

INPUT-OUTPUT ANALYSIS OF THE KICKAPOO RIVER VALLEY

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Input-Output Analysis of the Kickapoo River Valley

*** Executive Summary ***

July, 1994

The Kickapoo Valley has a new tool for economic development planning. The tool is a computerized model of the regional economy that provides local policy-makers with greater capacity to identify opportunities and forecast the outcome of economic development decisions.

Researchers at the University of Wisconsin-Extension have created an "input-output model" of the Kickapoo Valley regional economy. Input-output is an interactive program that shows how each part of the regional economy is

connected to every other. Understanding how economic sectors are interconnected provides insight into potential business development opportunities, how the effects of a business expansion or closing will ripple throughout the economy, or which local development policies are likely to yield the highest return.

While every project requires a detailed study of its feasibility, the analysis suggests a few areas that appear to have greater prospects for creating strategies enhancing business development potential:

- * Adding value through the processing of locally produced agriculture products.
- * Developing new markets for agricultural commodities.
- * Adding value to regional forest resources through additional processing.
- * Attracting visitors to the Valley through tourism-related activity.
- * Promoting small business development in all sectors of the economy.
- * Substituting locally produced goods and services for those currently being imported.

These are a few of the insights gained from the input-output analysis of the Kickapoo Valley. The analysis shows there are many ways for the Valley to enhance its economic position.

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The input-output model of the Kickapoo Valley was created through the support of the Kickapoo Valley Reforestation Fund administered by the School of Natural Resources at the University of Wisconsin-Madison. Development of the model is part of the ongoing cooperative program to enhance economic opportunities and the quality of life in the Valley.

Agriculture and Value Added Processing

In 1990, the largest single contributor to economic output in the Valley was agriculture. Agriculture produced \$217 million in sales, about 35% of the total for the economy. Agriculture was also the largest exporter of products from the Valley and the largest generator of income.

Of the \$217 million in total agricultural sales, about \$156 million was exported out of the region. These sales represent money coming back into the Valley to be used for agricultural production and to be recirculated throughout the economy. Agriculture was also the largest single source of local income, providing \$72 million to farmers and agricultural workers.

Closely related to agriculture is the nondurable goods manufacturing sector. A large portion of this sector consists of cheese, livestock and other food processing. Much of this sector's inputs come directly from local farms. Thus, food processing represents a good example of local "value added."

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Adding value to products directly increases regional income and indirectly stimulates other interconnected sectors in the area. In agriculture, for example, processing raw milk into cheese, butter and other products requires more labor (generating income) and enhances the value of the product. Additional processing from cutting and packaging the products will contribute even more local income to the economy. Industries that support the processing by supplying materials, transportation and business services will similarly benefit.

The nondurable goods sector contributed \$121 million to total sales in the Valley. It exported about \$115 million and contributed another \$17 million to local income.

In terms of total sales, the nondurable goods manufacturing sector has a strong "multiplier" effect on the economy. For each one dollar change in demand for its product, a \$1.64 change will be seen throughout the economy. Thus, as the nondurable goods sector expands, so too will agriculture and other interconnected businesses.

New Markets for Agricultural Products

The small but growing organic food production sector should also be seen as an opportunity. With concern about food safety, there has been increasing demand for organically grown products. Supplying this emerging

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market represents an opportunity to capitalize on changing consumer preferences. Given the existing infrastructure of farms and food processing plants, the Kickapoo Valley may be able to take advantage of an emerging market.

Agriculture and related food processing represent an opportunity for the Kickapoo Valley. Whether through traditional farm commodities such as milk, cheese and meats or through specialty products such as fruits and organically grown foods, agricultural value added provides a significant "bang-for-the-buck" in the local economy.

Adding Value to Forest Products

A primary purpose of the Kickapoo Valley Reforestation Fund is to identify economic development opportunities in the forest products sector. In 1990, the forest sector contributed \$7.3 million to total Valley sales.

Many local citizens see the forest products industry as representing untapped economic potential. The input-output analysis shows the current level of forest-related economic activity to be relatively small. However, the sales multiplier for this sector is 1.80, indicating a potentially significant bang-for-the-buck in the local economy.

There is also potential to establish a positive value added relationship between forest products and the durable goods manufacturing sector similar to the agriculture-nondurable goods relationship. At present, there is only a

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small amount of economic exchange between these sectors. Expansion of industries that process the raw timber produced in the Valley will have substantial multiplier effects.

Tourism Development

There is potential for increased tourism spending. Spending by visitors who canoe the Kickapoo River, hunt turkey, or attend fall festivals provides a boost for a wide variety of local trade and service businesses.

Businesses directly benefitting from tourist spending include motels, grocery stores, restaurants and bars, auto service stations, canoe outfitters, clothing stores, souvenir shops, amusement arcades, and other retail sales. Most of these are small businesses that provide a surprising amount of income and employment in the Valley. The owners and employees of these local businesses use the income from tourist spending to support other local businesses.

With the Valley's outstanding natural beauty, the forest and water resources, the state park and the newly acquired federal land, the goal of attracting visitors to the valley should be high on the list.

Small Business Development

While many people are aware of retail and service businesses, few recognize the major role it plays in the vitality of the Kickapoo Valley economy.

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Total services (consisting of personal and business services, finance, insurance and real estate) accounted for \$84 million in sales, the highest total after agriculture and nondurable goods manufacturing. Retail and wholesale trade added another \$51 million in total sales.

Trade and services together contributed a combined \$83 million in local income to residents in the Valley. Generally over half of the value of all trade and service sales goes to local labor and proprietor's profits.

When taken together, trade and service sectors produce a significant proportion of the total sales in the Valley and income for local residents. While many trade and service enterprises are individually small, the combined effect of the grocers, service stations, health care providers and other enterprises add up to a very large economic force in the Valley.

Here, too, an opportunity exists. Small businesses employing one, two or three employees each contribute to the overall economic welfare of the Valley. The larger the local trade and service sectors, the more opportunity exists to keep income circulating within the local economy. Thus, no business is too small or unimportant. Assistance targeted to individuals starting new businesses or those already in business is an important part of a local development strategy.

Import Substitution

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A significant amount of the inputs to local production and trade are imported from outside the region. About half of all inputs to agriculture, forest products, construction, and manufacturing are imported from outside the Valley. The input-output analysis sheds light on where there may be possibility to substitute locally produced inputs for those currently imported. While no local or regional economy can expect to be completely self-sufficient, import substitution is one more opportunity to keep money circulating in the local economy.

All of the development opportunities discussed in this report are within the ability of local communities to positively influence. While there are substantial challenges to overcome, it is possible to enhance the economic performance and long-term viability of communities in the Kickapoo River Valley.

Introduction

The Kickapoo River Valley (KRV) is a 766 square mile watershed encompassing parts of four counties (Crawford, Monroe, Richland and Vernon). It is an economically lagging rural region, with adjusted gross income levels less than 55% of state average [WI Department of Revenue 1991].

The KRV is currently working on a comprehensive regional economic development program with the School of Natural Resources at the University of Wisconsin-Madison, U.W.-Extension and the State of Wisconsin. One of the goals of this program is to enhance the economic well-being of Valley residents. This analysis is intended to provide detailed economic information to aid local development professionals to achieve that goal.

Input-output (I-O) has become an increasingly popular means for analyzing regional economic structure and assisting local economic development decision-making. I-O models provide a variety of useful information [Deller 1990]: it is a descriptive tool showing the existing structure of a regional economy; it provides information on individual economic sectors, the linkages between them and how they co-vary; it can show the relative importance of an individual sector to the overall economy; it can predict local responses to changing economic conditions.

Input-output analyses describe the economic transactions within a region. The transactions represent a "snap shot" of the economic activity that occurred in the period covered by the analysis. The use of computers and standard software packages makes it possible to manage the immense amount of data that goes into an I-O model.

The program used for this analysis is the U.S. Forest Service's IMPLAN (IMpact analysis for PLANning) system. IMPLAN is relatively easy to use. The program supplies necessary county economic data and it is reasonably simple to edit data files to refine an I-O model.

This project offers two enhancements of the standard data package supplied by IMPLAN. It alters the county data files to create a regional model that reflects project boundaries rather than county boundaries. Second, it refines the data by substituting actual employment and income information available for the Valley for the derived estimates provided by IMPLAN.

Introduction to Input-Output Analyses

Input-output creates a mathematical representation of the regional economy at a point in time [Hastings and Brucker 1993]. In its simplest form, an I-O model is a "spreadsheet representation" of the economy detailing the flow of dollars between producers and consumers of goods and services. All economic activity is assigned to production and consumption sectors. The fundamental relationship of I-O analysis is that the amount of local production

of goods and services is determined by the demand (consumption) generated by users of those products.

Demand comes from several sources. Goods and services produced in the region may be purchased by other producers for use in the production of their own products (intermediate demand). Demand also comes from consumers both within and out of the region who use the products in final form (final demand) in this period.

The flow of products between sectors are measured in dollars, representing transactions during the accounting period, typically one year. The sum of the transactions represent "output," i.e. the total economic activity that occurs in the regional economy during that period of time.

Data generated in the analysis can be arranged in several ways to illustrate the relationship between the producing and consuming sectors of the economy.

Transactions Table

The transactions table is divided into two parts. First is the purchasing sectors portion of the table showing the type and degree of interindustry linkages between the producing sectors of the regional economy. The second part of the table is the final demand section, showing sales to final consumers of the product. Table 1 illustrates a simplified transactions table.

Table 1. Sample Transactions Table

Production Sectors	-----Purchasing Sectors-----				---Final Demand---		Total
	Ag.	Mfg.	Serv.	HH	Exports	Output	
Agriculture	\$10	\$ 6	\$ 2	\$20	\$12	\$50	
Manufacturing	4	4	3	24	14	49	
Services	6	2	1	34	10	53	
Households	16	25	38	1	52	132	
Imports	14	12	9	53	0	88	
Total Inputs	\$50	\$49	\$53	\$132	\$88	\$372	

(Source: Deller 1990, p. 2).

The transactions table offers two perspectives of the relationship between production and consumption of the region's output. In the "purchasing sectors" section of the table, it shows the transactions between the producing sectors of the economy. Each industry group purchases inputs for the production of its particular product. Some of those inputs are purchased locally from other sectors within the region. These are termed "interindustry transactions." Other inputs to local production include imports from outside the region and payments to households in exchange for labor, rents, investments, etc.

Reading down a column of the table shows the total value of purchases made by each sector listed at the top of a column. The purchases are made from each of the sectors listed at the left side of the table. Thus, reading down the column, the interindustry purchases of inputs for production from other

regional industry sectors are shown. Continuing down the column, the imported inputs and payments to households required for production are also shown.

The agricultural sector, for example, purchases \$10 worth of inputs from other local agricultural businesses (e.g. seed, livestock). Agriculture also buys \$4 worth of inputs from manufacturing (fertilizer, equipment) and \$6 from services (accounting, veterinarian). In addition, the agricultural sector purchases \$16 worth of inputs from regional households in the form of payments for labor, rents to landowners, profits, dividends to investors, etc. Finally, the agricultural sector imports items from outside the region for its production (tractors, milking equipment). In total, the agriculture sector purchases \$50 worth of inputs into its production.

Reading across the table rows provides an alternative interpretation of economic activity. This perspective shows local sales from each sector listed at the left side of the table to other local sectors listed at the top. Thus, for any production sector it is possible to track to whom sales are being made.

Local agricultural businesses, for example, are selling \$10 of their output to other local agricultural businesses, \$6 to manufacturing (milk for cheese, poultry for processing) and \$2 to services (restaurants). In addition, local agriculture sells \$20 of its output to regional households, and exports \$12 of output out of the region.

"Final demand" consists of all the goods and services, other than interindustry sales, that have been purchased for final use. This includes inventories which will be processed at some future time, considering that the accounting period of I-O is one year. Households represent the local and nonlocal spending of income generated within the region. Exports are sales outside the region. Total output is the value of sales to final users plus the interindustry transactions.

Depending on the objectives of the I-O analysis, the "households" category can be considered as either part of the purchasing sectors portion of the table or as part of final demand. When households are included with the purchasing sectors, the model is termed a "closed model," and the spending of income by households is counted as part of regional economic activity. An "open model" classifies households as part of final demand, and their income is not included as part of regional economic activity. This distinction becomes important later when the "multiplier" effects of regional economic activity are calculated because a closed model generates larger multipliers.

Note how the \$50 in total agricultural output equals \$50 of agricultural inputs. In I-O analysis, the value of inputs must equal the value of output.

Direct Requirements Table

The second I-O table is the direct requirements table (also called the technical coefficients matrix). This table shows the proportion of inputs

required to produce one dollar of output. It is calculated by dividing each of the column values in the transactions table by the column sum.¹ Table 2 shows a simplified direct requirements table.

Table 2. Sample Direct Requirements Table

Production Sectors	-----Purchasing Sectors-----		
	Ag.	Mfg.	Serv.
Agriculture	.20	.12	.04
Manufacturing	.08	.08	.06
Services	.12	.04	.02
Households	.32	.51	.71
Imports	.28	.24	.17
Total Inputs	1.00	1.00	1.00

(Source: Deller 1990, p. 3).

Reading down the table shows the proportion of input required from each sector listed along the side to produce one dollar of output by the sector listed at the top.

The interpretation of this table shows what would happen if demand for a sector's output increased. For example, if the agriculture sector increased sales by \$1 (or \$100,000), this amount could be multiplied by the table values in the column to see the immediate impact on each of the other sectors providing inputs. The \$1 in increased output from agriculture would require

20 cents worth of input purchases from other agricultural firms, 8 cents from manufacturing, 12 cents from services, 32 cents from households and 28 cents worth of imported inputs. This table, then, shows the direct effects of an increase (or decrease) in demand originating from outside the economy.

¹ Output is a row total. Since inputs always sums to output, it is possible to divide by the column sum to get dollars of input per dollar of output.

Total Requirements Table

The total requirements table recognizes that an increase in demand for a sector's output has a greater impact on the regional economy than the direct effect. Firms that supply inputs to the sector experiencing the increase in demand must also increase their purchase of inputs for their production. These support firms purchase materials and labor in order to meet the interindustry demand from the sector initially stimulated by final demand changes. The effects on supporting sectors reflect the backward linkages in the economy as firms within the region buy and sell to one another. These additional "ripples" of economic activity are the indirect effects of an initial increase in final demand. A sample total requirements table is shown in Table 3.

Table 3. Sample Total Requirements Table

Production Sectors	-----Purchasing Sectors-----		
	Ag.	Mfg.	Serv.
Agriculture	1.28	.17	.06
Manufacturing	.12	1.11	.07
Services	.16	.07	1.03
Total Inputs	1.56	1.35	1.16

(Source: Deller 1990, p. 4).

The total requirements table captures the combined direct and indirect effects from a change in final demand. Assume the agricultural sector experiences a one dollar change in final demand. The total effect on each of the other interconnected sectors listed at the side of the table are shown in the column values. Thus, the total direct and indirect effects within the agricultural sector will be \$1.28 - the initial \$1 increase in final demand plus 28 cents in additional economic activity as agricultural firms buy and sell to produce necessary inputs. The total at the bottom of the table shows the combined direct and indirect effects for all sectors per dollar change in final demand in the initial sector.

The total requirements table yields more information than a total industry multiplier. The table shows specific industry-by-industry effects of a change in final demand. Thus, it is possible to ask, for example, how a change in the agricultural industry will affect the local services sector.

What is shown in all three tables are the strength of interindustry linkages. The relative size of the off-diagonal values in all three tables show the degree to which regional industries are linked to one another. The larger the values, the more tightly linked the local economy.

Economic Multipliers

Multipliers are another means of estimating the overall change in the economy due to changes in final demand. Among all the information provided by input-output, multipliers are probably the most frequently used and abused. To help avoid confusion and potential misuse of the economic multipliers generated in this report, a brief overview of their use and limitations is offered. For additional information on economic multipliers, see Stevens and Lahr [1988], Shaffer [1989, Pp. 242-253] and Coughlin and Mandelbaum [1991].

A change in final demand generates activity in the regional economy as various industries buy and sell from one another. These interindustry relations cause the total effect on the economy to exceed the initial change. The ratio of the total change in the economy to the initial change in final demand is the economic multiplier.

There are several impacts from changes in final demand that are measured by multipliers. To review the earlier discussion:

Direct Effects are the value of the immediate changes within the economy. If a business receives a new order for its product, the direct effects consist of the value of the inputs purchased from regional businesses (interindustry transactions) necessary to fill the initial order.

Indirect Effects are the value of inputs purchased by the backward-linked industries in additional rounds of spending. Businesses supplying inputs to the business receiving the initial order must also purchase inputs in order to meet their increased demand. The final products of suppliers become the inputs for the businesses directly stimulated.

Induced Effects are the value of the increased spending by households (labor) that results from the increased direct and indirect business activity. The induced effects of a change in final demand continues to recirculate through the economy several times before the additional income generated by the initial change in final demand finally "leaks out" of the economy through purchase of imported goods and energy, payment of non-local taxes, nonlocal investments, etc. "Closing" the model, i.e. including households as part of the purchasing sectors, is necessary in order to calculate induced effects.

Input-output analysis generates a variety of alternative multipliers. The best multiplier to use depends on the type of impact of interest to policy makers. Those generated by IMPLAN include:

Output Multipliers show changes in the value of production from all sectors when a sector's output changes by one dollar. This shows the degree of interdependence a given sector has with all other local sectors.

Personal Income Multipliers show the total effect of a dollar change in output on employee compensation. Income multipliers provide an indication of how much employee compensation is expected to change.

Total Income Multipliers show the total effect of a dollar change in output on employee compensation plus proprietary income plus other property income.

Value Added Multipliers show the total effect of a dollar change in output on employee compensation plus proprietary income plus other property income plus indirect business taxes. This is the income multiplier preferred by some economists, although local officials often focus on personal income multipliers.

Employment Multipliers show the changes in the total number of jobs that are created across the economy due to the addition of a single employee in a given sector.² The multiplier includes the initial job created plus others created through the multiplier effects. Total jobs refers to an "average" job within the economy. Thus, there is no indication whether additional jobs created will be full- or part-time, nor is there any indication of differences in wage rates for the employment created.

Cautions in the Use of Multipliers

There has been much discussion about the value and use of multipliers. Awareness of some of the limitations and common misuses will help to interpret multipliers more accurately:

² The stimulus for change in the regional economy is demand for output, measured in dollars. I-O measures output per employee and is therefore able to estimate employment changes based on dollar changes in final demand.

(1) Economic multipliers are not interchangeable. An employment multiplier should not be used as a proxy for an income multiplier because of differences in wage scales. If both are available, they should be used separately to estimate the respective employment and income impacts.

(2) Multipliers are not transferrable from one locale to another. Multipliers are based on the unique composition of the economy and the pattern of local/non-local purchases.

(3) Multipliers are less certain for completely new types of economic activity coming into the region. Multipliers are based on existing relationships within the local economy at the time the multiplier was calculated.

(4) Multipliers tend to over-state the impact of change. In the long term, the regional economy makes adjustments that tend to dampen the impacts implied by the multiplier. For example, if jobs are lost due to a business

closure, many people will make successful adjustments by finding new employment.

(5) Multipliers assume the regional economy is completely elastic, i.e., that there are no supply constraints and that new resources will be available to expand production.

(6) Multipliers change over time due to changing technology, prices, interregional and international trade patterns, etc. To the extent such changes may have occurred since the I-O table was initially constructed, the multipliers may be inaccurate.

(7) Employment multipliers estimated by IMPLAN are in terms of total jobs generated or lost. Economic sectors vary considerably in the proportion of full-time jobs to total employment. There is no indication of the mix of full- and part-time jobs that will actually be affected.

Assumptions of Input-Output Modeling

Input-output analysis requires a number of assumptions about the production of goods and services. It is not the intention of this report to provide a detailed discussion of the mechanics of I-O models. However, it will be useful to recognize some of the more limiting assumptions [Hastings and Brucker 1993; Shaffer 1989, Pp. 274-284]:

(1) Industry production is a linear process. Changing output creates no economies or diseconomies of scale.

(2) Each industry creates only one product. This assumes the total output of multi-product firms is allocated to the primary product produced by that firm or that the production of products can be separated.

(3) Each product is produced by a fixed and known process. Different firms producing the same product are assumed to use the same process. There is no substitution of factor inputs, e.g. a firm using a different technology is not recognized.

(4) Changes in price will not affect the proportion of inputs used. Changing final demand is the only way to change the level of inputs into production.

(6) There are no input constraints. The supply of inputs is infinite and perfectly elastic.

(7) There are no unused or underused local resources. Excess capacity in firms and labor are not recognized.

These assumptions obviously may not apply to a specific locale. In spite of these simplifying assumptions the model does a reasonably good job describing the economy and predicting impacts [Taylor *et al.*, 1992]. However, the reader should be aware of local conditions that substantially violate these assumptions and adjust estimates accordingly.

Kickapoo River Valley Input-Output Model

Construction of the KRV Model

The IMPLAN software used to create this model is based on 1990 county data and interindustry linkages. The model has been refined utilizing 1990 employment and employee payroll information available for the KRV. The following adjustments have been made to enhance the model:

Study Area: IMPLAN data is aggregated to the county level. However, the study area consists of 23 towns, 14 villages and two cities spread across four counties. The problem in using the data files provided by IMPLAN is that the major centers of economic activity in three of the four KRV counties lie outside the project boundaries. Detailed employment information enabled the project boundaries to be defined at the minor civil division (municipality) level. Figure 1 shows project boundaries on a locator map of the study area.

Employment: ES202 Unemployment Compensation (UC) data files were used to generate employment estimates [WI Department of Industry, Labor and Human Relations 1993]. The data files show employment and payroll information at the minor civil division level, allowing the refined allocation of economic activity to project boundaries.

Payroll: The ES202 data files also report the payroll for all employees. The value of certain fringe benefits are not included in the payroll reported for employees [U.S. Bureau of Labor Statistics 1993]. Payroll data is adjusted to estimate the value of non-reported fringe benefits and to estimate employee compensation.

Proportional Adjustments: Employment and employee compensation represent only two of 22 data elements in IMPLAN's county data files. The

sector specific proportion of employment in the study area to total county employment created a ratio to adjust other data elements. Adjustments were made to each county's data file and then combined to create a KRV data file.

Data Aggregation

IMPLAN is constructed on the basis of the national I-O model and allows for up to 522 producing sectors. To simplify analysis and preserve confidentiality, the data has been aggregated on the following basis:

- (1) Agriculture - including dairy, livestock, cash crops, and other agricultural products.
- (2) Forest Products - including the value of timber/pulp, other forest products and activity of primary wood processors, including logging operations and sawmills.
- (3) Construction - including residential and commercial building contractors, construction trades and building maintenance.
- (4) Durable Manufacturing - including wood products and other durable goods.
- (5) Nondurable Manufacturing - including agricultural processing and printing/publishing.
- (6) Transportation and Public Utilities.
- (7) Retail and Wholesale Trade.
- (8) Personal and Business Services - including finance, insurance and real estate (FIRE), health services, and other personal and business services.
- (9) Government and Schools - including local government and public schools.

IMPLAN also provides detail for 15 types of final demand. The final demand sectors are aggregated into households, government, inventory, domestic exports and foreign exports.

Research Procedure Limitations

The main limitation in the data alteration procedures relates to use of the unemployment compensation files. This data source only includes businesses that are reporting payroll subject to UC taxes. This does not include economic activity by individuals who employ only themselves or family members for whom they do not report taxable wages. Thus, the employment driven adjustments used in this project probably underestimate the economic activity actually present in the area.

Small business is important to the Kickapoo Valley. Much of the small business activity is associated with small farm enterprises. Because the UC data files do not contain very complete information related to farm employment, the IMPLAN estimates of agricultural employment were retained. However, non-agricultural small businesses who do not have employees are not represented in the ES202 data files, and are missing from the KRV employment estimates in the I-O model.

Nevertheless, the use of actual employment and wage information represents an improvement over derived estimation techniques. Also, to the extent that use of the I-O model is to estimate the strength of interindustry

linkages and the magnitude of change impacts, the effect of deleting these non-employers should not be too serious.

Results

KRV Transactions Table

The input-output transactions table is shown in Table 4. All dollar figures are expressed in 1990 dollars.

The KRV transactions table contains an expanded array of information over the illustrative table used in the introduction. The purchasing sectors portion of the table shows the interindustry transactions between the aggregate sectors of the KRV economy. Reading down the left side of the table, imports are divided into domestic (produced within the U.S., but outside the KRV) and foreign (produced outside the U.S.). Households refers to the returns to the factors of production - land, labor and capital. It is an aggregate of incomes to households, including wages to labor, proprietor's profits, rents, investment dividends, and other sources of income. Institutions is a "balancing" category, reflecting certain local government transactions, calculation residuals and measurement errors.

The final demand section of the table includes purchases made by regional households, government, and investment (capital investments and inventories). It is a convention to include the households sector in the final demand section of the transactions table. When closing the model, households

are included as part of the regional purchasing sectors. Exports are sales outside the Valley. Domestic exports go somewhere outside the Valley but within the U.S., while foreign exports are outside the U.S.

Total demand sums the categories of final demand. Total output adds final demand and the value of interindustry transactions. To aid the discussion of the transactions table, several important components will be broken out for individual examination.

Total output in the KRV economy in 1990 was \$619.8 million.

Table 5 shows the rank order of regional industries by the value of total output (sales to intermediate and final demand). The table has been supplemented with estimates of local employment. The agriculture sector produces the largest share (35%) of total output. The nondurable goods manufacturing sector, which consists primarily of food processing (cheese and meat) and printing/publishing is another substantial contributor to total output (19.5%).

Table 5. Rank Order of KRV Sectors by 1990 Total Output (\$ Millions) versus Employment

Industry	Total Output	Employment
Agriculture	\$217.0	2,919
Nondurable Goods Manufacturing	121.1	560
Personal & Business Services	84.1	1,468
Retail and Wholesale Trade	51.2	1,758
Construction	41.3	658
Government & Schools	36.7	1,617
Transportation & Public Utilities	32.8	246
Durable Goods Manufacturing	28.3	313
Forest & Forest Products	7.3	68
TOTAL	\$619.8	9,608

When taken together, trade and services represent about 21.8% of total economic output. This shows the relative importance of trade, services and related industries to the Valley's economy. Note that these sectors provide a significant amount of employment for Valley residents.

Table 6 shows the rank order of sectors by their provision of value added (the households row of the transactions table) to the Valley economy. Recall that value added refers primarily to income going to households. Agriculture accounts for about 29% of the region's value added. The combined trade and services account for about 33.6% of the region's value added. Local

government also contributes a substantial amount (12.4%) to the income of Valley residents.

Table 6. Rank Order of KRV Sectors by 1990 Value Added (\$ Millions)

Industry	Value Added
Agriculture	\$72.0
Personal & Business Services	48.1
Retail and Wholesale Trade	35.3
Government & Schools	30.8
Transportation & Public Utilities	18.0
Nondurable Goods Manufacturing	17.1
Construction	13.7
Durable Goods Manufacturing	12.4
Forest & Forest Products	<u>1.3</u>
TOTAL	\$248.7

Table 7 compares regional industries by the value of their imports and combined domestic and foreign exports. Agriculture is the largest exporter in the region accounting for 44.8% of all exports. This is positive because the exports bring money back into the region. The manufacturing sectors are also large exporting sectors (combining for 41.1%). Services and construction export a modest amount, while trade and transportation/public utilities sectors generally service only the Valley, accounting for very little of the export activity.

Imports show a different picture. Imported inputs into agriculture and manufacturing are important components of local production. Trade, services and some other sectors are also large importers. Generally, it is desirable to reduce imported inputs if it is possible to produce them locally. Import substitution is an important local economic development strategy.

Imports are not necessarily bad, however. No region can be completely self-sufficient. In addition, importing allows local economic activity that might not otherwise occur. Thus, another important local development strategy is to add value to imported products prior to final sale.

Table 7. Rank Order of KRV Sectors by 1990 Exports versus Imports
(\$ Millions)

Industry	Exports	Imports
Agriculture	\$155.6	\$109.5
Nondurable Goods Manufacturing		115.3
Durable Goods Manufacturing		27.4
Construction	19.7	25.6
Personal & Business Services		14.3
Government & Schools		5.7
Forest & Forest Products		5.1
Retail and Wholesale Trade		2.8
Transportation & Public Utilities		1.1
TOTAL	\$347.0	\$278.2

The KRV transactions table (Table 4) also provides important information about interindustry transactions. The size of the values in the purchasing sectors portion of the table shows the volume of buying and selling between industry sectors within the region. Note that the nondurable goods manufacturing sector purchases over \$36.9 million worth of inputs from local agriculture. This reflects the relationship between the local milk, cheese and meat processors and local farmers. Relationships of this type help to keep money recirculating in the regional economy longer, allowing more local people to benefit from the value added to products.

KRV Direct Requirements Table

Interindustry linkages are highlighted in Table 8. The direct requirements table presents the linkages in terms of one dollar worth of output, making it easier to compare industry sectors. The proportion of inputs accounted for by value added and imports are also shown.

Reading down the table, each industry sector totals to \$1.00. In the first column, local farms (agriculture) purchase 9.53 cents worth of inputs from other local farms, but almost nothing from forest and forest products industries.

The nondurable goods manufacturing sector column shows the strongest linkage to another sector. Over 30 cents worth of inputs into nondurable manufacturing products is purchased from the agriculture sector. This shows the influence of the local milk, cheese and meat processors purchasing from local farms.

Table 9 shows the rank order of industries by the proportion of value added to total inputs. Government and schools have the highest proportion of value added (84 cents per dollar), attesting to the labor intensive nature of these activities. Much of the local taxes collected are used for wages to local government employees. Services, trade and transportation/public utilities also require a relatively high level of value added for the production of their products. The manufacturing sectors have a relatively smaller proportion of their input costs going to value added. This is not because their value added

contribution is small (see Table 6) so much as the costs of imported inputs are such a high proportion of total costs.

Table 9. Rank Order of KRV Sectors by 1990 Value Added per Dollar of Inputs

Industry	Value Added
Government & Schools	\$0.84
Retail and Wholesale Trade	0.69
Personal & Business Services	0.57
Transportation & Public Utilities	0.55
Durable Goods Manufacturing	0.44
Agriculture	0.33
Construction	0.33
Forest & Forest Products	0.18
Nondurable Goods Manufacturing	0.14

The direct requirements table (Table 8) also shows the proportion of imported inputs per dollar of output. Table 10 summarizes the import information. Construction has the highest proportion of imported inputs per dollar (62 cents). Most other economic sectors import costs are in the 25 to 50 cents per dollar of output range. About 13 cents of every dollar spent by government and schools is used to purchase imports.

Table 10 hints at sectors where a local substitution program might work. Using locally produced inputs rather than imports represents an opportunity to keep more money circulating in the local economy. However, the viability of

this strategy is constrained by the ability to produce the inputs locally in a cost-competitive fashion.

Table 10. Rank Order of KRV Sectors by 1990 Imports per Dollar of Inputs

Industry	Imports
Construction	\$0.62
Nondurable Goods Manufacturing	0.52
Durable Goods Manufacturing	0.51
Agriculture	0.50
Forest & Forest Products	0.47
Transportation & Public Utilities	0.40
Personal & Business Services	0.37
Retail and Wholesale Trade	0.27
Government & Schools	0.13

KRV Total Requirements Table

Table 11 is the total requirements table for the Valley. The table combines the direct and indirect effects per additional dollar spent in a sector. For each dollar spent in the sector, there is the effect of the new dollar plus the additional purchases made by the interconnected sectors that supply the one

directly stimulated. For example, a dollar spent in the agriculture sector has the direct effect of the dollar, plus the indirect effect of increasing total output by 18.4 cents across the entire KRV economy. Thus, it is possible to see which sectors will stimulate the economy most when they produce additional output. Similarly, if a sector contracts, it can be seen how other sectors will be impacted.

Table 12 shows the rank order of regional industries by the size of their combined direct and indirect effects. The forest sector has the largest multiplier effect of all regional sectors (1.46), followed closely by the nondurable goods manufacturing sector (1.40). The reason for the size of the multiplier effect in these sectors is the close ties these sectors have with other local sectors. Forestry products are closely tied to logging and sawmills. Nondurable manufacturing ties are with local agriculture. As the milk, cheese and meat processors expand the benefits carry over to local farmers.

It is important to remember I-O assumes the economy is driven by demand and not by supply. This means, for example, dairy farms increase their production of milk because demand for cheese increases, not that cheese production increases because the supply of milk increases.

Table 12. Rank Order of KRV Sectors by 1990 Total Direct and Indirect Multiplier Effects

Industry	Multiplier
Forest & Forest Products	1.46
Nondurable Goods Manufacturing	1.40
Agriculture	1.18
Durable Goods Manufacturing	1.06
Personal & Business Services	1.06
Transportation & Public Utilities	1.06
Retail and Wholesale Trade	1.05
Construction	1.05
Government & Schools	1.03

Recall that the usefulness of the total requirements table extends beyond the generation of multipliers. The relative size of the off-diagonal coefficients in the table (Table 11) shows the strength of the interindustry linkages in terms of their ability to stimulate other local economic sectors. The larger the coefficients the stronger the ties and the greater the ability of a sector to stimulate economic activity in other sectors. Smaller or zero coefficients indicate an economy that relies on more imported inputs for regional production activities.

KRV Multipliers

IMPLAN calculates a variety of economic multipliers for the regional economy. The multipliers shown in Table 13 include the combined direct, indirect and induced effects per additional dollar of final demand (or per job added for the employment multiplier).

The forest and nondurable goods manufacturing sectors show the greatest potential to stimulate the regional economy across most types of multiplier impacts. Agriculture industries also show a strong potential for multiplier effects. Noteworthy are the relatively large multiplier effects of the trade, service and related sectors. Many people do not realize the positive spin-off effects that trade and service activities can have on a local economy.

Finally, the employment multipliers show how total employment is projected to change for each job created (or lost) within a sector. The nondurable goods manufacturing sector shows the potential for greatest impact. This multiplier suggests that for each new job created in nondurable manufacturing, a total of 3.33 new jobs will be created throughout the economy (counting the one nondurable manufacturing job).

Policy Implications

The Kickapoo River Valley I-O model provides a variety of useful information for local development professionals and policy-makers. It shows a detailed picture of the local economy, including the type and strength of the linkages between industry sectors. Such information becomes useful in recognizing the value of various sectors to the economic well-being of local residents. It can also help to establish development priorities given limited available resources. In addition, I-O analysis introduces a predictive capacity previously unavailable to the Valley.

Agriculture and Value Added Processing

The input-output analysis of the KRV economy highlights the prominence of agriculture and related food processing industries (recall that food processing is categorized within nondurable goods manufacturing). Among the strengths of the economy are the milk, cheese and meat processors that add value to the raw farm commodities through additional processing and export the products. This is one of the sectors that offers opportunity for the Valley.

Processing local products directly increases regional income and indirectly stimulates other interconnected sectors within the area. Turning raw milk into cheese, butter and other products requires more labor (generating

income) and enhances the value of the product. Additional processing by cutting and packaging the products will contribute even more local income to the economy. Industries that support the processing by supplying materials, transportation and business services will similarly benefit. All of the activity helps keep the export-generated income recirculating in the regional economy longer.

New Markets for Agricultural Products

A small and growing organic food products industry in the Valley may present another opportunity. Given the existing infrastructure in farm enterprises and food processors, the Valley is in a good position to take advantage of the emerging market for organic products. Adding value to organic food products through processing and packaging will result in multiplier benefits similar to conventional farm commodity-cheese/meat processing relationship.

Organic farming illustrates yet another development strategy. Organic foods is a growing specialty market. With more attention to food safety, the trends are toward increasing demand for these products. Early development of the capacity to service this emerging specialty market could place area producers in a competitive position to exploit the opportunity. Specialty markets like organic foods may be among the best opportunities for traditional farming areas to enhance economic prosperity.

Adding Value to Forest Products

There has also been discussion among policy-makers in the Valley about the potential for expanding the forest products industry. The I-O model shows this sector is small but would produce strong spin-off effects should growth occur. To the extent that the resource base can be more fully exploited in an environmentally sound manner, this could be pursued as a policy objective. As illustrated by the agriculture-food processing sectors, there would be significant advantage to developing businesses to process available forest resources into lumber, furniture, moldings and other products.

Tourism Development

There is also potential for increased visitor/tourism spending. Marketing the area as a premier turkey hunting spot, a tranquil canoeing experience or a spectacular fall colors destination are means to attract visitors. As visitors recreate in the area, they often spend considerable money at area motels, gas stations, restaurants, and other retail and service businesses.

To attract these visitors, there needs to be an assessment to the local capacity to accommodate visitor's needs. It does little good to produce promotional brochures if the area cannot accommodate the visitors it seeks to attract. If the capacity exists, marketing efforts should be targeted to attract

the hunters, canoeists or other visitors whose recreational pursuits match local resources.

Small Business Development

Many people might not think of trade and services as a linchpin of the Valley's economy. The I-O model shows, however, that when taken together these sectors produce a significant proportion of output and value added in the Valley. This sector also demonstrates very positive multiplier effects. Expansion of trade and services could yield a beneficial return.

Small businesses employing one, two or three employees each contribute to the overall economic welfare of the Valley. Individually, it is easy to miss the importance of a single business. When taken together, small businesses add up to a sizable component of overall economic activity and jobs. Even more than providing local employment directly, the trade and service sectors provide an opportunity to keep dollars recirculating in the regional economy. The longer the money recirculates locally, the more jobs and income it can support.

Assistance to individuals starting new businesses and those already in business is an important component of a local development strategy. Small business feasibility and management counseling, assistance in meeting regulatory requirements, and access to finance are all areas where communities can make a difference in supporting a strong small business community.

Import Substitution

The idea of import substitution has already been discussed. The I-O analysis provides potentially useful information in identifying where strong interindustry linkages currently exist. This is a good place to start asking whether it is possible to expand regional trade through the local provision of inputs that are currently imported. There may be opportunities for new small business development or sales expansion from existing businesses through import substitution. However, care must be taken to carefully evaluate the feasibility any new business venture.

Summary

The Kickapoo Valley input-output analysis provides insight into many of the strengths and opportunities for economic growth in the area. Some of the opportunities discussed here included adding value to agricultural and forestry products, capturing emerging markets such as organic agriculture, supporting small business development, implementing import substitution programs, and expanding efforts to attract visitors to the area. In almost all these areas, the Valley has a start or substantial existing advantage.

The key to capitalizing on these opportunities, however, lies in the local leadership. There is no substitute for persistence and hard work. To the extent leaders understand their local economy, recognize emerging

opportunities and plan carefully, that hard work can pay off. Many economic opportunities are within the control of local initiative.

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