)

(1) Industrial Classification	(2) Total SALES	(3) Per Cent Sales in Garden City	(4) Value of Sales in Garden City	(5) Per Cent Sales in Finney County	(6) Value of Sales in Finney County	(7) Per Cent Sales Outside Finney County	(8) Value of Sales Outside Finney County	(9) Per Cent Sales in Southwestern Kansas	(10) Value of Sales in Southwestern Kansas	(11) Per Cent Sales Outside Southwestern Kansas	(12) Value of Sales Outside Southwestern Kansas
Agricultural Chemicals	$1,000,000	0.7%	$ 7,000	67.5%	$ 675,000	32.5	$ 325,000	100.0%	$1,000,000	0.0%	$ -
Bakery Products	19,000	80.0	15,200	100.0	19,000	0.0	-	100.0	19,000	0.0	-
Beverage Industries	245,153	35.1	86,123	43.8	107,464	56.2	137,689	68.1	167,044	31.9	78,109
Commercial Printing	157,000	51.0	80,000	55.9	87,700	44.1	69,300	65.3	102,550	34.7	54,450
Communications	542,000	67.7	367,050	72.9	395,320	27.1	146,680	92.0	498,530	8.0	43,470
Concrete Products	1,474,300	10.9	160,920	34.0	501,950	66.0	972,350	78.8	1,162,270	21.2	312,030
Dairy Products	1,864,979	27.0	520,746	28.6	533,196	71.4	1,331,783	89.4	1,667,881	10.6	197,098
Fabricated Metal Products	117,200	15.0	17,580	41.1	48,190	58.9	69,010	89.4	104,760	10.6	12,440
Farm Machinery & Equipment	1,275,953	1.4	1,750	3.8	48,216	96.2	1,227,737	13.4	170,848	86.6	1,105,105
Grain Mill Products	3,400,000	1.2	4,750	29.8	1,012,500	70.2	2,387,500	47.6	1,617,500	52.4	1,782,500
Iron & Steel Foundries	35,000	5.0	1,750	5.9	1,750	95.0	33,250	90.0	31,500	10.0	3,500
Meat Packing	400,000	45.0	180,000	80.0	320,000	20.0	80,000	100.0	400,000	0.0	-
Mining & Quarrying Nonmetallic Minerals except Fuel	75,000	90.0	67,500	100.0	75,000	0.0	-	100.0	75,000	0.0	-
Petroleum Products	11,961,294	4.9	582,360	4.9	582,360	95.1	11,378,934	4.9	582,360	95.1	11,378,934
Plastic Products	750,000	8.0	60,000	8.0	60,000	92.0	690,000	16.0	120,000	84.0	630,000
Structural Wood Products	400,000	10.0	40,000	30.0	120,000	70.0	280,000	35.0	140,000	65.0	260,000
Transportation Equipment	2,000	0.0	-	30.0	600	70.0	1,400	75.0	1,500	25.0	500
TOTALS	23,718,879	9.2	2,192,729	19.3	4,588,246	80.6	19,130,633	33.1	7,860,743	66.9	15,858,136

$675,000 were within Finney County, column 10 that $1,000,000 of these sales were within Southwestern Kansas as defined, and column 12 that none of the sales were exported beyond the boundaries of Southwestern Kansas. Columns 3, 5, 7, 9, and 11 break these dollar terms into percentages.

With the presentation of Table 13, a major distinction can be pointed out between the methodology of the traditional economic base analysis and the Finney County study. In the traditional analysis, emphasis is placed on a comparison of columns 5 and 7. In the Finney County study, the results of column 7 were considered to be exogenous variables, and the analytical emphasis was placed on column 5.

As stated earlier, education was treated separately. It will be recalled from earlier discussion that exports were considered to contribute to the economic base. Educational activities that bring money into the economy are considered to contribute to the economic base. Educational activities that bring money into the economy are considered basic. Those education activities, such as primary and secondary schools, which merely serve a local need, are considered service activities. With this definition, Garden City Junior College which brings both students and state financial support into the county, is considered basic.

Garden City Junior College has a total enrollment of 384 students. Of this number, 226 are from Finney County. The remaining 158 students contribute to the economic base of the county. Of the 158 out-of-county students, 114 live within

Finney County during the school year, 44 commute from neighboring towns.

It has been estimated that the 114 students who live within the community during the school sessions spend an average of $700 each on housing, food, entertainment and other services.[4] The college then contributes $79,800 to the Finney County economic base from money generated directly from the students. This overstates the figure somewhat, as some students work part-time within Garden City to support themselves, but the exact percentage of such students is unavailable.

In addition to the $79,800 already mentioned, the state contributes $90 per student-year. Based on the figure of 322 full-time students, this figure amounts to $28,980 in gross form, as no adjustment of taxes is taken into account.

Although no exact figure can be derived, it appears, however, that Garden City Junior College contributes in excess of $100,000 to the Finney County economic base. The payroll that is directly generated by the basic elements of Garden City Junior College amounts to 41.4 per cent of the school's total payroll, or $51,129.

This concludes the presentation of the data gained from the Finney County interviews. A detailed examination of the structure of the county's economy will follow in Chapter VI.

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[4]From personal interview with Mr. Wallace Good, Dean of Garden City Junior College.

CHAPTER VI

ANALYSIS OF THE STRUCTURE OF THE FINNEY COUNTY ECONOMY

A Measure of Economic Development

The value of input-output analysis in examining an area economy stems from the fact that although the pattern of sales from one sector to another may change significantly from year to year as the requirements of the input sectors change, the pattern of inputs into any given sector tends to be stable and predictable.[1]

The established entrepreneur possesses a collection of machinery and capital equipment that is designed to process a certain material in order to produce a given product. Likewise, the entrepreneur hires labor which is trained to utilize such equipment. As a result, great changes in output are unlikely in a normally functioning market economy.

This relative stability in input and output patterns provices the basic data for numerous conclusions.

The great virtue of input-output analysis is its form of presentation. A careful study of the matrices presented in Chapter V can yield precise information concerning the

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[1] W. D. Evans, "Marketing Uses of Input-Output Data," Journal of Marketing, XVII (July, 1952), 12.

sources of income, employment, and output of the area under consideration.

A considerable amount of work has recently been carried out in analyzing the development of an economy from the structural relationships of an input-output matrix.[2] If every cell in the matrix were to contain some number other than zero, the conclusion would plainly be that every output sector supplied inputs to every demand sector. In even the most specialized of economies, such a circumstance is literally impossible.

If the cells that contained numbers other than zero could be rearranced into a perfect triangular shape, using the entire lower left-hand corner of the matrix and placing the final demand sector in the extreme right-hand column, it would mean that the output to final demand passed out of the constructive process through one industry only. This case also is extremely unlikely.

An endeavor to this end has been attempted in Table 7. Of course there is more than one outlet to the demand sectors. It can be seen that the triangle, however, is far from complete. It is more in the form of a crescent, concave to the point of origin. The structural relationships point to the fact that the Finney County economy is not highly advanced. This statement assumes the criterion of advancement as being

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[2]Wassily W. Leontief, "The Structure of Development," Scientific American, CCIX (September, 1963), 148-154 ff.

interaction among the segments of the economy, i.e., a fully integrated economy.

The question that inevitably follows asks if it is possible for the agriculturally based economy to advance? If the economic criterion of increased per capita real income is used, the Finney County economy, although based upon agriculture, can advance.

A number of economists feel that agricultural and other primary sectors of the economy must be replaced by manufacturing enterprises for advancement to take place.[3] The argument originates from the ideas of the diminishing returns of agriculture, the greater productivity of manufacturing, and the thought that it is difficult to shift resources to more advanced endeavors once diminishing returns have set in.

North takes exception to this view.[4] Yet, it is North's contention, and one that appears relatively logical, that it is not agricultural production itself that will lead to advancement in an economy, but the processing advantages that exist within the agricultural economy.[5]

The Finney County input-output matrix seems to bear

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[3]For example see Walter W. Rostow, The Stages of Economic Growth (Forge Village, Massachusetts: The Murray Printing Company, 1962), p. 39.

[4]Douglass C. North, "Agriculture in Regional Economic Growth," Journal of Farm Economics, XLI (December, 1959), 943-951.

[5]Ibid., pp. 949-50.

out this view. If the economic structure was based on a single commodity export that was transported out of the economy, the existence of ballast return rates[6] in the transportation media serving the region with low cost material inputs could effectively limit the ability of the area to furnish their own import substitutes. Due to their natural disadvantages in fields other than agriculture, transfer rates could prevent industrialization.

The conclusion drawn from this analysis appears to be that agricultural exportation by itself does not lead to advancement of the economy. Coupled with the product diversification that exists in Finney County, as evidenced by Table 7, the potential for economic advancement exists, although development is still in rather primitive stages.

This argument that a successful agricultural export industry will result in increased income for the area is neatly summed up by North. He sees an evolutionary process that will include the following steps:

1. Specialization and division of labor with a widening of the regional market;
2. The growth of facilities and subsidiary industry to efficiently produce and market the export commodity;
3. The development of residentiary industry to serve local consumers, some of which may, in consequence of expanding markets and external economies developed in association with the

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[6] Edgar M. Hoover, The Location of Economic Activity (New York: McGraw-Hill Book Company, Inc., 1963), p. 22.

export industry, lead to a broadening of the export base;

4. As a natural consequence of the above conditions, the growth of urban areas and facilities;

5. An expanded investment in education and research to broaden the region's potential.[7]

At no point in this analysis is the necessary development of industry questioned. It is merely stated that agricultural exports can be used to facilitate the development of industries that use agriculture commodities for inputs.

The Potential for Economic Development

The input-output transactions matrix in Table 7, can be used then to discover what processing industries might be of potential value. It is noted that despite the comparatively large volume of sales made by the grain mill products sector, the value of wheat ($5,391,988) and grain sorghums ($3,601,351) shipped from the county without any processing is large. It would appear that a processing potential would most certainly exist in these areas. Despite local sales by the livestock sector of $350,000, still $7,570,000 of sales were exported in unslaughtered livestock.

Perhaps the greatest industrial potential lies in processing of petroleum products. $11,378,934 in sales were exported from the county unprocessed. A processing of these commodities would provide increased employment and increased

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[7] Op. cit., pp. 949-50.

income for the county. This would then have a greater effect in providing increased demand for service activities which would again increase the Finney County income and employment.

One of the above mentioned "potentials" has already been seized by a Finney County entrepreneur. A livestock packing plant is on the drawing boards and should be in operation by 1965. But the technique illustrated by the input-output approach to an economic base study cannot be denied: the easy-to-take investment opportunities are clearly displayed.

The Role of Exports

The basic role of exports has often been questioned in the application of the economic base study. It is argued that the existence of exports depends on the geographical size of the region under consideration. The individual exports all of his services, the Finney County economy exports about 75 per cent of its products, the United States as a whole exports only about 5 per cent of its gross national product.[8] "Such other items as business investments, government expenditures, and the volume of residential construction may be just as autonomous with respect to regional income as are exports."[9]

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[8]Charles M. Tiebout, "Exports and Regional Economic Growth," Journal of Political Economy, LXIV (April, 1956), 161.

[9]Ibid.

When this argument is applied to the county level, as witnessed in the Finney County study, it loses much of its applicability. This is a small geographic region. Its present structure is based primarily upon the export of agricultural and agriculturally related products. As seen from Table 7, of the $47,017,520 in commodity sales made within Finney County during 1963, fully $36,488,241 were for export beyond the county's boundaries.

With more than 75 per cent of the commodity production value of Finney County dependent upon the export market, one can conclude that the success of the export base has been the determining factor in the economic growth of this region.[10]

The Question of Economic Stability

With so much dependence placed upon the exogenous demand beyond the control of the county itself, it is evident that the stability of the county's economy is a function of the structure of the export base. However, the stability mentioned here is somewhat different from the normal economic usage of the term. Finney County is primarily a producer of basic food commodities. A decline in exogenous industrial productivity will have but little effect upon the demand for food. People eat regardless of whether they have a job or not. The primary stability problem that affects Finney

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[10]Douglass C. North, "Locational Theory and Regional Economic Growth," Journal of Political Economy, LXIII (June, 1955), 257.

County is a reflection of weather conditions at harvest. This stability is far more exogenous than the normal cyclical stability.

It must be granted that cyclical fluctuations will have some effect upon Finney County income. These fluctuations would primarily manifest themselves in the concrete products sector, the farm machinery and equipment sector, and the plastic products sector. Without doubt, there would also be a psychological effect, but agricultural production would be affected in a minor fashion.[11] Certainly agricultural prices would decline, but other prices would also decline.

Finney County agricultural grain production is largely dependent upon spring rains and a dry ripening and harvest season. A five minute hail storm in June can literally bring havoc upon the grain exports sector of the economy. Likewise a severe winter blizzard which wipes out livestock herds has the same effect. With a decreased farm income, the agricultural population spends less, thus providing less income for the service sectors of the Finney County economy.

The effect is transmitted to other parts of the economy due to the structural dependence of the county's economy. In order to facilitate the export of agricultural commodities,

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[11]The Great Depression of the 1930's does not at first glance tend to bear out this view as applied to Finney County. Agricultural production suffered a severe shock, but this was primarily due to a prolonged drought which drastically affected production.

other parts of the economy specialize. The character of the labor force, banking institutions, transportation facilities, and business services become highly dependent upon the export sector. If the export sector is wiped out by adverse weather conditions, they too suffer the shock.

With this in mind, it can be concluded that the Finney County economy does not contain the diversified elements that would lead to stability. Instability could be caused by two sources: cyclical fluctuations affecting exports, but more important, weather conditions that would strike at the heart of the agriculturally based economy.

A further source of future instability rests with the county's high degree of dependence upon oil and gas production. Nearly one-third of the county's export receipts depend on oil and gas. Although at present, reserves are considered sufficient for the forseeable future, the day will come when these receipts no longer exist. Southeastern Kansas oil fields are currently at this stage. Future readjustment will have to be made in some manner.

Ubiquitous Inputs

The constancy of input coefficients should also be further considered. Table 7 shows that of the twenty-seven output sectors in the structure of the economy, primary dependence of the demand sectors rests upon four: the communications sector, the fabricated metal products sector, the concrete products sector, and the commercial printing sector. These

four sectors produce what might be termed ubiquitous outputs, products which are found in most cities with a population of 10,000. Most industries advertise, employing the communications media. Construction of any type uses concrete products. Repair work is a common task of the fabricated metal industries. Business forms are supplied by the commercial printing sector. The conclusion is clear, that the input requirements of most of the demand sectors are not too highly specialized.

It may be safe to hypothesize from the evidence at hand, that these ubiquitous inputs are primarily a function of population. A city of 7,500 population might be able to support one radio station, a city of 12,000, two radio stations. As the population grows, more of these ubiquitous inputs would be demanded. With one radio station, a firm might well allocate $200 for advertising. The advent of a second radio station might raise this total advertising outlay to $350. The conclusion can be reached quite easily, that the demand for these ubiquitous inputs depends upon their existence. Their existence in turn seems to depend upon the population of the market area.

The agricultural sectors are peculiar in that the primary inputs come from the federal government. Finney County income is highly dependent upon the existence of policies of assistance of the United States Department of Agriculture. Federal government expenditures in the county total $3,497,333. In the

barley and corn sectors, the federal assistence exceeds the sectors' outputs, as evidenced from the productivity coefficients in Table 10. The total federal government expenditure in agriculture amounts to 7.4 per cent of the total Finney County inputs. This figure takes on more meaning when it is stated that federal assistance to agriculture is equal to 9.6 per cent of the total value of Finney County exports.

Those who decry the intervention of the federal government should take note of the economic implications of its removal. Even with a modest income multiplier of 1.5[12] the total expenditures dependent upon the governmental assistance would amount to $5,246,000. A reduction in sales of this magnitude in the county serving sector would be sizeable. During the State of Kansas' fiscal year from July 1, 1962 to July 1, 1963, Finney County sales tax receipts totaled $772,188.[13] With the sales tax rate at 2 1/2 per cent, this would signify a total retail sales of $30,887,520 during this period. Were the federal assistance to be removed, one would expect about a 16 per cent reduction in this amount. Granted the time periods are not the same, but the point of the comparison cannot be denied: the Finney County economy is highly dependent upon the federal agricultural assistance.

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[12]The income multiplier is defined by Paul A. Samuelson, Economics: An Introductory Analysis (5th ed. New York: McGraw-Hill Book Company, Inc., 1961), p. 266, as "the numerical coefficient showing how great an increase in income results from each increase in such investment spending." The purchase of goods by the agricultural sector is here treated as an investment in the retail sales industries.

[13]Figures obtained from the Kansas Department of Revenue, Topeka, Kansas.

Predictions from Input-Output Data

One of the great values of input-output analysis is its use in making predictions concerning future output levels of different sectors when one demand sector is increased a certain amount. This power is dependent upon the assumption of constant productivity coefficients. One use of this procedure has been to forecast the results of a possible cutback in defense spending.[14]

This procedure can likewise be applied to the Finney County economy. In this example, assume that the final demand for items produced by the bakery products sector were to increase. This would mean that the final demand which had been valued in terms of sales of $19,000 in 1963 would become $25,500 in 19??.

In order to meet this sales increase, the bakery products sector would increase their inputs of various items. It will be recalled from Table 10, that the productivity coefficients for the bakery products industry were as follows:

Communications:	.015
Fabricated Metal Products:	.038

This means that for every dollar increase in sales $0.015 increase in communications inputs and $0.038 in fabricated metal products is necessary. This includes only

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[14]Wassily W. Leontief and Marvin Hoffenberg, "The Economic Effects of Disarmament,: Scientific American, CCIV (April, 1961), 47-55.

the products that originated in Finney County.

Table 11 revealed that the labor productivity coefficient value was .632 or $0.632 in labor inputs was used for each dollar's output. The bakery products industry had a total payroll of $12,000.

If annual sales in the bakery products sector were increased to $25,500 from $19,000, an increase of $6,500, the amount of increased sales times the producitivity coefficients would yield the new required input value. The bakery products sector demand for communications inputs would increase by $6,500 X .015, or $95.50, for fabricated metal products inputs, $6,500 X .038, of $247.00 for household inputs, or labor, $6,500 X .632, or $4,108.00. This would mean that the total bakery products sector inputs from Finney County would be:

Communications: $95.50 + $293 = $388.50

Fabricated Metal Products: $247.00 + $715.00 = $962.00

Households (payroll): $4,108.00 + $12,000.00 = $16,108.00.

But the story does not end here. Both the communications sector and fabricated metal products sector must also increase their outputs to meet this increased demand.

The productivity coefficients of the communications sector were as follows:

Communications: .021

Fabricated Metal Products: .003

Concrete Products: .039

Commercial Printing: .005

Households: .492.

The total amount of sales of these sectors would equal the increase in communications sales times the productivity coefficient:

Communications: $95.50 X .021 = $2.0055

Fabricated Metal Products: $95.50 X .003 = $0.2865

Concrete Products: $95.50 X .039 = $3.7245

Commercial Printing: $95.50 X .005 = $0.4775

Households (payroll): $95.50 X .492 = $46.9860.

The productivity coefficients for the fabricated metal products were:

Communications: .034

Fabricated Metal Products: .013

Concrete Products: .056

Commercial Printing: .011

Households: .434.

The total increase in demand from the fabricated metal products would then equal:

Communications: $247.00 X .034 = $8.398

Fabricated Metal Products: $247.00 X .013 = $3.211

Concrete Products: $247.00 X .056 = $13.832

Commercial Printing: $247.00 X .011 = $2.717

Households (payroll): $247.00 X .434 = $107.198

This completes the second round effects from a doubling in the final demand from the items produced by the bakery products sector. To this point, the total increase in output to facilitate the bakery products sector to double its output have been as follows in Table 14:

TABLE 14

SECOND ROUND INCREASES IN OTHER SECTORS AS A RESULT OF $6,500 INCREASE IN FINAL DEMAND FOR BAKERY PRODUCTS

Sector	Total Increase in Output at Increased Level of Production
Bakery Products	$6,500.00
Communications	105.90
Fabricated Metal Products . . .	250.50
Concrete Products	17.56
Commercial Printing	3.19
Households (payroll)	4,262.19
TOTAL	$11,139.33

It would be possible to carry this process on indefinitely, but this is a job that is better suited for modern digital computers.

It is conceivable that some production bottlenecks might be encountered. Suppose the process revealed that a certain amount of some mineral would be needed, and that metal was not available in such quantities due to supply limitations. In that case obviously the productive sector which required the mineral would not be able to increase its output by the desired amount.

By employing this process, it is possible to see what adjustments would have to be made in order to produce the doubling of bakery products outputs. The increase in demand would affect not only the bakery products sector, but those sectors which supply its inputs, and also inputs for those inputs, and indefinitely back through the entire economy.

Decreases in demand could likewise be followed through by using the same procedures. This obviously is one of the most useful purposes of input-output analysis.

Summary

The data presented in Chapter V have yielded a wealth of information. The precise sources of employment, income, and outputs have been located. Questions concerning cyclical stability have been analyzed. The exogenous factor of weather has been examined. The role of the federal government in the Finney County economy has been pinpointed. Finally, the

input-output technique has been employed to make predictions concerning the effects of a given increase in the demand for the product of one of the sectors.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Review of Analysis

The analysis of the Finney County economy, may be evaluated in terms of the study objectives stated at the beginning of Chapter III.[1]

The analysis of the Finney County economy has centered on two goals: to isolate and examine the components of the economic base and to study the flows of goods that took place within the economy.

For such an examination, Finney County entrepreneurs were asked to identify the demand sectors that purchased their goods. The relation of these outputs which become subsequent inputs from the various demand sectors were then arranged in the form of an input-output transactions matrix. An open input-output model was employed. By using such a model, it was possible to study the flow of goods and services that passed out of the county economy.

In isolating the county production sectors that were dependent upon demand sectors located outside the geographic boundaries of the economy, it was possible to see which

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[1] <u>Supra</u>, p. 18.

industries exported goods from the economy. The sales of these exports were responsible for bringing money into the economy, to pay for the necessary imports.

Interactions within the economic base itself were also studied in detail. Some Finney County firms which themselves were found to have no direct exports, were found to contribute directly to those firms that did. Although such firms would be treated as purely service, or county serving industries by the use of the traditional basic-nonbasic dichotomy, the input-output approach revealed their "basic-industries serving functions."

The traditional base analysis was expanded to give a more precise destination of the goods from the Finney County economic base. In this manner, it was possible to more accurately discover which segments of exogenous demand determined the demand for Finney County products.

In analyzing the data of the Finney County economy, a number of different aspects were explored. The problem of agricultural contributions to economic development were examined. The potential development of new industries that would employ Finney County outputs and offer employment to Finney County labor was discussed. The question of economic stability in the Finney County were analyzed, with the conclusion that much of the stability of the economy represents a dependence on weather factors that affect agricultural production. The role of the federal agricultural assistance to agriculture was examined in hopes of discovering to what extent the county's prosperity depended upon such programs. Finally, employing the assumptions

upon which input-output analysis is based, a method for making predictions was used.

In recapitulation, these conclusions concerning the Finney County economy are the basic value of the input-output approach to the Finney County base analysis.

The Objectives Revisited

In attempting to fit the Finney County analysis into the original objectives of the study, the following conclusions were reached:

1. The Finney County economic base consists of those industries which export their products beyond the Finney County borders. The leading individual export industry is the petroleum products industry, which exported $11,378,934 in oil and gas. The leading industrial group in exports was the agricultural industries. The leading sectors of this group in terms of exports consisted of livestock ($7,570,000), wheat ($5,391,988), and grain sorghums ($3,601,351).

The leading manufacturers were also closely associated to the agricultural industries, with the grain mill products ($2,387,500) and farm machinery and equipment ($1,227,737) leading in exports. The dairy products industries exported $1,331,783 in products from the Finney County economy.

2. Interaction of industries within the economic base are relatively rare. The Finney County transactions matrix shown in Table 7, displayed 115 cases of interaction out of

the total 702 cells. The leading Finney County input for other sectors of the economy are those which have been termed ubiquitous inputs: Communications, fabricated metal products, concrete products, and commercial printing.

3. The major sources of income and employment appear to be those industries which have the largest total sales output. These include the petroleum products sector, the wheat sector, the livestock sector, the grain sorghum sector, the federal government and the grain mill products sector.

From Table 11, it can be seen that the leading manufacturing payrolls are provided by the petroleum products sector ($454,500), the grain mill products sector ($451,760), and the agricultural chemical industries ($428,236).

4. The Finney County economy contains several unique characteristics. One such characteristic is the large degree of dependence upon diversified agricultural production. A by-product of the agricultural base is the large degree of dependence the county has upon agricultural assistance programs. Federal government expenditures in the county amounted to $3,497,233, in 1963.

Another peculiarity of the county economy is its geographical location over the Hugoton gas and oil field. This location leads to $11,961,294 in sales of petroleum products.

These were the objectives and results of applying the input-output economic base analysis to Finney County. The study itself suggests potentials for further studies of the

county's economy. The exact exogenous factors that lead to demand for Finney County products should be further analyzed to precisely determine what determines the demand. A more precise measure of farm income should be developed. Great value could be gained from the development of a method of determining the labor productivity coefficients in the agricultural sectors. The relationships between investment and economic growth could be explored.

This study has attempted only to identify the extent of the Finney County economic base and the interactions that take place within that base. It is hoped that this analysis accomplished this task and contributes to the growing body of thought in the economic study of small areas.

APPENDICES

APPENDIX A

FINNEY COUNTY AREA ECONOMIC STUDY MANUFACTURING QUESTIONNAIRE

KANSAS STATE UNIVERSITY

Firm:

According to the Directory of Kansas Manufacturers and Products (Kansas Department of Economic Development), your firm is engaged in manufacturing the following products:

In the following questions, if you sell to wholesalers or retailers, please disregard this fact and estimate where your wholesaler or retailer sells your product. Please try to make all estimates as accurate as possible.

1. What per cent of your total sales in each of the above product lines were within the city limits of Garden City during 1963?
2. What per cent of total sales of each of the above product lines were within Finney County during 1963?
3. What per cent of 1963 total sales of each of the above product lines were within Southwestern Kansas (Finney, Grant, Greeley, Stevens, Lane, Stanton, Kearney, Wichita, Seward, Morton, Gray, Meade, Haskell, Scott, and Hamilton Counties)?
4. For each of the above product lines, what per cent of your raw material inputs, including farm produce, originated in Finney County?
5. What was the value of your total sales in each of the above product lines in 1963?

6. What per cent of your sales in the above product lines were purchased by the federal government?

7. What per cent of your total sales in each of the above product lines were purchased by local government, i.e. Finney County, Garden City, or local township government?

8. What per cent of your total sales in each of the above product lines did you sell directly to the consumer, i.e. no middleman, in 1963?

9. What percentage of your total sales in each of the above product lines did you sell directly to a retail establishment in 1963?

10. What per cent of your total in each of the above product lines did you sell to:

Agricultural Industries (excluding individual farmer)?

Individual farmer?

Construction firms?

Other manufacturing firms?

Other (Please Specify)?

11. What per cent of your 1963 total sales in each of the above product lines did you sell to these Finney County industrial groups:

Meat Packing?

Dairy Products?

Grain Mill Processors (excluding elevators)?

Grain Elevators or Storage?

Bakery Goods?

Beverage Industries?

Printing and Publishers?

Agricultural Chemicals and Fertilizers?

Petroleum Refining and Related Industries?

Plastic Products?

Stone, Clay, and Glass Producers?

Farm Machinery and Equipment?

Machine Shops, Jobbing, and Repair?

Transportation Equipment?

Iron and Steel Foundries?

Rolling, Drawing, and Extruding of Metals?

Fabricated Metal Products?

Electroplating?

Photographic Equipment?

Communications?

Electricity Generating?

Other (please specify)?

12. Approximately how many people do you employ?

13. What was your payroll in 1963?

APPENDIX B

AGRICULTURAL INCOME ESTIMATION IN FINNEY COUNTY

Farm income accounting appears to be one of the most difficult tasks that exists in modern income accounting. Official published data are usually made available considerable after the harvest is made.

The procedure used in Finney County is not perfect, but does offer a close approximation to the true figure, which might forever remain unknown.

The method employed involved interviews with each elevator in the county. Elevator operators were asked how much grain they shipped from their elevator, and also what they thought the total crop was in 1963. The estimates made were only for commodities grown in Finney County.

The Garden City Co-op Equity Exchange then figured an average price for each commodity, considering price changes throughout the year.

The result of these computations are given in the table below:

Commodity	Bushels Shipped	Average Price to Farmers Per Bushel	Average Price of Shipped Commodity Per Bushel	Total Revenue to Dealers
Barley	26,450	$0.77	$0.85	$ 22,463
Corn	66,500	1.00	1.08	71,820
Milo	3,674,848	0.90	0.98	3,601,501
Rye	30,300	1.00	1.08	32,756
Soybeans	2,000	2.20	2,28	4,560
Wheat	2,793,750	1.88	1.93	5,391,998

The figures used in Table 7 were the "Total Revenue to Dealers," as this was the actual amount of money brought into the county by the sale.

The sugar beet data was obtained from Mr. F. R. Smith of the American Crystal Sugar Company in Rocky Ford, Colorado. The American Crystal Sugar Company has contract for all sugar beets in the county, thus the figures should be extremely accurate. Mr. Smith reported that 1963 payments amounted to $655,000. This was based on 58,100 tons of beets. This is exclusive of the government benefits payments of about $2.25 per ton, which have been listed separately in Table 7.

As the American Crystal Sugar Company contracts the labor used for planting, thinning, hoeing, weeding, irrigating, and harvesting all sugar beets in Finney County, it is possible in this instance to derive a labor input coefficient. 240,960 man-hours of labor were used (60 man-hours per acre for 4,016 acres). If the labor price for such service is assumed to be $1.05 per hour, which is nearly correct, then the labor input coefficient has a value of .386.

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A COUNTY ECONOMIC BASE STUDY: AN INPUT-OUTPUT APPROACH

by

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AN ABSTRACT OF A MASTER'S THESIS

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ABSTRACT

The purpose of this study was to isolate the economic base of Finney County, Kansas. The economic base of the county consists of those activities which provide basic employment and income upon which the rest of the county depends. Economic base analysis distinguishes between the "basic activities," or those industries which bring money into the county from beyond its borders, and the "service activities," or those which serve local needs.

The methodology of the economic base study has a long and varied history. Traditionally, the economic base study divides the local economy into a dichotomy of basic and service activities.

The study herein presented made use of a more useful approach: input-output analysis. Input-output analysis is a method of accounting which allows for a study of the flows of goods and services that pass through the economy. By the use of this method it is possible to study the interrelationships that occur within the county's economic base.

By employing an open input-output model, or one which allows for the accounting of exports from the county, the basic sectors of the economy can be isolated. It was then possible to see which service activities within the county provided inputs for the basic industries.

Finney County is predominantly an agriculturally based

economy. In the input-output accounting method employed, individual farm commodities were treated in the same manner as other industries.

In addition to the agricultural components, it was discovered that petroleum products, processed food products, and farm machinery and equipment were the major contributors to the economic base.

It was found that the industries in the county were primarily dependent upon natural resources and inputs which originated outside of the county. Four inputs that were widely used were what might be called ubiquitous inputs, that meaning that they are found in most communities with a population of 10,000. These inputs were communications, fabricated metal products, commercial printing, and concrete products.

To determine the major sources of income and employment within the Finney County economy, productivity coefficients were derived. These coefficients revealed the cost of inputs for each dollar's output of the final product. In addition to agriculture, the leading providers of employment were industries dealing with petroleum products, grain mill products, and farm marchinery and equipment.

Finally, an attempt was made to examine the distinguishing features of the county's economy. Being agriculturally-based, the county was found to be extremely dependent upon agriculturally-related income sources. Federal agricultural programs were

important. The county is extremely dependent upon favorable weather conditions in order to maximize agricultural income.

This study represents the adaptation of a method of urban analysis to the rural environment. Its use lies in determining possible production bottlenecks in periods of increased demand and as a guide to the county's potential for economic development.