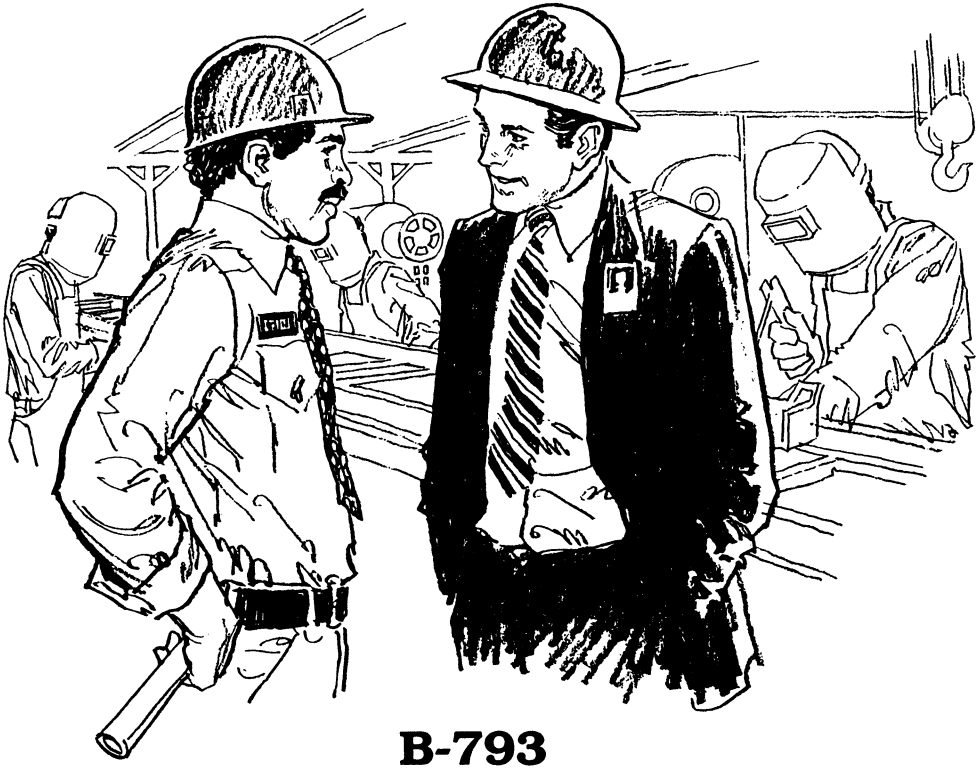
A METHODOLOGY FOR ASSESSING THE IMPACTS OF BUSINESS ACTIVITY



B-793
November 1990

Agricultural Experiment Station
Division of Agriculture
Oklahoma State University

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This research was conducted under
Oklahoma Agricultural Experiment Station Project No. H 2011.

INTRODUCTION

The State of Oklahoma, ravaged by the volatility of petroleum and agricultural prices, has discovered none-to-soon that economic recovery can only be substained through diversification. Fortunately, Oklahoma is in an excellent position to claim its share of economic development benefits.

OPPORTUNITY FOR ECONOMIC DEVELOPMENT

It has long been recognized that firms will locate where they can gain comparative advantages. In a world of multi-markets that are geographically diverse, producers are attracted to sites that help them minimize the total costs of their products and services. Oklahoma's diversification efforts are enhanced by natural geographic advantages, proximity to lucrative markets, relative quality roads, a "pro-business" tax climate, educated workers, and "quality of life" amenities.

NEED TO MEASURE THE ECONOMIC IMPACT ON OKLAHOMA

Developing efficient policies to attract new businesses or retain or expand existing firms requires a knowledge of the benefits expected to accrue to the impacted area. Recent studies have revealed a need for tools that could be used to quickly determine the impacts of a business location, expansion, or loss. Results from sound impact analysis is a basis for justifying state and local incentives to attract economic activity.

OVERVIEW

The purpose of this report is to introduce a model that can be used by Oklahoma based University consultants, or local economic development practitioners to quickly evaluate the economic impact of businesses locating or expanding in the State of Oklahoma. This model development was supported in part by a Motor Transportation Safety, Education and Economic Development Foundation (SEED) research project to develop an impact model for assessing the impacts of transportation activity on Oklahoma's economy (Allen, et al.). The model was modified to be applicable to a wide range of business activities.The report is divided into three sections and three appendices. The first section reviews some basic concepts of community economics. The second section presents a review of the literature, a discussion of the technical

considerations incorporated in developing the model, and a description of the methodological approach taken. The last section is a simulated case study utilizing the model. Appendix I contains a list of the data needs and sources of the model's inputs. Appendix II contains the Business Impact Model (BIM) worksheet. For users desiring greater detail, Appendix III contains an annotated bibliography that corresponds to the selected bibliography.

SOME BASIC CONCEPTS OF COMMUNITY ECONOMICS

Industries that produce goods primarily for sale outside the economy are called basic industries. They are important components of all economic systems. Two other major components of economic systems are service firms and households. Figure 1 (page 3) illustrates the major flows of these sectors within any economy. Basic industries purchase labor from households and reimburse them with dollars. Other inputs used by basic industries are purchased from local service firms. Local service firms also provide goods and services to households (consumers). Naturally, each of these three sectors of an economy purchase goods and services from outside the economy. Local transactions determine the relationships that exist among the various firms in an economy.

The total impact of any basic industry on an economy consists of direct, indirect, and induced impacts. Direct impacts are the immediate or "direct" effects of the impacting industry; for example, the jobs created to fill certain positions within the firm. Indirect impacts are the "second-round" effects that occur in the business sector as a result of the input purchases made by the impacting industry. Induced effects are the changes brought about by the increased consumer spending due to the initial direct and the following indirect effects. In short, the initial jobs created or rather the accompanying income is spent in ways that tend to create further employment in other sectors of the local economy.

The above discussion indicates how basic industries serve as the foundation of an economy and how households and service firms are necessary to make the economy function. Service industries account for a substantial part of the outputs of most economies. But, as Figure 1 shows, much of the service industries' output supports the local basic industries and households. Mathematical techniques can be used to measure the relationships between basic industries, households, and services.

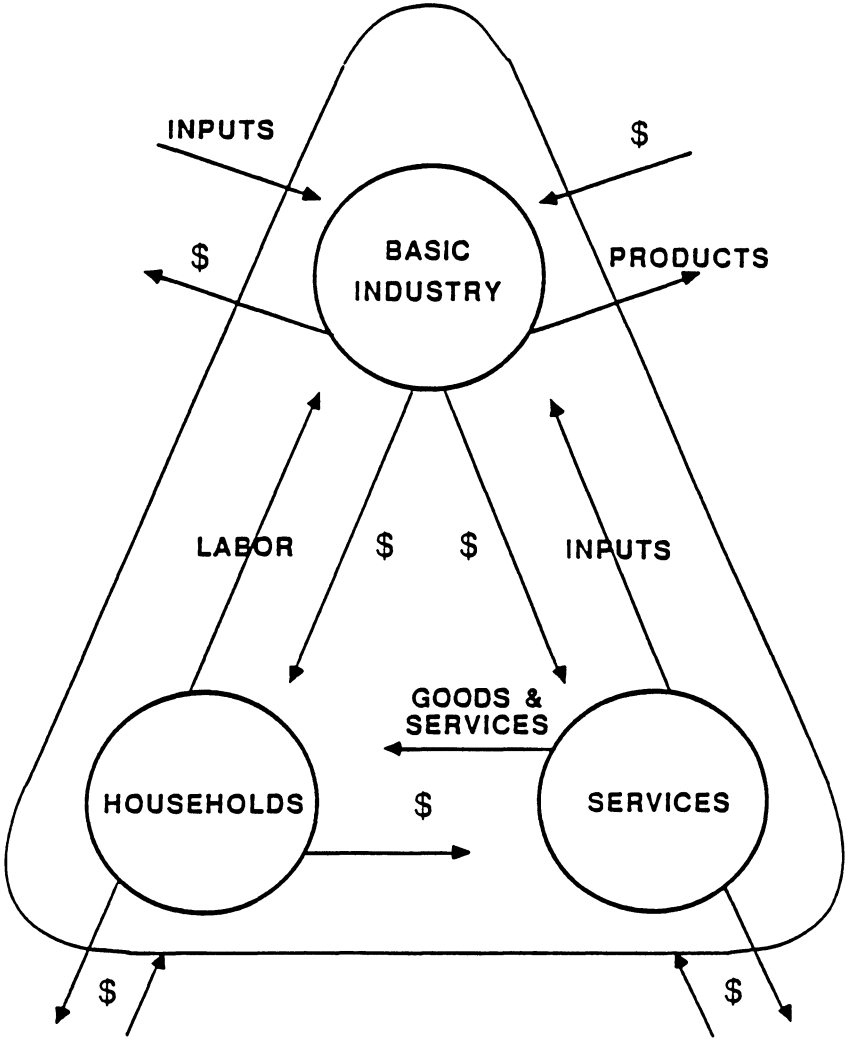

Figure 1

OVERVIEW OF COMMUNITY ECONOMIC SYSTEM

A REVIEW OF THE LITERATURE AND TECHNICAL CONSIDERATIONS

After a review of the literature concerning impact models, two aspects of the Business Impact Model's design became apparent. First, the model would be based on an input-output model. Secondly, much work has been done concerning impact assessment, whereby previous works could be utilized as a starting point. But the unique nature of the worksheet format had to be considered. Appendix III presents details from a selected review of the literature. A general review is given below.

REVIEW OF SELECTED LITERATURE

Input-output and export base models both allow estimation of the changes in employment and/or income as a result of a new plant location. If the impacted community knows the particular type of firm locating within its boundaries, then input-output is the more appropriate model to use. On the other hand, if the activity is unspecified, then export base would provide an adequate estimate of impacts (Goode, 1982).

Nelson and Bender (1986) reviews the differences between "pure" Equilibrium Planning Analysis and Impact Analysis. Equilibrium planning models disregard intermediate time periods as a system moves toward an equilibrium. They are most appropriate when measuring impacts from the expansions and contractions of small manufacturing plants in rural areas. Impact analysis attempts to identify the changes due to one project alone. Using a "with-without" approach, impact analysis may be either a dynamic or equilibrium model. The advantage of using an input-output model is its ability to trace the changes in each sector's activity due to some initial change in another sector (Nelson and Bender, 1986, p.17).

Woods, Doeksen, and Nelson (1983) describe several community impact models. A model developed by Shaffer and Tweeten (1972) measures the impact of new industry on rural communities in Oklahoma. Their model calculates the net gains or losses to a community. It is a single-period model based on partial budgeting techniques. Ford (1976) developed his BOOM1 model, which describes the impacts of large power plants on small communities. The Florida model by Clayton and Whittington (1977) analyzed impacts over city, county, and school districts. It was notable for providing default data when local data were not available.

The Community Simulation Model, developed by Woods, Doeksen, and Nelson was adapted from the previous works. It was specifically designed to simulate the impacts of new industry on rural Oklahoma communities. It is a

computerized, dynamic model containing over 200 linking equations. As an input-output, "with-without" model, it utilizes a gravity model to define the community service area.

Woods and Jones (1982) describe the Industrial Impact Model, which attempts to estimate benefits and costs for the private, municipal, school district, and county sectors brought about by a new industry location. It uses discounting equations to amortize the additional investments made by each sector.

Gordon (1982) describes a "pen and pad" procedure for estimating community economic impacts. When the procedure is put in a worksheet form, its methodology is clear and concise. The model tends to be highly detailed and subject to substantial estimation variances since it relys heavily on user estimates of local conditions. It is not a dynamic model as it estimates for a single period, only and it is site specific. In any event, this model was a valuable reference in developing the framework for the impact worksheet.

TECHNICAL CONSIDERATIONS

In building any model to assess the economic impacts of an industry location, a number of methodological considerations must be addressed. In this section, thought is given to approaches to the assessing problem, such as the levels and types of impacts, geographic boundaries, appropriate time horizons, and the data requirements of the model. The section ends with a selected review of the literature concerning impact models and an account of the methodological approach taken.

Approaches To The Problem

In developing a model to project economic impacts several factors must be considered. According to Murdock, Leistritz, and Jones (1982) these include the following:

1. Conceptual or computational compatibility;
2. Model structure;
3. Data acquisition;
4. Model design;
5. Model validation.

Conceptual or Computational Compatibility. In the searching for a "useful" model that yields to modification, careful consideration must be given to the way the model is conceptualized. Frequently, impact models are computerized. Computerization provides instantaneous output and encourages sensitivity

analysis. They readily accept changes in economic assumptions, and many models are dynamic, thus generating predictions over many time periods.

However, the model design sought had to be logical in form and concept. It must be computationaly easy, encouraging hand calculations, but remaining essentially accurate. Future plans include computerizing the model while maintaining its ease of application.

Model Structure. The model must be structured in such a way as to easily represent a variety of local economies. The demographic and fiscal parameters must be easy to change. Normally, these variables are not difficult to modify, with the exception of a few factors such as worker commuting patterns and differing tax structures between communities.

Data Acquisition. The importance and availability of the needed data must be considered. Demographic and fiscal data are not much of a problem since they are usually available from secondary sources. However, multipliers, project expenditures, and public service data tend to be more difficult to collect. The needed information must be readily available from secondary sources or from the input of experienced local officials.

Model Design. The model must be constructed in such a manner that the user can quickly become familiar with its computational procedures. This can be accomplished if assumptions are kept to a minimum, and the worksheet is logically designed.

Model Validation. Validating any impact assessment model is difficult. Projections should be viewed in light of their reasonableness. One important question is whether the estimates are reasonable given the assumptions made. Historical trends can be compared with the model's projections. Also, sensitivity analysis, in which input values are varied, can be used to test the model under conditions of uncertainty.

Levels of Impact

The model must distinguish between the different levels of impact resulting from the introduction of a business in order to fully describe the effects. This involves direct, indirect, and induced effects. The best way to accomplish this is by using the inter-industry capabilities of input-output models. Multipliers are derived from input-output analysis which delineate between these effects.

Direct effects are quite straight-forward. They are the immediate effects of the activity. For example, assuming a facility is constructed in a community, the immediate or "direct" effect is that jobs will be created to fill certain

positions within the firm. Indirect effects reflect input purchases made by the impacting facility (i.e. the additional income to local merchants resulting from input purchases and spending by plant workers). A multiplier that reflects both the direct and indirect changes is often referred to as a Type I multiplier. Induced effects are the changes brought about by the increased consumer spending as a result of the initial direct employment and the following indirect effects. Type II multipliers show direct, indirect, and induced effects. (Employment) A given sector's Type II multiplier will always be larger than its Type I multiplier (Shaffer and Tweeten, 1972, p. 60, and Miernyk, 1965, p.48).

Types of Impacts

Just as the model should reflect the different levels of impact, so too should it also differentiate between the types of impacts. Three impacts commonly examined are employment, wages, and taxes. Again, multipliers from input-output models are useful for this purpose.

Employment multipliers (Type I or II) are computed from input-output tables. The employment multiplier is defined as the total change in employment as a result of a one unit change in the labor force of the considered industry. Following the discussion above, the direct employment effects reflect the initial hiring of the business. The direct plus the indirect employment effects considers the resulting repercussions on employment in all the other sectors. Induced effects can be similarly represented (Doeksen and Schreiner, 1974).

Likewise, wage impacts are shown by income multipliers derived from coefficients within the input-output model. The direct income effect is the amount of income (from a firm's earnings), accruing to the household sector through wages or other forms of compensation. Indirect and/or induced income effects on other sectors can also be estimated using appropriate procedures. To clarify these effects, assume a shoe factory locates in a community and pays wages to shoemakers (direct income effect). The factory will purchase leather supplies and services from local merchants. This, together with the shoemakers' spending, injects additional income into the local economy (indirect income effect). Because of this infusion of income, households purchase more fast -food services, thus fast-food businesses now receive more income (induced income effect).

Tax revenues are frequently estimated by tracing the sources of revenue change. For example, the employment of workers and the resulting additional income generates additional taxes within different levels of government. Increased property tax revenue and service fees are other sources of revenue that can result from in-migration and/or the initial establishment of the facility.

Geographic Boundaries

The geographic area frequently covered by impact models is ordinarily the local community that receives the new project. Yet, depending upon the availability of data, models can be developed to include county and state boundaries. Of several models studied, the Oklahoma Community Simulation Model was the only one that "explicitly addressed the issue of the appropriate boundaries of an impact area" (Nelson and Bender, 1986, p.12).

The Business Impact Model projects economic effects across state, county and municipal boundaries. This is accomplished by injecting the appropriate data into separate parts of the worksheet and, most critically, by applying the appropriate multipliers.

Time Horizon

Computers have allowed researchers to develop relatively accurate dynamic equilibrium impact models. These models project annual changes by producing estimates of the partial impacts as the system moves toward its new equilibrium. Two examples of dynamic models are the Community Impact (Simulation) Model and the Texas Assessment Model. The former projects impacts annually over a 15 year period on the county and municipal level. The latter projects estimates annually over a 25 year period on a regional, county, and state level. These models are in contrast to the Industrial Impact Model which yields only single time period projections (Woods, et al., 1983).

Moving through time horizons requires greater amounts of data and more complex methodologies. Models that are readily adaptable to a worksheet formulation, such as the Industrial Impact Model or Gordon's (1982) "Pen and Pad Procedure" require much less data and are computationally easy to follow. However, they yield only a single period estimate. Nevertheless, single period estimates are quite appropriate given the basic assumption of constant technology in input-output analysis.

Data Requirements

The degree of the model's complexity will determine the amount and even the availability of the needed data. Often, the more complex the model the more detailed its predictions. Unfortunately, a trade-off exist between detail and efficient "usability". Clearly, a non-computerized impact model in worksheet form must, by necessity, be "simple". But, even in this frame, the model can still become relatively detailed, requiring data that might be very hard to obtain or estimate. For example, the worksheet could require subjectively gathered information such as estimates of former jobs remaining vacant, additional housing needs, law enforcement, fire, health, and highway costs. Or the worksheet could lean less toward complexity and more toward the use of averages and readily available secondary sources.

Methodological Approach Taken

Using the results of the literature search, the Business Impact Model was developed. The model had to have:

(1) the ability to be reduced to a worksheet format.
(2) a structure that lended itself to characterizing the geographical area of interest.
(3) modest and obtainable data requirements with a minimum amount of user estimated inputs.
(4) a conceptually easily to understand structure.
(5) the ability to be validated for accuracy and subsequent fine-tuning.

The "pen and pad" approach by Gordon was consequentially singled out for consideration since it came the nearest to meeting the criteria. Another model closely studied was the Industrial Impact Model. This model was delineated into its fundamental steps and converted to a worksheet framework. The worksheets of both these models were quite detailed and would need a great amount of user generated inputs. The others were eliminated because they were either too industry specific or so "highly computerized" as to render them unadaptable.

The worksheet that developed is a synthesis of the two former models. The synthesized model was simplified to eliminate as much user "guesstimates" as feasibly possible while still retaining an acceptable degree of relevance and accuracy. After completing a data needs questionnaire (see Appendix I), the user is prepared to calculate a business's impact using the appropriate multipliers. The model yields only single period estimates. The impact over a period of time might be examined by applying appropriate assumptions about industry growth rates.

Impacts Considered. The Business Impact Model is an input-output based worksheet with logical step-by-step procedures for estimating the impact of a business or industrial facility on employment, income, and tax revenues within the state, county, municipality, and school district. Corporate income taxes are not considered due to the sensitive nature of the data and the relatively small percentage of total state revenues it entails (3.6 percent of all state tax collections, according to the Oklahoma Tax Commission in 1989). According to a Bureau of Labor Statistics Consumer Survey, about 35 percent of an individual's disposable income is spent on goods generating sales tax revenues (Woods and Jones 1982). Therefore, state and local sales taxes are calculated by multiplying 35 percent of an area's estimated disposable income by the area's sales tax rate.

Generation of Multipliers. Income and employment multipliers are developed within an aggregation scheme consisting of 84 industry sectors by geographic site using a non-survey based input-output methodology, specifically the IMPLAN model. IMPLAN is a sophisticated, computerized model that derives income and employment multipliers (direct, indirect, and induced) for any of 528 industrial sectors over state and county boundaries. For convenience, an 84 sector aggregation scheme was used, and multipliers for a specific industry within the scheme can be generated. Indirect and induced sales and income taxes are estimated by applying a "tax revenue per dollar of wage income" factor to indirect and induced income.

With these things in mind, the Business Impact Model (BIM) seeks to be useable and straight-forward. Listed in Appendix I is the data needed to estimate a business' impact on the state, county, and local governments. Much of the data must be provided by the user based upon their knowledge of the locality. Others are taken from secondary sources. Default values (employment/income multipliers) for both the geographical area and industry are provided in appropriate tables.

Summary

The Business Impact Model (BIM) worksheet is divided into four sections-state, county, municipal, and other jurisdictions (i.e. common school and service districts). These sectors are further divided into sub-sections consisting of employment, income, and tax impacts. The BIM worksheet (is in Appendix II) completed using information provided by local officials through the data needs questionnaire (see Appendix I). Default data can be obtained for income and employment multipliers. Impacts are quickly estimated by injecting the appropriate data into separate parts of the worksheet and sequentially working through each step. All estimates assume one full year of operations.

A SIMULATED CASE STUDY

To demonstrate how the BIM worksheet can help decision-makers, the model is applied to a hypothetical food processing firm located in a unnamed county and city in Oklahoma. Assume further that local officials completed a data needs questionnaire (Appendix I) and the relevant multipliers were obtained from the Cooperative Extension Service. Although this illustration assumes an established firm, the proceedure remains the same for potential new business activity.

RESULTS OF THE ANALYSIS

The BIM worksheet was completed using information provided by local officials through a data needs questionnaire (see Appendix I). The model considers impacts in four areas: state, county, and municipal government, and other jurisdictions (local school and service districts). Figure 3 contains details of the analysis.

State Impacts

Table 1 (page 13) shows summary results of the impacts for the State. More detailed results are shown in Figure 3 (page 28). The total benefits to the State is 205 jobs and $2,155,164 in income and tax revenues. Direct employment of the firm is 84 employees. Using a State sector employment multiplier of 2.44, the total employment is 205 jobs (84 direct plus 121 indirect and induced jobs).

The payroll of the firm is $1,158,844. Multipliers account for leakages outside the study area, so they are applied to the direct impact.. Using a State sector income multiplier of 1.75, total income is $2,022,183 ($1,158,844 plus $863,339 indirect and induced income).

Tax impacts on the State are based on estimated collections of sales and individual income taxes. Corporate income taxes are not considered in the model due to the sensitive nature of the data and the relatively small percentage of total State revenues it entails. The direct State individual income tax revenue is estimated to be $35,923. The State sales tax revenue from the firm's input purchases are estimated to be $43,224. State sales tax revenue from individuals is estimated to be $15,514. Therefore, the total direct State tax revenue is $94,661. Indirect and induced sales and income taxes are estimated by applying a tax revenue per dollar of payroll factor to indirect and induced income. In this way, indirect and induced state income and sales tax revenues are estimated to be $26,762 and $11,558 respectively. Since no tax incentives or exemptions are reported, the total state tax revenue is $132,981.

County Impacts

Table 2 (page 15) contains summary results of the impacts for the County. More detailed results are in Figure 2. The total benefits to the county is 133 jobs and $1,910,005 in income and tax revenues. County direct employment is 84. Using a county sector employment multiplier of 1.58, the total employment is 133 jobs (84 direct plus 49 indirect and induced jobs). County impacts will typically be smaller than state impacts because of the leakages occurring.

TABLE 1

ESTIMATE OF IMPACTS ON THE STATE OF OKLAHOMA

			TOTAL
DIRECT BENEFITS			
JOBS		84	
INCOME TO INDIVIDUALS		$1,158,844	
INCOME TAXES TO THE STATE	$35,923		
SALES TAXES FROM FIRM INPUTS	$43,224		
SALES TAXES FROM INDIVIDUALS	$15,514		
TOTAL DIRECT TAX REVENUES		$94,661	
INDIRECT AND INDUCED BENEFITS			
JOBS		121	
INCOME TO INDIVIDUALS		$863,339	
INCOME TAXES TO THE STATE	$26,762		
SALES TAXES TO THE STATE	$11,558		
TOTAL INDIRECT & INDUCED TAX REVENUES		$38,320	
TOTAL BENEFITS			
JOBS			205
INCOME TO INDIVIDUALS			$2,022,183
TAX REVENUES TO THE STATE			$132,981

Income impacts on the county are calculated using a county sector income multiplier reflecting leakages outside the region. The county direct income is $1,158,844. Using a county sector income multiplier of 1.65, the total income is $1,906,762 ($1,158,844 plus $747,918 indirect and induced income).

The tax impacts on the county are recorded as $3,243 based on ad valorem tax revenue collected by the county. The Firm has an assessed valuation of $160,759 and with the present millage rate (0.02017) pays $3,243 in property taxes to the county. Portions of this amount are used by the county toward the general fund and public facilities. The county presently has no sales tax levy, so there is no county sales tax per dollar of payroll factor to apply to the indirect and induced income.

Municipal Impacts

Table 3 (page 17) summarizes the impacts on the city. More details are available in Figure 3. The total benefits to the city is 70 jobs and $810,374 in income to individuals and $33,233 in city taxes and revenues. There are 40 out-of-city in-commuters which are excluded from the city level impact analysis. The county sector multipliers are then used for the city since IMPLAN can only delineate to the county level. In this way, the sector employment multiplier (1.58) is applied to the 44 direct (84 less 40) to yield a total employment of 70 within the city (44 direct plus 26 indirect and induced).

TABLE 2

ESTIMATE OF IMPACTS ON THE COUNTY

		TOTAL
DIRECT BENEFITS		
JOBS	84	
INCOME TO INDIVIDUALS	$1,158,844	
PROPERTY TAX REVENUE	$3,243	
INDIRECT AND INDUCED BENEFITS		
JOBS	49	
INCOME TO INDIVIDUALS	$747,918	
TOTAL BENEFITS		
JOBS		133
INCOME TO INDIVIDUALS		$1,906,762
TAX REVENUES TO THE COUNTY		$3,243

After accounting for the propensity to spend within the city (0.50), the direct income is $492,509. Reapplying the county sector income multiplier (1.65) yields a total income of $810,374 ($492,509 direct plus $317,865 indirect and induced).

The tax and revenue impacts on the city is $33,233 ($29,895 direct plus $3,338 indirect and induced). This figure is based on a three percent sales tax which yields tax revenues of $8,237. Utility service fees paid by the firm was $21,658 (municipal water and sewer). Therefore, total direct municipal revenues is $29,895 ($8,237 plus $21,658).

Other Jurisdictional Tax Impacts

Table 4 (page 17) shows summary results of the impacts on the other jurisdictional districts. Again, detailed results are in Figure 3. The total benefits to the common school and other districts is $13,483 in property tax revenues. This figure is calculated by multiplying the property tax rate (0.08387), by the firm's assessed valuation ($160,759). The common school district receives $10,991 (0.06837), and the area vocational school gets $2,492 (0.0155) of the property tax revenue.

TABLE 3

ESTIMATE OF IMPACTS ON THE CITY

			TOTAL
DIRECT BENEFITS			
JOBS (less in-commuters)		44	
INCOME TO INDIVIDUALS			
(less leakages)		$492,509	
SALES TAXES FROM THE FIRM	$3,066		
SALES TAXES FROM INDIVIDUALS	$5,171		
UTILITY FEES TO THE CITY	$21,658		
TOTAL DIRECT REVENUES			
TO THE CITY		$29,895	
INDUCED AND INDIRECT BENEFITS			
JOBS		26	
INCOME TO INDIVIDUALS		$317,865	
SALES TAXES TO THE CITY		$3,338	
TOTAL BENEFITS			
JOBS			70
INCOME TO INDIVIDUALS			$810,374
REVENUES TO THE CITY			$33,233

TABLE 4

OTHER JURISDICTIONAL TAX IMPACTS

			TOTAL
ASSESSED VALUE OF THE FIRM	$160,759		
PROPERTY TAX RATE	0.08387		
COMMON SCHOOL AND OTHER			
DISTRICT REVENUE		$13,483	

FIGURE 2

WORKSHEET FOR IMPACT ANALYSIS

Business Impact Worksheet

This worksheet was developed to assist decisionmakers in assessing the economic impacts of a new business location within a community. Instructions are provided within the parenthesis () below each heading. The user may be asked to: (1) Refer to a University Source for an Input; (2) Provide an input based on either the users' knowledge of the locale or from secondary data; (3) Perform a calculation; or (4) Insert in an estimate from an earlier calculation.

Description of Development

Firm Name: Hypothetical Food Processor

County: Somewhere

Community: Somewhere

SIC Code: 2099

STATE

I EMPLOYMENT IMPACTS:

A. New Direct Employment of the Firm — 84

(1) State Sector Employment Multiplier: 2.4420 (University Source)

B. Total Employment Impact (A Times A_1) — 205

II INCOME IMPACTS

C. Annual Payroll of the Firm (User Input or Secondary Data) — $ 1,158,844

(1) Social Security & Federal Income Tax Payments (C Times 0.15) — $ 173,827

D. Total State Disposable Income (C Less C_1) — $ 985,017

(1) State Sector Income Multiplier: 1.7450 (University Source)

(2) Indirect & Induced State Income (C Times [D_1 Less 1.00]) — $ 863,339

E. Total New State Income (C Times D_1) — $ 2,022,183

III TAX IMPACTS:

F. Assessed Value of the Firm Investment (User Input or Secondary Data) $ 160,758

(1) Estimated Value of Inputs Purchased in State (User Input or Secondary Data) $ 960,536

(2) State Sector Retail Sales Multiplier: 1.4418 (University Source)

G. State Tax Rates

(1) State Sales Tax Rate: 4.5 % (Use Recent Sales Tax Rate)

(2) Average Individual Income Tax Paid: 427.65 (Use Recent Individual Income Tax Rate)

H. State Tax Revenues

(1) State Sales Tax Revenue (F_1 Times G_1) $ 43,224

(2) Individual State Sales Tax Revenue (D Times 0.35 Times G_1) $ 15,514

(3) Average Individual Income Tax Revenue (A Times G_2) $ 35,923

I. Total Direct State Tax Revenues (H_1 Plus H_2 Plus H_3) $ 94,661

J. Indirect & Induced State Tax Revenue

(1) State Sales Tax Per Dollar of Payroll: 0.0134 (H_2 Divided By C)

(2) State Income Tax Per Dollar of Payroll: 0.0310 (H_3 Divided by C)

(3) Indirect & Induced State Sales Tax Revenue (J_1 Times D_2) $ 11,558

(4) Indirect & Induced State Income Tax Revenue (J_2 Times D_2) $ 26,762

K. Tax Incentives

(1) State Sales Tax Exemptions (User Input or Secondary Data) $ 0

(2) Investment/Job Tax Credit (User Input or Secondary Data) $ 0

(3) Other State Inducements
(User Input or Secondary Data) $ 0

(4) Total State Tax Credits
(K_1 Plus K_2 Plus K_3) $ 0

L. Total State Tax Revenues
(I Plus J_3 Plus J_4 Less K_4) $ 132,981

M. Indirect & Induced Retail Sales from Input Purchases
(F_1 Times [F_2 Less 1.00]) $ 424,365

COUNTY

I. EMPLOYMENT IMPACTS:

AA. New Direct Employment of the Firm
(From A) 84

(1) Jobs Filled By Out-of-County In-Commuters
(User Input or Secondary Data) 10

(2) County Direct Employment
(AA Less AA_1) 74

(3) County Sector Employment Multiplier: 1.5800
(University Source)

BB. Total County Level Employment Impact
(AA Times AA_3) 133

II. INCOME IMPACTS:

CC. Total State Disposable Income
(From D) $ 985,017

(1) Propensity To Spend Within the County: 0.75
(User Input)

DD. Total County Disposable Income
(CC Times CC_1) $ 738,763

(1) County Sector Income Multiplier: 1.6454
(University Source)

(2) Indirect & Induced County Income
(C Times [DD Less 1.00]) $ 747,918

EE. Total New County Income
(C Times DD_1) $ 1,906,762

III. TAX IMPACTS:

FF. Assessed Value of the Firm Investment (From F) $ 160,759

(1) Estimated Value of Inputs Purchased in County (User Input or Secondary Data) $ 836,886

(2) County Sector Retail Sales Multiplier 1.3210 (University Source)

GG. County Tax Rates

(1) County Property Tax Rate: 0.02017 (Use Recent Property Tax Rate)

(2) County Sales Tax Rate: 0 (Use Recent Sales Tax Rate)

HH. County Tax Revenues

(1) County Property Tax Revenue (FF Times GG_1) $ 3,243

(2) County Sales Tax Revenue From Firm (FF_1 Times GG_2) $ 0

(3) Individual County Sales Tax Revenue (DD X 0.35 X GG_2) $ 0

II. Total Direct County Tax Revenue (HH_1 Plus HH_2 Plus HH_3) $ 3,243

JJ. Indirect & Induced County Tax Revenue

(1) County Sales Tax Per Dollar of Payroll: 0 (HH_3 Divided By C)

(2) Indirect & Induced County Sales Tax Revenue (JJ_1 Times DD_2) $ 0

KK. County Tax Incentives

(1) County Property Tax Exemptions (User Input or Secondary Data) $ 0

(2) Other County Inducements (User Input or Secondary Data) $ 0

(3) Total County Tax Credits (KK_1 Plus KK_2) $ 0

LL. Total County Tax Revenues (II Plus JJ_2 Less KK_3) $ 3,243

GGG. Municipal Tax Rates

(1) Municipal Property Tax Rate: 0
(Use Recent Property Tax Rate)

(2) Municipal Sales Tax Rate: 3%
(Use Recent Sales Tax Rate)

HHH. Municipal Tax Revenues

(1) Municipal Property Tax Revenue
(FFF Times GGG_1) $ 0

(2) Municipal Sales Tax Revenue From Firm
(FFF_1 Times GGG_2) $ 3,066

(3) Individual Municipal Sales Tax Revenue
(DDD X 0.35 X GGG_2) $ 5,171

III. Total Direct Municipal Tax Revenues
(HHH_1 Plus HHH_2 Plus HHH_3) $ 8,237

JJJ. Indirect & Induced Municipal Tax Revenue

(1) City Sales Tax Per Dollar of Income: 0.0105
(HHH_3 Divided by DDD)

(2) Indirect & Induced City Sales Tax Revenue
(JJJ_1 Times DDD_2) $ 3,338

(3) Utility Service Fees for from Firm
(User Input or Secondary Data) $ 21,658

KKK. Municipal Tax Incentives

(1) Municipal Property Tax Exemptions
(User Input or Secondary Data) $ 0

(2) Other Municipal Inducements
(User Input or Secondary Data) $ 0

(3) Total Municipal Tax Credits
(KKK_1 Plus KKK_2) $ 0

LLL. Total Municipal Tax Revenues
(III Plus JJJ_2 Plus JJJ_3 Less KKK_3) $ 33,233

MMM. Indirect & Induced Municipal Retail Sales from Input Purchases
(FFF_1 Times [FF_2 Less 1.00]) $ 32,802

MM. Indirect & Induced County Retail Sales From Input Purchased: (FF_1 Times [FF_2 Less 1.00]) $ 268,640

MUNICIPAL

I. EMPLOYMENT IMPACTS:

AAA. New Direct Employment of the Firm (From A) 84

(1) Jobs Filled by Out-of-City In-Commuters (User Input or Secondary Data) 40

(2) Municipal Direct Employment (AAA Less AAA_1) 44

(3) County Sector Employment Multiplier: 1.5800 (From AA_3)

BBB. Total Employment Impact (AAA_2 Times AAA_3) 70

II. INCOME IMPACTS:

CCC. Total State Disposable Income (From D) $ 985,017

(1) Propensity To Spend Within the City: 0.50 (User Input or Secondary Data)

DDD. New Municipal Disposable Income (CCC Times CCC_1) $ 492,509

(1) County Sector Income Multiplier 1.6454 (From DD_1)

(2) Indirect & Induced Municipal Income (DDD Times [DDD_1 Less 1.00]) $ 317,865

EEE. Total New Municipal Income (DDD Times DDD_1) $ 810,374

III. TAX IMPACTS:

FFF. Assessed Value of the Firm Investment (From F) $ 160,759

(1) Estimated Value of Inputs Purchased in City (User Input or Secondary Data) $ 102,188

Other Jurisdictional Tax Impacts

NNN. Other Property Tax Rates

(1) Common School District
Property Tax Rate: 0.06837
(Use Recent Property Tax Rate

(2) Service District
Property Tax Rate: 0.0155
(Use Recent Property Tax Rate)

OOO. Other Property Tax Revenues

(1) Common School District
Property Tax Revenues
(FFF Times MMM_1) $ 10,991

(2) Service District
Property Tax Revenue
(FFF Times MMM_2) $ 2,492

PPP. Other Jurisdictional Property
Tax Exemptions
(User Input or Secondary Data) $ 0

QQQ. Total Other Jurisdictional
Property Tax Revenues
(NNN_1 Plus NNN_2 Less OOO) $ 13,483

Summary of the Results

Based on the application of the BIM worksheet to the hypothetical firm, the total impact on the state is 205 jobs (derived from the initial 84 direct jobs), $2,022,183 in income to individuals (derived from the payroll of $1,158,844), and tax revenues to the state is $132,981. The impacts on the county is 133 jobs, $1,906,762 in income, and $3,243 in tax revenues. Likewise, the city benefits from 70 jobs (considering out-of-city in-commuters), $810,374 in income to individuals, and $33,233 in revenues. The common school and other district revenue amounts to $13,483.

KEY ITEMS OF INTEREST WHEN ANTICIPATING ECONOMIC CHANGE

Several key questions should be considered when anticipating economic change in a local community. This change affects both the private sector and local government. Table 5 (page 26) lists some important considerations regarding economic change and the private sector. Table 6 (page 27) is concerned with the impacts of change on the local government sector. Important considerations concerning local government involve tax jurisdiction, tax revenue and new public expenditures which may be required. Table 7 (page 28) lists the nonmarket impacts of economic change which may be of importance to local communities. Community decision-makers should review these questions and add or delete based on their specific needs.

TABLE 5

IMPACTS OF ECONOMIC CHANGE ON THE PRIVATE SECTOR - IMPORTANT CONSIDERATION

1. How many workers will be hired by the new business activity? What is the dollar value of the anticipated payroll? What will be the value of production or sales from the new business activity?

2. What is the "multiplier" effect and how can it be appraised in a community?

3. When will the new workers be hired? When will the payroll be generated? And when will the new purchases and sales be made in the local economy?

4. Is the new economy activity associated with construction or operation of the business?

5. Will the new economic activity stimulate construction in related businesses, housing, and service and trade sectors of the economy?

6. Do the changes in employment, income, and sales represent net or gross additions to the community's economic base?

7. How does the new economic activity compliment the local economic situation?

8. What will be the incidence of the impacts? More specifically, which people and businesses are likely to benefit, and which people and businesses are likely to bear the costs of the economic development?

Source: Gordon, John. "Considering Economic Change in the Community's Private Sector," in How Extension Can Help Communities Conduct Impact Analysis, University of Wisconsin-Extension, 1982.

TABLE 6
IMPACTS OF ECONOMIC CHANGE ON THE LOCAL GOVERNMENT SECTOR-IMPORTANT CONSIDERATIONS

1. Within what governmental jurisdictions will new families live?
2. How many in-migrant families are expected, and what is their anticipated income level?
3. How many school-age children are expected?
4. Do the public services and schools have excess capacity, or would expansions be required to maintain the quality of service at predevelopment levels?
5. Are there migration fees to cover additional public service costs?
6. Will state and federal aid increase as population grow?
7. When will the project be completed?
8. Does the expenditure estimation procedure used include only the additional costs associated with the new growth?
9. Will new revenues be divided among more than one governmental unit, such as city, county, and school district? If so, how much additional revenue will each receive?
10. When will the public expenditures for the project begin and when will the community begin receiving project-generated revenues? How will these change over time?
11. Will projected demands for services require a change in tax rates or a change in the level of service?
12. Who benefits and who loses from the development?
13. Will tax abatements or other publicly supported inducements be used to encourage this growth?
14. Is the project capital-or labor intensive?
15. What is the probability that the firm will remain in the area and operate successfully over a five, 10, or 20 year period?
16. What are the income and employment multiplier effects of the new industry?
17. How will this development and associated population growth affect state aid to education and local property tax revenues in your state?

Source: More, George and George McDowell, "Estimating the Impacts of Growth on Local Governments," in How Extension Can Help Communities Conduct Impact Analysis, University of Wisconsin-Extension, 1982

TABLE 7
NONMARKET IMPACTS OF ECONOMIC CHANGE - IMPORTANT CONSIDERATIONS

1. Distribution: Who will be Affected?
   - A. Will effects vary among geographic sectors of the community?
   - B. What income groups will be affected and in what ways?
   - C. Will all or just certain economic sectors of the community have to make adjustments?
   - D. Will the impacts vary over time?

2. Employment-Related Impacts.
   - A. Will the new jobs be satisfying to workers?
   - B. Effects on commuting time and distance. How far must local residents travel to their new jobs?
   - C. Will the jobs be permanent or will they be highly sensitive to managerial decision and economic trends?
   - D. Will the workers perceive the new jobs as an improvement over previous conditions?

3. Population-Related Impacts.
   - A. Demographic
     1. How much in-migration will occur?
     2. Will the newcomers and their families match or be different from the prevalent age and family structure of the community?
     3. What value changes might occur?
     4. Can the newcomers easily be integrated into the community social structure or will adjustments be needed?
   - B. Housing.
     1. How will the value of housing change?
     2. How will the quality of housing change?
     3. What changes in housing ownership will occur?
     4. What type of new housing will be needed?

4. Community Ecology.
   - A. How will communication networks be affected?
   - B. How will religious organizations be affected?
   - C. How will participation in community affairs be affected?
   - D. What different internal-external linkages will appear?
   - E. Will satisfaction with the community change?

5. Political and Local Goernment.
   - A. Political
     1. What leadership changes will occur?
     2. Will voter participation change?
   - B. How will public recreation facilities and use be altered?
   - C. Will physical safety of workers and residents change?
   - D. What short-and long-term health effect could occur?

Source: Shaffer, Ron. "Nonmarket Impacts From Economic Development," in How Extension Can Help Communities Conduct Impact Analysis, University of Wisconsin-Extension, 1982.

SUMMARY

The State of Oklahoma is in a unique position to capture a significant portion of the nation's business and industrial activity given its favorable tax structure, relative quality roads, and its natural geographic advantages. This report introduced a methodology designed to quickly estimate the impacts of these activities. This report described some basic concepts of community economics along with a review of the literature and the technical considerations examined in developing the model. A hypothetical case study is used to illustrate the application of the model. Appendices contain a data needs questionnaire, the B.I.M. worksheet, and an annotated bibliography. It is hoped that this report will be helpful to those persons interested in evaluating the economic impact of facilities locating or expanding in the State of Oklahoma.

Every attempt was made to keep the model's worksheet easy to use. However, each application is unique and special circumstances do arise. Users must take care that the generated estimates make sense. If further assistance is needed, please seek the help of an experienced impact analyst.

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APPENDIX I

Data Needs and Sources

The Business Impact Model (B.I.M.) Worksheet is divided into four sections-State, County, Municipal, and Other Jurisdictions (i.e. Common School and Service Districts). The State, County, and Municipal sections are further divided into sub-sections consisting of employment, income, and tax impacts. This appendix describes and explains the nature, type, and sources of data required to complete the worksheet. 33 separate pieces of information are needed. Most of the data is readily available from primary or secondary sources. Whenever exact information or data are unavailable, the user should provide their best estimate.

Description of Development

Firm Name:_____

County:_____

Community:_____

SIC Code:_____

Name the closest industry classification the Firm could be identified with:

Multipliers:

I (AI) State Sector Employment Multiplier;_____
II (D1) State Sector Income Multiplier_____
III (F2) State Sector Retail Sales (Income) Multiplier;_____

I (AA3) County Sector Employment Multiplier;_____
II (DD1) County Sector Income Multiplier;_____
III (FF2) County Sector Retail Sales (Income) Multiplier;_____

Available from the Cooperative Extension Service, Department of Agricultural Economics at Oklahoma State University.

Estimated Utility Service Fees

A.	Water, Sewer & Trash [$_____ x 12 months]:	$_____
B.	Natural Gas [$_____/sq. ft./ year x_____sq. ft.]:	$_____
C.	Electricity [$_____/sq. ft./ year x_____sq. ft.]:	$_____
D.	Utility Service Fees [A + B + C]	$_____

(KKK)Municipal Tax Incentives-Estimates of Municipal Property Tax Exemptions and Other Municipal Inducements are most readily available from the local Chamber of Commerce, Industrial Foundations, or other private groups that promote industry for the municipality.

(1) Municipal Property Tax Exemptions: $_____
(2) Other Municipal Inducements: $_____

Section IV- Other Jurisdictional Tax Impacts

(MMM1)Common School District Property Tax Rate[1]:_____mills
Use the recent total Common School District property tax percentage. This information is available from the local county assessor's office or the School Board.

(MMM2)Service District Property Tax Rate[1]:_____mills
Use the recent total Service District property tax percentage. This information is available from the local county assessor's office.

(OOO)Other Jurisdictional Property Tax Exemptions:_____
Estimates of School and Service District Property Tax Exemptions and Other Jurisdictional Inducements are most readily available from the local School Board, Chamber of Commerce, Industrial Foundations, or other private groups that promote industry for the area.

Section III - Municipal

I Employment Impacts

(AAA1)Jobs Filled by Out-of-City In-Commuter:_____

Estimate the number of total direct jobs that will most likely be taken by persons living outside the community. Normally, information of this type is limited; therefore, provide a best estimate. Some help might be obtained from the local Chamber of Commerce.

II Income Impacts

(CCC1)Propensity to Spend Within the City[2]:_____

Estimate the proportion of local employee's total disposable income that will be spent within the community. Information of this type is limited; therefore, provide a best estimate. Take into consideration Out-of-City shopping for both durable goods (autos, appliances, etc.) and non-durable goods (food, clothing, etc.).

III Tax Impacts

(FFF1)Estimated Value of Inputs Purchased in City:$_____

Estimate the dollar value of materials purchased by the Firm within the Community. This figure is used to estimate the amount of city sales tax revenue generated by the Firm's purchases. Since this information is highly speculative, use a best estimate.

(GGG1)Municipal Property Tax Rate[1]:_____mills

Use the recent total city property tax percentage. This information is available from your local county assessor's office.

(GGG2)Municipal Sales Tax Rate:_____

Use the recent city sales tax percentage. This information is available from the Oklahoma Tax Commission, Chambers of Commerce, and local merchants.

(JJJ4)Utility Service Fees:$_____

Utility services include municipal charges for water, sewer & trash, natural gas, and electricity. These fees can be estimated by obtaining estimates of cost per square feet available from local utility offices and then completing the following worksheet:

Section II - County

I Employment Impacts

(AA1) Jobs Filled by Out-Of-County In-Commuter:_____

Estimate the number of total direct jobs that will most likely be taken by persons living outside the County. Normally, information of this type is a limited; therefore, provide a best estimate. Some help might be obtained from the local Chamber of Commerce.

II Income Impacts

(CC1) Propensity to Spend Within the County[2]:_____

Estimate the proportion of local employee's total disposable income that will be spent within the County. Information of this type is limited; therefore, provide your best estimate. Take into consideration Out-of-County shopping for both durable goods (autos, appliances, etc.) and non-durable goods (foods, clothing, etc.).

III Tax Impacts

(FF1) Estimated Value of Inputs Purchased in County:$_____

Estimate the dollar value of materials purchased by the Firm within the County. This figure is used to estimate the amount of county sales tax revenue generated by the Firm's purchases. Since this information is highly speculative, use a best estimate.

(GG1) County Property Tax Rate[1]:_____mills

Use the recent county property tax percentage. This information is available from the local county assessor's office.

(GG2) County Sales Tax Rate:_____

Use the recent county sales tax percentage. This information is available from the Oklahoma Tax Commission, Chambers of Commerce, and local merchants.

(KK) County Tax Incentives-Estimates of County Property Tax Exemptions and Other County Inducements are most readily available from the local Chamber of Commerce, Industrial Foundations, or other private groups that promote industry for the municipality.

(1) County Property Tax Exemption:$_____

(2) Other County Inducements:$_____

(G2) **Average Individual Income Tax Paid:$_____**
This is the amount of State income taxes expected to be collected from Firm employees. It can be estimated by using the worksheet below:

Estimated Average Individual Income Tax Paid

A.	Annual Payroll of the Firm [From Part II (C) above]:	$_____
B.	New Direct Employment of the Firm [From Part I (A) above]:	_____
C.	Average Individual Annual Income [A÷B]:	$_____
D.	Average Individual Income Tax Paid [Use the appropriate taxable income bracket from the State Income Tax Formula Method II, Schedule R or S & calculate the tax according to the schedule formula]:	$_____

(K) **Tax Incentives**-Estimates of State Sales Tax Exemptions, Investment/Job Tax Credit, and Other State Inducements are most readily available from the State Department of Commerce, Chamber of Commerce, Industrial Foundations, or other private groups that promote industry for your municipality.

(1) State Sales Tax Exemptions:$_____
(2) Investment/Job Tax Credits:$_____
(3) Other State Inducements:$_____

Section I - State

I Employment Impacts

(A) **New Direct Employment of the Firm:**_____
Include all management, and labor. This information is most readily obtained by asking representatives of the potential firm. This should be the number employed during the first full year of operation.

II Income Impacts

(C) **Annual Payroll of the Firm:$**_____
Use the total annual payroll of the Firm. This might be available from the Firm representatives or by multiplying the Average Individual Annual Income by the estimated number of employees. Estimates of median earnings by worker category in selected Oklahoma areas is available from the Oklahoma Employment Security Commission's most recent Occupatioal Wage Survey. These estimates can be used with the worksheet below:

A.	Average Annual Wage of workers within the Firm's Occupation:	$_____
B.	Average Annual Wage of Office Occupations:	$_____
C.	Other Average Annual Wages:	$_____
D.	Average Payroll wage of the Firm [(A+B+C) + Number of Entries]	$_____
E.	Annual Payroll of the Firm [D x New Direct Employment of the Firm]	$_____

III Tax Impacts

(F) **Assessed Value of the Firm Investment:$**_____
This value can best be estimated by consulting the county assessor's office since assessed valuations vary over time and geographic area.

(F1) **Estimated Value of Inputs Purchased in State:$**_____
This is the estimated dollar value of supplies and materials the firm might purchase each year within the State. This figure might be most readily obtained by consulting representative of the potential firm.

(G1) **State Sales Tax Rate:**_____
Use the recent state sales tax percentage. This information is available from the Oklahoma Tax Commission, Chambers of Commerce, and local merchants.

1. An important source of county, city, and school revenue is the ad valorem taxation on property. In Oklahoma, county assessors are required to appraise real estate and tangible personal property every five years within three percentage points of twelve percent of the fair market price. This is called the assessed value of the property. A "millage rate" (the rate of taxation), defined as "mills" (one-tenth of a cent or $1 per $1000 of assessed value), is multiplied by the assessed value to determine the amount of taxes paid.

Local units of government have a great deal of flexibility in the application of ad valorem taxes. For example, a County must, by law, apply ten mills toward the general fund, but they have discretion to levy property taxes for building funds, health departments, sinking funds, libraries, industrial development, and/or solid waste management services. Likewise, cities can levy property taxes for building funds, city hospitals, sinking funds, and/or support for public utility services. Other ad valorem taxes go to support the Common School Districts and, in some cases, Area Vocational and Technical School and/or other Service Districts.

Property tax rates can and do vary significantly over geographic boundaries. Often, property may be located within different taxing districts with several rates being applicable. It is not unsual for assessed values or millage rates to change within short periods of time. Therefore, rather than attempt to list all applicable property tax rates, it would be more prudent for the user to consult their local county assessor's office for the correct property tax rate to apply to the value of the firm.

2. According to Gordon and Mulkey (1978), the propensity to consume locally (PCL) depends upon the sizes of household budgets and the probable location of major spending. It is known that 12% to 14% of total personal income (through Federal and State income taxes) leave the community immediately. Depending on the size of the community, other expenditures (utility payments, transportation, insurance payments, medical care, food, clothing, and housing) will also be spent, in some measure, outside the community. Therefore, it is reasonable that a PCL would range from 0.30 to 0.60. A value greater than 0.80 or less than 0.20 seems unlikely, unless the community was extremely large (larger PCL) or extremely small (smaller PCL).

Gordon, J., and Mulkey, D., "Income Multipliers for Community Impact Analysis-What Size is Reasonable," Journal of Community Development Society of America, 9 (1978), 85-93.

APPENDIX II

THE B.I.M. APPROACH TO ESTIMATING IMPACTS

The impact model worksheet was originally developed in Oklahoma to assess the impacts of motor transport and warehousing facilities. However, with modifications, the model can estimate the economic impact of any industrial sector. The Business Impact Model (BIM) is an input-output based worksheet with logical step-by-step procedures for estimating the impacts of an industry on employment, income, and tax revenues within the state, county, municipality, and school district.

Income and employment multipliers are developed for a specific industry and geographic site using a non-survey based input-output methodology, specifically the IMPLAN model. IMPLAN is a sophisticated, computerized model (developed by the U.S. Forest Service), that allows the derivation of employment and income multipliers for any of 528 industrial sectors over state and county boundaries (Alward, et al., 1989). Applying the appropriate multiplier to its respective direct impact (employment or payroll) generates estimates of total (direct, indirect, and induced) impacts made by a given industry on the economy.

The pages that follow shows the BIM worksheet. After completing the questionnaire in Appendix I, the user can proceed to work through the worksheet calculations via the worksheet instructions. Specific industry multipliers are available from the Department of Agricultural Economics at Oklahoma State University. Care must be taken in interpreting the analysis results since all estimates are contingent upon the assumptions used and each situation is unique.

WORKSHEET FOR IMPACT ANALYSIS

Business Impact Worksheet

This worksheet was developed to assist decisionmakers in assessing the economic impacts of a new business location within a community. Instructions are provided within the parenthesis () below each heading. The user may be asked to: (1) Refer to a University Source for an Input; (2) Provide an input based on either the users' knowledge of the locale or from secondary data; (3) Perform a calculation; or (4) Insert in an estimate from an earlier calculation.

Description of Development

Firm Name:_____

County:_____

Community:_____

SIC Code:_____

STATE

I EMPLOYMENT IMPACTS:

A. New Direct Employment of the Firm _____

(1) State Sector Employment Multiplier:_____ (University Source)

B. Total Employment Impact (A Times A_1) _____

II INCOME IMPACTS

C. Annual Payroll of the Firm (User Input or Secondary Data) $_____

(1) Social Security & Federal Income Tax Payments (C Times 0.15) $_____

D. Total State Disposable Income (C Less C_1) $_____

(1) State Sector Income Multiplier:_____ (University Source)

(2) Indirect & Induced State Income (C Times [D_1 Less 1.00]) $_____

E. Total New State Income (C Times D_1) $_____

III TAX IMPACTS:

F. Assessed Value of the Firm Investment
(User Input or Secondary Data) $_____

(1) Estimated Value of Inputs Purchased
in State (User Input or Secondary Data) $_____

(2) State Sector Retail Sales
Multiplier:_____
(University Source)

G. State Tax Rates

(1) State Sales Tax Rate:_____
(Use Recent Sales Tax Rate)

(2) Average Individual Income Tax Paid:_____
(Use Recent Individual Income Tax Rate)

H. State Tax Revenues

(1) State Sales Tax Revenue
(F_1 Times G_1) $_____

(2) Individual State Sales Tax Revenue
(D Times 0.35 Times G_1) $_____

(3) Average Individual Income Tax Revenue
(A Times G_2) $_____

I. Total Direct State Tax Revenues
(H_1 Plus H_2 Plus H_3) $_____

J. Indirect & Induced State Tax Revenue

(1) State Sales Tax Per Dollar of Payroll:_____
(H_2 Divided By C)

(2) State Income Tax Per Dollar of Payroll:_____
(H_3 Divided by C)

(3) Indirect & Induced State Sales Tax
Revenue (J_1 Times D_2) $_____

(4) Indirect & Induced State Income Tax
Revenue (J_2 Times D_2) $_____

K. Tax Incentives

(1) State Sales Tax Exemptions
(User Input or Secondary Data) $_____

(2) Investment/Job Tax Credit
(User Input or Secondary Data) $_____

(3) Other State Inducements
(User Input or Secondary Data) $_____

(4) Total State Tax Credits
(K_1 Plus K_2 Plus K_3) $_____

L. Total State Tax Revenues
(I Plus J_3 Plus J_4 Less K_4) $_____

M. Indirect & Induced Retail Sales
from Input Purchases
(F_1 Times [F_2 Less 1.00]) $_____

COUNTY

I. EMPLOYMENT IMPACTS:

AA. New Direct Employment of the Firm
(From A) _____

(1) Jobs Filled By Out-of-County In-Commuters
(User Input or Secondary Data) _____

(2) County Direct Employment
(AA Less AA_1) _____

(3) County Sector Employment
Multiplier;_____
(University Source)

BB. Total County Level Employment Impact
(AA Times AA_3) _____

II. INCOME IMPACTS:

CC. Total State Disposable Income
(From D) $_____

(1) Propensity To Spend Within
the County;_____
(User Input)

DD. Total County Disposable Income
(CC Times CC_1) $_____

(1) County Sector Income
Multiplier;_____
(University Source)

(2) Indirect & Induced County Income
(C Times [DD Less 1.00]) $_____

EE. Total New County Income
(C Times DD_1) $_____

III. TAX IMPACTS:

FF. Assessed Value of the Firm Investment (From F) $_____

(1) Estimated Value of Inputs Purchased in County (User Input or Secondary Data) $_____

(2) County Sector Retail Sales Multiplier_____ (University Source)

GG. County Tax Rates

(1) County Property Tax Rate:_____ (Use Recent Property Tax Rate)

(2) County Sales Tax Rate:_____ (Use Recent Sales Tax Rate)

HH. County Tax Revenues

(1) County Property Tax Revenue (FF Times GG_1) $_____

(2) County Sales Tax Revenue From Firm (FF_1 Times GG_2) $_____

(3) Individual County Sales Tax Revenue (DD X 0.35 X GG_2) $_____

II. Total Direct County Tax Revenue (HH_1 Plus HH_2 Plus HH_3) $_____

JJ. Indirect & Induced County Tax Revenue

(1) County Sales Tax Per Dollar of Payroll:_____ (HH_3 Divided By C)

(2) Indirect & Induced County Sales Tax Revenue (JJ_1 Times DD_2) $_____

KK. County Tax Incentives

(1) County Property Tax Exemptions (User Input or Secondary Data) $_____

(2) Other County Inducements (User Input or Secondary Data) $_____

(3) Total County Tax Credits (KK_1 Plus KK_2) $_____

LL. Total County Tax Revenues (II Plus JJ_2 Less KK_3) $_____

MM. Indirect & Induced County Retail Sales From Input Purchased: (FF_1 Times [FF_2 Less 1.00]) $\$$_____

MUNICIPAL

I. EMPLOYMENT IMPACTS:

AAA. New Direct Employment of the Firm (From A) _____

(1) Jobs Filled by Out-of-City In-Commuters (User Input or Secondary Data) _____

(2) Municipal Direct Employment (AAA Less AAA_1) _____

(3) County Sector Employment Multiplier:_____ (From AA_3)

BBB. Total Employment Impact (AAA_2 Times AAA_3) _____

II. INCOME IMPACTS:

CCC. Total State Disposable Income (From D) $\$$_____

(1) Propensity To Spend Within the City:_____ (User Input or Secondary Data)

DDD. New Municipal Disposable Income (CCC Times CCC_1) $\$$_____

(1) County Sector Income Multiplier_____ (From DD_1)

(2) Indirect & Induced Municipal Income (DDD Times [DDD_1 Less 1.00]) $\$$_____

EEE. Total New Municipal Income (DDD Times DDD_1) $\$$_____

III. TAX IMPACTS:

FFF. Assessed Value of the Firm Investment (From F) $\$$_____

(1) Estimated Value of Inputs Purchased in City (User Input or Secondary Data) $\$$_____

GGG. Municipal Tax Rates

(1) Municipal Property Tax Rate:_____
(Use Recent Property Tax Rate)

(2) Municipal Sales Tax Rate:_____
(Use Recent Sales Tax Rate)

HHH. Municipal Tax Revenues

(1) Municipal Property Tax Revenue
(FFF Times GGG_1) $_____

(2) Municipal Sales Tax Revenue From Firm
(FFF_1 Times GGG_2) $_____

(3) Individual Municipal Sales Tax Revenue
(DDD X 0.35 X GGG_2) $_____

III. Total Direct Municipal Tax Revenues
(HHH_1 Plus HHH_2 Plus HHH_3) $_____

JJJ. Indirect & Induced Municipal Tax Revenue

(1) City Sales Tax Per Dollar of Income:_____
(HHH_3 Divided by DDD)

(2) Indirect & Induced City Sales Tax Revenue
(JJJ_1 Times DDD_2) $_____

(3) Utility Service Fees for from Firm
(User Input or Secondary Data) $_____

KKK. Municipal Tax Incentives

(1) Municipal Property Tax Exemptions
(User Input or Secondary Data) $_____

(2) Other Municipal Inducements
(User Input or Secondary Data) $_____

(3) Total Municipal Tax Credits
(KKK_1 Plus KKK_2) $_____

LLL. Total Municipal Tax Revenues
(III Plus JJJ_2 Plus JJJ_3 Less KKK_3) $_____

MMM. Indirect & Induced Municipal Retail Sales from Input Purchases
(FFF_1 Times [FF_2 Less 1.00]) $_____

Other Jurisdictional Tax Impacts

NNN. Other Property Tax Rates

(1) Common School District
Property Tax Rate:_____
(Use Recent Property Tax Rate

(2) Service District
Property Tax Rate:_____
(Use Recent Property Tax Rate)

OOO. Other Property Tax Revenues

(1) Common School District
Property Tax Revenues
(FFF Times MMM_1) $_____

(2) Service District
Property Tax Revenue
(FFF Times MMM_2) $_____

PPP. Other Jurisdictional Property
Tax Exemptions
(User Input or Secondary Data) $_____

QQQ. Total Other Jurisdictional
Property Tax Revenues
(NNN_1 Plus NNN_2 Less OOO) $_____

APPENDIX III

ANNOTATED BIBLIOGRAPHY

Alward, G., et al., Micro IMPLAN Software Manual, Judy Olson, ed., (St. Paul: Regents of the University of Minnesota), 1989.

The complete software manual by Greg Alward, Eric Siverts, Doug Olson, John Wagner, Dave Senf, and Scott Lindall, describes the operation of the IMPLAN (Impact Analysis for Planning) model developed by the USDA Forest Service, Federal Emergency Management Agency, and the USDI Bureau of Land Management. The program requires an IBM XT or compatible with a math coprecessor chip, hard drive (10Mb free), 640 K Ram (568K free). Sections include: (1) Getting Started-installation and general commands; (2) Example Analysis; (3) Study Area Definition: (4) Regional Accounts; (5) Model Development: (6) Impact Analysis; (7) Other Options.

Clayton, K., and Whittington, D., "The Economics of Community Growth: An Impact Model," Southern Journal of Agricultural Economics, 9 (1977), 63-69.

A community-level, Florida Economic Growth Impact Model is described as an "after the fact" evaluation of the impacts resulting from a new industry location. New fiscal surpluses or deficits are calculated at the city, county, and school district levels, including a break-even property tax rate. The model is packaged to include an input guidebook and report, and a default data set. User-provided data is also used in the model. Average per capita values are computed for 13 city and 9 county groupings based on 1973-74 comptroller data for the State of Florida. Additionally, annualized capital expenditure functions are estimated for the city and county, and school district revenues. Expenditures are estimated as per pupil coefficients. Multipliers are derived from input-output analysis.

Doeksen, G. A., and Schreiner, D. F., Interindustry Models for Rural Development Research, Stillwater: Oklahoma State University, Agricultural Experiment Station, Technical Bulletin T-139, 1974.

Four models are presented that are used in rural development research: Input-output, From-to, Dynamic Input-output, and Simulation. Input-output and From-to models are static models that attempt to measure interindustry effects in the short-run. Dynamic input-output is used to measure interindustry effects over time. Short and long-run effects might be captured using Simulation models. The basics of each model is discussed, along with an application. A mathematical presentation is given within an appendix for readers wanting a deeper understanding.

Ford, A., Users Guide to the BOOM1 Model (Los Alamos Scientific Laboratory), LA-6396-M5, Ausust 1976.

BOOM 1 is a computer model used to describe the impacts large power plants near rural communities. Typically, these communitites experience an initial "boom" period from the construction phase, followed by periods of slower growth. Demographics of the new, immigrating population are often different from the community's original population. Public services are often expanded to support the new population growth, thus a strain is placed on the local, public sector budget. A "bust" period often follows the initial rapid growth; tax revenues fall and excess capacity results. The BOOM1 model projects annual changes resulting from the cycles.

Goode, F., "Comparative Features of Input-Output and Export Base Models as Tools for Extension Programming," in How Extension Can Help Communities Conduct Impact Analysis, Report by the Extension Committee on Organization and Policy Task Force on Economic Impact and Data Analysis (Madison: University of Wisconsin-Extension), 1982, pp.17-23.

Input-output and Export Base models allow estimation of changes in employment and/or income as a result of a new plant. The input-output model takes its name from the tables built for studies. The columns of such tables represent inputs and rows represent outputs of sectors in the local economy. An input coefficients table is built from the initial transaction table, which shows the amount of inputs bought by one sector from each of the other sectors. Coefficients are obtained by dividing the entries of each column (in the transaction table), by the total of the corresponding row. Next, multipliers are developed to reflect the changes in output associated with a $1 increase in exports from a sector, over all sectors. The direct effect is the immediate $1 increase in output to a sector. The first-round indirect effects are the required inputs needed to support the initial direct effect. Similarly, the second-round indirect effects are the inputs required to support the first-round indirect effects. This "round-by-round" procedure continues until magnitudes are negligible. Summing all rounds in each sector yields multipliers for that sector over all other sectors. While input-out multipliers are estimated for each sector, the export base multiplier is viewed as an average multiplier for all sectors. If the community knows the particular type of firm locating in its community, then input-output is the most appropriate model. If the community wants to attract an unspecified type of activity, then export base provides an adequate estimate of impacts.

Secondary data is often used and assumes that the production coefficients found in the national input-output studies represents the coefficients in the local area studied. National input-output coefficients are readily available. Total output figures for sectors are estimated by obtaining the total value of production of a sector at the state or national level and dividing this by the total employment in that sector (state or national level) to obtain the output per man. This estimate is then multiplied by the sector's employment within the area of study to get the total output in the area. Employment figures are generally not available for areas smaller than a county. Sub-county areas might be found in the Dunn and Bradstreet Market Indicators File.

Gordon, J., "A Pen and Pad Procedure for Estimating Community Economic Impacts," in Proceedings of the Workshop on Community Impact Analysis (Lexington: Southern Rural Development Center), 1982, pp. 65-76.

Instructions are given on estimating the economic, demographic, and fiscal impacts of a new industry location within a community using a simple, non-

computerized worksheet. Impacts estimated for the private sector include employment, income, and sales. Demographic impacts include items such as new residents, new homes, and new students. Public sector impacts include new revenues and expenditures for the county, city, and school district. Multipliers, derived from an input-output model, are intended to be inputted into the worksheet by the user.

Miernyk, G. W., The Elements of Input-Output Analysis (New York: Random House), 1965.

Two "rules" is all it takes to read an input-output table:

1. "To find the amount of purchases from one industry by another, locate the purchasing industry at the top of the table, then read down the column until you come to the producing industry."

2. "To find the amount of sales from one industry to another, locate the selling industry along the left side of the table, then read across the row until you come to the buying industry." (p. 11)

Sections include: (1) Input-Out analysis, an introduction to the transaction table and technical coefficients; (2) Applications of Input-Output Analysis, an introduction to multiplier analysis; (3) Regional and Interregional Input-Output Analysis, an introduction to data problems and variations of input-output analysis; (4) International Developments, an introduction to input-output analysis in planned economies and development; (5) The Frontiers of Input-output Analysis, an introduction to dynamic analysis; and (6) The Rudiments of Input-Output Mathematics, an introduction to Matrix Algebra.

Morse, G. W., and McDowell, G., "Estimating the Impacts of Growth on Local Governments," in How Extension Can Help Communities Conduct Impact Analysis, Report by the Extension Committee on Organization and Policy Task Force on Economic Impact and Data Analysis (Madison: University of Wisconsin-Extension), 1982, pp. 9-16.

Local government's provision of services depend upon the dollars generated by local taxes and users fees. Fiscal impact analysis estimates the fiscal consequences of alternative community economic development policies. A new development nearly always adds to a community's cost of providing services. Five methods of estimating expenditures are:

1. Expenditures Per Capita- assumes average cost is constant, while population changes. Disadvantages include (a) everyone doesn't use the services to the same degree; (b) economies (diseconomies) of scale (c) some services don't add to costs.
2. Department Estimates- educated, best guesses. They can be biased by budgetary concerns.
3. Service Budgets- a detailed description of needs and costs. Disadvantage includes resources used in data collection. But, this is the "best" method.
4. Standard Manpower Requirements- the number of service personnel needed based on the Census of Government data per 1000 population. Doesn't address unique local situations.
5. Regression Analysis- changes in expenditures are related to community characteristics. Assumes present services are at capacity.

Revenue estimates from new development depends upon: (1) location of new worker's homes; (2) Income level and geographic spending patterns of new residents; (3) multiplier effects; (4) lags in revenue collection. Growth affects local taxes (property, income, and sales), state and federal aid, user fees, hook-up charges, and mitigation fees (impact fees).

Murdock, S. H., Leistritz, F.L., and Jones, L. L., "Economic-Demographic Impact Assessment Models: Characteristics and Considerations in Adaptation and Development," in Proceedings of the Workshop on Community Impact Analysis (Lexington: Southern Rural Development Center), 1982, pp. 13-35.

The criteria for evaluating impact models should include considering the information requirements, the methodological form and validation, and the use characteristics. At a minimum, information must include economic, demographic, public service and the social changes that are likely to occur. It is

also important to know the levels of geographic output and the ability of the model to predict over alternative time periods.

Factors to consider in model adaptation and development are: (1) Computer compatibility; (2) Estimations of necessary changes in the model structure; (3) data acquisition; (4) model implementaation; and (5) model validation. Evaluation of a model over each of these factors and careful consideration of alternatives and problems are essential for effective model adaptation effort.

Nelson, M. K., and Bender, L. D., Choosing Among Local Impact Models. Rural Development Research Report No. 63. U.S. Dept. of Agriculture, Economic Research Service, November 1986.

Equilibrium Planning Analysis disregards intermediate time periods as a system moves toward equilibrium. Planning models are inappropriate for impact analysis (p. 7). A planning model may be a "now-then" or "before-after" model. "Now-then" models estimate the adequacy of local government revenues to support services. They are appropriate to use with small communities with stable economic bases. "Before-after" models don't separate the estimated results caused by a change from that caused by other changes. They are appropriate for expansions and contractions of small manufacturing plants in rural areas or large changes in cities.

Impact Analysis attempts to find the changes due to one project alone. Using a "with-without" approach, it may utilize either a dynamic or equilibrium model. The difference between estimates "with" and "without" a project are the project's impacts. A source of large errors are the under-representation of a project's employment.

Input-output models have a high level of industrial disaggregation with linking coefficients that specifies the amount one sector buys from and sells to another sector. The advantage of input-output is the ability to face changes in each sector's activity caused by some initial change in another (p. 17).

The Oklahoma Community Development Simulation Model (CSM) is the only considered model that "explicitly addressed the issue of the appropriate boundaries of an impact area" (p. 12) by using a gravity technique that defines points of equal influence. CSM is an input-output model using "with-without" techniques over a community. It uses cohort-survival techniques in estimating population. It uses the interface of employment, income, and population. A gravity model is used to analyze the spatial disaggregation of impacts, specifically, fiscal impact.

Shaffer, R., and Tweeten, L., "Measuring the Impacts of New Industry on Rural Communities in Oklahoma," in Research Applications in Rural Economic Development and Planning, Agricultural Experiment Station Research Report P-665, Oklahoma State University pp-60-70, 1972.

A procedure is outlined, called the "New Gain to the Community" model, to measure the impacts of a new industry location. Two hypothetical communities and industries are used to illustrate the model. It uses partial budgeting techniques to determine the changes resulting from industrialization. The model projects the net gains or losses within a community's private, municipal, and school district sectors. The model might be used to analyze the efficiency of incentives given to prospective plants. It is stressed that both the community and the industry must be right for each other in order for the association to be profitable to both.

Two changes are defined. Direct or primary changes are measured as employment by the new firm, including the resulting wages. Indirect and Induced or secondary changes are measured by multipliers. They are the additional income to local businesses as a result of the injection of the new income from the plant purchase, and the new employed worker's spending (indirect); Likewise, there are changes in local consumption due to the additional influx of people and income within the household sector (induced).

Woods, M. D., Doeksen, G. A., and Nelson, J. R., "Community Economics: A Simulation Model for Rural Development Planners, "Southern Journal of Agricultural Economics, December (1983), 71-77.

Several impact models are reviewed: Shaffer and Tweeten developed a model to measure the impact of a new industry on rural communities in Oklahoma. The framework calculated net gains/losses to the community. This allows decision-makers to evaluate incentives offered to prospective industry. It is based on partial budgeting techniques; however, it is a single-period model.

Andrew Ford's BOOM1 model describes the impacts of large power plants on small communities. It follows the path of initial "boom" to "bust" periods after construction of a plant. It is a dynamic model.

The Florida model by Clayton and Whittington analyzes impacts within the private and public sector, including city, county, and school districts. Default data (research-based estimates) are used when local data is not available. The

model calculates net fiscal surpluses or deficits, including a break-even property tax rate.

The North Dakota Model, by Leistritz, Murdock, Toman, and Hertsgaard, measures the impact of energy development. It gives annual projections of key variables, including settlement patterns, school enrollment, housing requirements, and public sector costs and revenues.

The Community Simulation Model is adapted from the above works. Model adaptation is possible as long as care is taken to use the appropriate data for the new area. The model simulates the new industry impacts on rural Oklahoma communities. It has four major data bases: economic, capital, demographic, and government accounts. It contains over 200 linking equations and utilizes a gravity model to define the community service area. It is an input-output based "with-without" model.

Woods, M. D., and Jones, L. L., "Measuring the fiscal Impacts of New Industry in Small Towns, "Municipal Management, 5 (1982), 48-56.

A computerized Industrial Impact Model is presented. Benefits and costs are estimated for the private, municipal, school district, and county sectors to arrive at an estimation of the net sector gains or losses brought about by a new industry location. This model uses discounting equations to amortize investment made by each sector. According to a Bureau of Labor Statistics Consumer Survey, 35% of an individual's disposable income is spent on goods generating sales tax revenues in the local area.

When applied to rural Texas communities, it was found that most communities had net gains. Specifically, the private sector gained the most, while municipals, schools, and the county gained less, broke-even, or lost. This information could help decision-makers analyze the effects of a plant location in terms of inducements and resulting tax revenues.

Woods, M. D., Doeksen, G. A., and Jones, L. L., "A Presentation and Comparison of Three Computer Models Developed to Model the Social and Economic Impacts of Rural Community Growth," The Review of Regional Studies, 13 (1983), 22-31.

A detailed review and comparison is given between three impact models: The Industrial Impact Model (IIM), the Texas Assessment Model (TAMS), and The Community Impact Model (CIM). Other models are briefly reviewed.

Types of Output:

Industrial Impact Model (IIM)-Single Time Period Projections- Private, City, Schools, County Sector Impacts.
Community Simulation Model (CSM)-Yearly, 15 year-County, City Impacts
Texas Assessment Model (TAMS)-Yearly, 25 years-Regional, County, City Impacts-Specific to the energy industry

Data Requirements:

IIM-Most recent year, data-user input from secondary sources, primarily fiscal.
CSM-Historical, user input from secondary sources.
TAMS-Historical, large data base of demographic and economic.

In general, models should be flexible and fit local situations. IIM analyzes fiscal impacts during first year of operations. CSM emphasizes community service analysis. TAMS is designed for large scale energy related projects, but is useful over a wide area. Time Horizons require greater data requirements and more complex methodologies.

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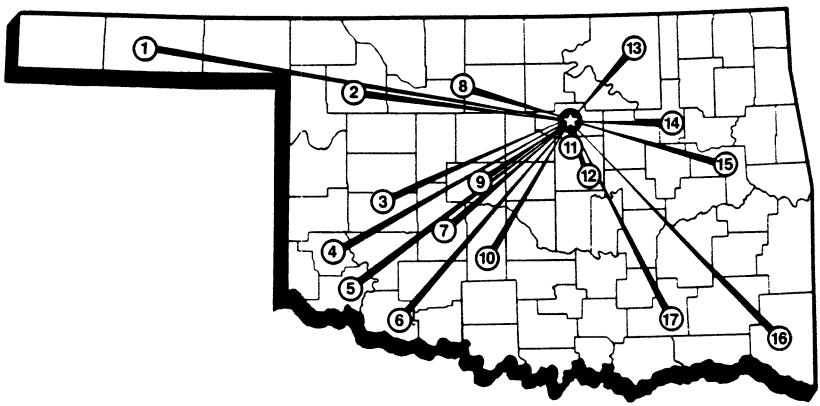

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