

# Appendix - Economics



## Appendix A: Cluster Initiatives

Cluster initiatives (and the associated cluster analysis) are considered the proper strategic framework for sustainable economic development. They have been widely used as strategies to increase the competitiveness of regions by closing gaps and also to serve as “road-maps” to move economies from a lower stage of development to a higher one. The use of cluster analysis highlights the interdependence (linkages) and the importance of agglomeration and integration, and provides a superior representation of local industry drivers and regional dynamics than do traditional methods (sector analysis). Several methodological techniques were used in a complementary process to identify and select clusters with the greatest likelihood of generating sustainable economic growth, wealth, and employment for the city of Brownsville.

The cluster analysis process consists of five steps: 1) Preliminary screening of potential industries through the use of Location Quotient Analysis (LQ). 2) Refinement of industries identified in the LQ step by taking into account the average annual income and the level of employment in order to identify the most valuable industries. 3) Further refinement of the identified industries by selecting those with the highest growth rates and identification of industrial clusters. 4) Selection of industrial clusters with the greatest potential for economic impact using Input-Output’s Multiplier Product Matrix (MPM) model; and 5) Validation of the identified clusters through economic impact analysis.

The appendix is organized into six sections. The first section describes the data sources used in the analysis. The remaining five sections describe the process steps with the final section presenting the validation results.

### Section 1: Data Collection

The analysis performed required a comprehensive set of data that describes the whole economic system of the region. The data was compiled from a number of different sources and used in a complementary way to build a model of the region’s economic activities. The data sources are: The Bureau of Labor Statistics (BLS), Bureau

of Economic Analysis (BEA), U.S. Department of Commerce, The U.S. Census Bureau, The Federal Reserve Bank of Dallas, Texas Workforce Commission, and Minnesota IMPLAN Group.

### Section 2: Location Quotient Analysis

Location Quotient (LQ) analysis is the most frequently used economic base analysis method. It is often the first step in identifying specializations and concentration in a local economy, and analyzing the economy’s diversity. LQ analysis compares the local economy to a reference economy (e.g. National economy); by doing so it identifies industries with higher and lower employment concentration relative to the national level. Location quotients were calculated for all industries to determine whether or not the local economy has a greater share of each industry than expected when compared to the national economy. When the share of employment of a local industry is greater than the share of employment in that same industry in the national economy, that industry is assumed to be Basic because the number of jobs exceeds the amount needed to meet the local demand. For example, manufacturing of automotive parts is an industry that exports almost all of its production and the numbers of jobs in this industry are above the number of jobs required to meet the local demand for automobile parts. To determine whether an industry is basic or not, we calculate the ratio of that industry’s local employment relative to its employment at the national level. LQ for an industry “i” is computed by dividing the percent of local employment within that industry by the percent of national employment within the same industry as follows:

$$\text{Location Quotient} = \frac{\% \text{ of total local employment in industry } i}{\% \text{ of total national employment in industry } i}$$

Three general outcomes are obtained when computing location quotients. These are:

LQ is greater than (LQ>1): Industries with LQ greater than 1 are summarized in Table 1. These industries are Basic, since employment in those industries exceeds what is needed to meet the local demand for a particular good or service. The surplus output is exported to non-local areas.

For example, Ambulatory Health Care Services LQ is 3.51, two and half times greater than the national average. It is slightly lower than that of Hidalgo County (3.65) but significantly larger than that of Webb County (2.18).

LQ is equal to one (LQ=1): Industries with LQ equal to one are also assumed to be Non-Basic, since employment in those industries is just sufficient to meet the local demand for a particular good or service and no surplus output is exported to non-local areas.

LQ is less than one (LQ<1): Industries with LQ less than 1 are summarized in Table 2. These industries are Non-Basic by definition, since they are not able to meet the local demand for a given good or service. For example, Professional and Technical Services LQ is 0.34. It is lower than that of Hidalgo (0.41) and Webb Counties (0.4). All three counties LQs are less than 1 and thus importing most of these services from outside the region to meet the local demand,

making Professional and Technical Services a Non-Basic industry.

(Basic industries: Industries composed of local businesses that rely entirely on external factors and markets. Most manufacturing and local resource-based firms (like logging or mining) are usually considered to be basic sector firms because their fortunes depend largely upon non-local factors, they usually export their goods. Non-basic industries: Industries composed of local businesses that depend on local business conditions. Their customer base is locally based and their products are consumed locally. Almost all local services (like drycleaners, restaurants, and drug stores) are identified as non-basic.

LQ technique does not assume that all employment can be divided in two general categories, Basic or non-local and Non-Basic or local.)

(NAICS Code) Industry	Cameron County, TX	Hidalgo County, TX	Webb County, TX
(621) Ambulatory health care services	3.51	3.65	2.18
(488) Support activities for transportation	2.99	1.36	18.34
(624) Social assistance	2.15	2.05	1.37
(336) Transportation equipment manufacturing	1.86	0.21	0.07
(515) Broadcasting, except Internet	1.84	1.13	1.22
(452) General merchandise stores	1.83	1.6	1.82
(447) Gasoline stations	1.6	1.81	1.72
(448) Clothing and clothing accessories stores	1.5	1.65	2.19
(484) Truck transportation	1.42	1.62	5.32
(335) Electrical equipment and appliance mfg.	1.4	ND	ND
(441) Motor vehicle and parts dealers	1.27	1.57	1.2
(111) Crop production	1.25	2.31	ND
(622) Hospitals	1.23	1.21	ND
(623) Nursing and residential care facilities	1.22	0.48	ND
(562) Waste management and remediation services	1.2	0.69	2.09
(722) Food services and drinking places	1.16	1.14	1.26
(445) Food and beverage stores	1.14	1.35	1.3
(999) Unclassified	1.14	1.39	1.69
(721) Accommodation	1.11	0.66	0.64
(442) Furniture and home furnishings stores	1.1	1.28	1.03
(813) Membership associations and organizations	1.1	0.38	0.22
(531) Real estate	1.03	0.57	0.62
(327) Nonmetallic mineral product manufacturing	1.02	1.22	0.69

Table 1: Industries with Location Quotient greater than 1  
Source: Bureau of Labor Statistics



(NAICS Code) Industry	Cameron County, TX	Hidalgo County, TX	Webb County, TX
(115) Agriculture and forestry support activities	0.99	7.13	ND
(444) Building material and garden supply stores	0.99	1.24	1.09
(532) Rental and leasing services	0.98	0.9	0.88
(311) Food manufacturing	0.95	1.14	0.19
(314) Textile product mills	0.93	ND	0.11
(443) Electronics and appliance stores	0.89	1.02	1.33
(713) Amusements, gambling, and recreation	0.88	0.5	0.53
(453) Miscellaneous store retailers	0.87	1.04	0.92
(493) Warehousing and storage	0.87	0.67	2.58
(446) Health and personal care stores	0.86	1.27	0.79
(454) Non-store retailers	0.85	0.47	0.26
(451) Sporting goods, hobby, book and music stores	0.84	0.71	0.74
(236) Construction of buildings	0.82	0.87	0.85
(561) Administrative and support services	0.82	0.79	0.67
(522) Credit intermediation and related activities	0.8	1.05	2.11
(424) Merchant wholesalers, nondurable goods	0.78	1.11	1.34
(237) Heavy and civil engineering construction	0.77	1.11	0.92
(423) Merchant wholesalers, durable goods	0.72	0.73	0.55
(238) Specialty trade contractors	0.69	0.77	0.5
(221) Utilities	0.68	0.99	0.64
(811) Repair and maintenance	0.66	0.89	1.1
(312) Beverage and tobacco product manufacturing	0.64	0.56	ND
(812) Personal and laundry services	0.63	0.73	0.58
(326) Plastics and rubber products manufacturing	0.58	0.35	ND
(492) Couriers and messengers	0.57	0.46	0.85
(339) Miscellaneous manufacturing	0.56	0.18	1.75
(814) Private households	0.54	0.39	0.33
(112) Animal production	0.53	0.5	1.49
(322) Paper manufacturing	0.53	1.01	NC
(511) Publishing industries, except Internet	0.5	0.32	0.25
(324) Petroleum and coal products manufacturing	0.46	ND	ND
(333) Machinery manufacturing	0.45	0.42	ND
(332) Fabricated metal product manufacturing	0.42	0.32	0.09
(517) Telecommunications	0.41	1.31	0.34
(485) Transit and ground passenger transportation	0.39	0.74	1.68
(524) Insurance carriers and related activities	0.39	0.46	0.24
(321) Wood product manufacturing	0.36	0.27	NC
(541) Professional and Technical Services	0.34	0.41	0.4
(425) Electronic markets and agents and brokers	0.32	0.54	0.32



(512) Motion picture and sound recording industries	0.29	0.61	ND
(337) Furniture and related product manufacturing	0.28	0.81	0.17
(481) Air transportation	0.28	0.11	0.14
(323) Printing and related support activities	0.25	0.12	0.16
(611) Educational services	0.25	0.38	0.17
(315) Apparel manufacturing	0.22	0.39	0.34
(212) Mining, except oil and gas	0.21	ND	0.07
(334) Computer and electronic product manufacturing	0.18	0.04	ND
(551) Management of companies and enterprises	0.18	0.06	0.04
(325) Chemical manufacturing	0.16	0.03	0.16
(313) Textile mills	0.12	ND	NC
(518) Data processing, hosting and related services	0.12	ND	ND
(213) Support activities for mining	0.04	4.69	8.92

Table 2: Industries with Location Quotient less than 1  
Source: Bureau of Labor Statistics

From the LQ analysis industries related to Health Services (Among others: Ambulatory health care services (3.56), Hospitals (1.25), Nursing and residential care facilities (1.22)), Retailing, Transportation, Tourism and Hospitality were identified with LQ greater than 1. The location quotient provides only the relative importance of the industry in terms of employment within a region. It does not provide information about the importance of the level of employment in terms of the absolute number of jobs nor does it provide the regional value contribution by the industry in terms of average annual income.

### Section 3: Location Quotient Analysis, Average Annual Income, and Employment Level Analysis

Our analysis went one step beyond the industry location quotient analysis. We added the industries average annual income and their employment level. Figure 1 portrays those industries with Location quotient greater than 1, with a circle size proportional to their level of employment. The horizontal axis measures the local industry's relative importance with respect to the national relative importance (Location quotient) and the vertical axis mea-

asures the average annual income (Salaries) of the industry. For example, Ambulatory Health care services (LQ= 3.5) are the largest employer among the basic industries with 15,853 employees, an average annual income of \$22,156. On the other hand, Hospitals employ only 4,837 employees (Smaller circle) but with largest annual average income (\$43,446), and a location quotient equal to 1.23.

This analysis allowed us to identify emerging industries that otherwise would have not been identified. For example, manufacturing and retailing are among the industries with location quotient greater than 1. Our analysis shows that manufacturing warrants further analysis because it pays significantly higher salaries than retailing and has the potential to generate significant wealth and to add more value to the community than retailing.



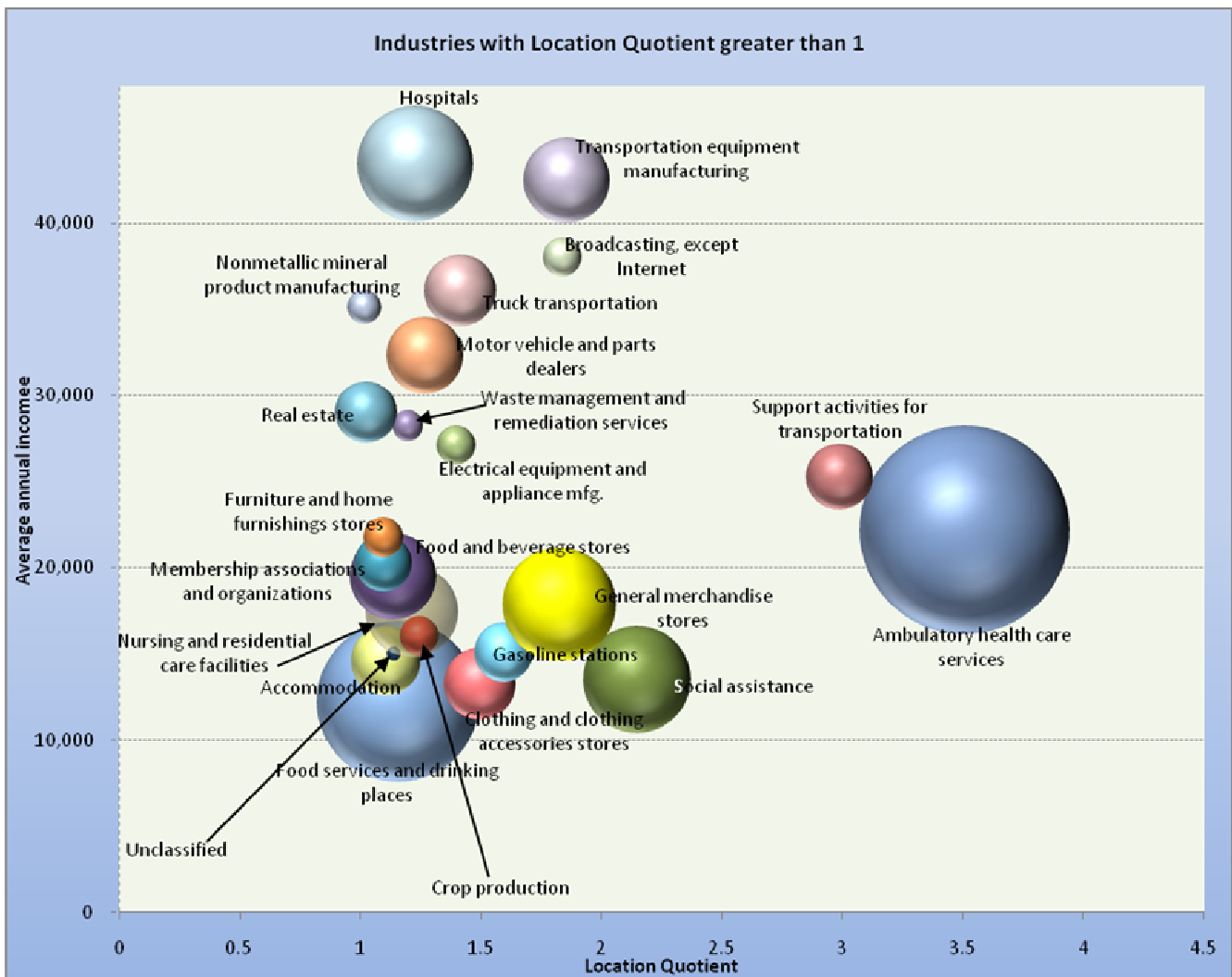


Figure 1: Industries with LQ>1.  
Source: Bureau of Labor Statistics

#### Section 4: Shift-Share Analysis

Shift-Share analysis was performed to examine the sources of employment change in each of the industries with LQ greater than 1. It decomposes the change of employment in a region over time in three components as expressed in the following equation:

$$AC = RG + IM + RS$$

- AC Actual Change (Shift-Share)
- RG National Growth Effect (National Shift)
- IM Industry Mix Effect
- RS Regional Shift Effect (Competitive Effect)

The National Growth Effect (RG) measures the increase in total employment in a local area that is attributed to growth in the national economy during the period of analysis. For example, ceteris paribus, if employment in the U.S. economy grew by 10% during the period of analysis, then total employment in the local area would have grown at the same rate. It is calculated through the following equation:

Where  $J_{i,t}$  represents the number of local jobs in an industry (i) at the beginning of the analysis period t, and  $J_{n,t}$  is total number of jobs in the nation at the beginning of the analysis period t.

The Industry Mix (IM) identifies fast growing or slow growing industrial sectors in a local area based on the national growth rates for individual industry sectors. Thus, a local area with an above-average share of the nation's high-growth industries would have grown faster than a local area with a high share of low-growth industries. It is calculated by the following equation:

Where  $E_i$  is number of jobs, nationwide, in industry (i) at the beginning of the analysis period (t-1)

The Regional Shift (RS) or competitive effect is perhaps the most important component. It highlights a local area's leading and lagging industries. Specifically, the competitive effect compares a local area's growth rate in an industry sector with the growth rate for that same sector at the U.S. level. A leading industry is one where that industry's local area

growth rate is greater than its U.S. growth rate. A lagging industry is one where the industry's local area growth rate is less than its U.S. growth rate.

Shift-Share analysis is a technique that is widely used in regional analysis; it examines the sources of change in employment. This change could be due to the national rate of change in given industries, or the industrial structure of the region itself and its location advantages or disadvantages. Table 3 identifies industries with the greatest likelihood for potential job opportunities and presents the results of the components of the shift share analysis. For example, Hospitals shows a growth of 880 jobs during the period of the first quarter of 1996 and first quarter of 2007. 74% of this growth is attributed to the national growth (655 jobs), 5% attributed to Industry Mix (43 jobs) and 21% (182 jobs) attributed to local growth.

NAICS	Industry Title	Employment								
		Local		National		% Chg	Nat'l	Ind.	Local	Abs
		1st Qtr 1996	1st Qtr 2007	1st Qtr 1996	1st Qtr 2007	Loc Emp.	Share (RG)	Mix (IM)	Share (RS)	Chg
611	Educational Services	14,679	18,797	9,774,822	12,325,002	28	2335	1495	288	4118
722	Food Services and Drinking Places	6,146	9,383	7,229,198	9,212,151	53	978	708	1551	3237
624	Social Assistance	2,373	4,005	1,647,311	2,465,127	69	377	801	454	1632
238	Specialty Trade Contractors	1,820	2,784	3,021,441	4,586,889	53	289	653	21	964
622	Hospitals	4,118	4,998	4,622,681	5,406,218	21	655	43	182	880
488	Support Activities for Trans.	853	1,589	434,761	573,934	86	136	137	463	736
448	Clothing and Clothing Accessories	1,355	1,828	1,203,108	1,455,417	35	216	69	189	473
444	Building Material & Garden Supply	759	1,075	945,945	1,264,694	42	121	135	60	316
446	Health and Personal Care Stores	438	699	815,786	978,423	60	70	18	174	261
493	Warehousing and Storage	294	528	456,196	649,577	80	47	78	109	234
237	Heavy and Civil Engineering Const.	403	634	663,766	896,011	57	64	77	90	231
713	Amusement, Gambling & Recreation	670	886	990,874	1,261,255	32	107	76	33	216
442	Furniture and Home Furnishings	420	528	461,311	576,050	26	67	38	4	108
523	Financial Investment & Related Activities	72	165	587,899	835,788	129	11	19	63	93
485	Transit and Ground Passenger Trans.	86	126	334,044	412,177	47	14	6	20	40

Table 3: Greatest Likelihood for Potential Job Opportunitie.

Source: <http://socrates.cdr.state.tx.us/iSocrates>



Table 4 identifies industries with potential comparative advantage and presents the results of the components of the shift share analysis. Comparative advantage refers to the ability of a region to produce a particular good or service at a lower marginal cost than another region, or country.

Transportation Equipment Mfg shows a growth of 899 jobs during the period of the first quarter of 1996 and first quarter of 2007. 32% of this growth is attributed to the national growth (289 jobs), 55% decline attributed to Industry Mix (-496 jobs) and 123% (1106 jobs) attributed to local growth.

NAICS	Industry Title	Employment								
		Local		National		% Chg	Nat'l	Ind.	Local	Abs
		1st Qtr 1996	1st Qtr 2007	1st Qtr 1996	1st Qtr 2007					
919	Federal Gov't.	1068	2016	2,028,560	1,949,528	89	170	-211	990	948
336	Transportation Equipment Mfg	1818	2717	1,950,019	1,728,012	49	289	-496	1106	899
484	Truck Transportation	954	1696	1,237,317	1,410,446	78	152	-18	609	742
441	Motor Vehicle and Parts Dealers	1512	2048	1,659,352	1,883,094	35	240	-37	332	536
423	Merchant Wholesalers, Durable Goods	1404	1888	2,696,091	3,075,853	34	223	-26	286	484
721	Accommodation	1253	1675	1,594,697	1,771,168	34	199	-61	283	422
447	Gasoline Stations	744	1163	899,875	847,023	56	118	-162	463	419
524	Insurance Carriers & Related Activities	531	726	1,932,686	2,148,202	37	84	-25	136	195
443	Electronics and Appliance Stores	273	441	477,511	550,957	62	43	-1	126	168
339	Miscellaneous Manufacturing	71	213	714,874	638,367	200	11	-19	150	142
453	Miscellaneous Store Retailers	501	641	854,336	849,211	28	80	-83	143	140
333	Machinery Manufacturing	319	435	1,454,688	1,180,179	36	51	-111	176	116
445	Food and Beverage Stores	2644	2717	2,839,592	2,796,420	3	421	-461	113	73
532	Rental and Leasing Services	403	459	575,091	622,487	14	64	-31	23	56
115	Agriculture & Forestry Support	192	247	285,998	283,427	29	31	-32	57	55
451	Sporting Goods/Hobby/Book/Music	373	420	618,074	646,059	13	59	-42	30	47
326	Plastics & Rubber Products Mfg	326	369	875,466	755,336	13	52	-97	88	43
221	Utilities	254	278	648,219	544,927	9	40	-81	64	24
332	Fabricated Metal Product Mfg.	548	572	1,644,757	1,548,358	4	87	-119	56	24

Table 4: Potential Comparative Advantage  
Source: <http://socrates.cdr.state.tx.us/iSocrates>

Table 5 organizes industries in a 2x2 matrix with resulting possible states: Industries growing nationally and locally, industries growing nationally but declining locally, industries declining nationally but growing locally, and industries declining nationally and locally.

Table 5 organizes industries in a 2x2 matrix with resulting possible states: Industries growing nationally and locally, industries growing nationally but declining locally, industries declining nationally but growing locally, and industries declining nationally and locally.

NAICS Industry Title	Employment								
	Local		National		% Chg Loc Emp.	Nat'l Share	Ind. Mix	Local Share	Abs Chg
	1st Qtr 1996	1st Qtr 2007	1st Qtr 1996	1st Qtr 2007					
517 Telecommunications	348	365	957,157	1,033,704	5	55	-28	-11	17
811 Repair and Maintenance	685	696	1,157,573	1,235,022	2	109	-63	-35	11
492 Couriers and Messengers	303	283	537,928	572,274	-7	48	-29	-39	-20
711 Performing Arts and Spectator Sport	272	216	330,833	366,005	-21	43	-14	-85	-56
812 Personal and Laundry Services	821	670	1,143,254	1,277,859	-18	131	-34	-248	-151
424 Merchant Wholesalers, Nondurable Goods	1547	1246	1,788,688	2,023,887	-19	246	-43	-504	-301
334 Computer and Electronic Product Mfg	438	118	1,732,220	1,289,942	-73	70	-181	-208	-320
311 Food Manufacturing	1631	1075	1,523,335	1,448,068	-34	259	-340	-475	-556
327 Nonmetallic Mineral Product Mfg	1007	428	500,515	491,107	-57	160	-179	-560	-579

Table 5: Less Likely to Offer Employment Opportunity

Source: <http://socrates.cdr.state.tx.us/iSocrates>



	<b>Growing nationally</b>	<b>Declining Nationally</b>
<b>Growing Regionally</b>	Educational Services	Federal Government
	Food Services and Drinking Places	Transportation Equipment Mfg
	Social Assistance	Miscellaneous Manufacturing
	Specialty Trade Contractors	Machinery Manufacturing
	Hospitals	Food and Beverage Stores
	Support Activities for Transportation	Heavy Steel industry
	Clothing and Clothing Accessories Stores Building Material & Garden Supply Stores Health and Personal Care Stores	Sporting Goods/Hobby/Book/Music Stores Sporting Goods/Hobby/Book/Music Stores Plastics & Rubber Products Mfg Fabricated Metal Product Mfg
	Renewable energy	Heavy industry steel mill
	Warehousing and Storage	
	Heavy and Civil Engineering Construction Hospitality and Tourism	
	Furniture and Home Furnishings Stores Financial Investment & Related Activities	
	Truck Transportation	
	<b>Declining Regionally</b>	Credit Intermediation & Related Activities Construction of Buildings
Membership Organizations & Associations Electronic Markets and Agents/Brokers		Performing Arts and Spectator Sport Computer and Electronic Product Mfg Food Manufacturing
		Nonmetallic Mineral Product Mfg

Table 6: Employment Trends Growth Grid

Through shift share analysis we were able to confirm our initial hypothesis with respect to the heavy manufacturing cluster. Though associated industries are declining nationally, they are growing regionally with higher salaries than most of the regional industries. AMFELS a regional flag firm illustrates this fact. A possible explanation is that these types of industries are moving to the region to take advantage of its strategic location and the relatively lower labor cost. On the other hand, Health Care industries, Tourism and Hospitality,

Logistics (Warehousing and Storage) and Truck Transportation were confirmed to be growing nationally and regionally.

**Section 5: Input-Output Analysis**

Input-output analysis was used to evaluate the strengths and weaknesses of clusters based on their linkages. Linkage analysis is used to examine the interdependence of sectors and to identify the most important sectors in the economy. Within the input-output framework there are two types of linkages:



Backward linkages and forward linkages. Backward linkage is the interconnection of an industry to other industries from which it purchases its inputs in order to produce its output. It is measured as the proportion of intermediate consumption to the total output of the sector (direct backward linkage) or to the total output multiplier (total backward linkage). An industry has significant backward linkages when its production of output requires substantial intermediate inputs from many other industries.

Forward linkage is the interconnection of an industry to other industries to which it sells its outputs. It is measured as the row sum of the direct requirements table (direct forward linkage) or as the row sum of the total requirements table (total forward linkage). An industry has significant forward linkages when a substantial amount of its output is used by other industries as intermediate inputs to their production. (BEA)

The expansion of output in sectors with strong and extensive linkages generates more economic activity than an equal expansion in sectors with weak and thin linkages. A valuable sector is a sector that is largely dependent on other local industries in the utilization of their products in its production process, but also a sector whose output is used by other sectors in their production processes. Investments in these sectors would result in significant economic activities because of the tight interdependencies with other sectors. Measuring linkages and associated leakages can help identify and explain why some sectors are more beneficial to the economy than others. For example, location quotient and shift share analysis failed to identify Heavy Manufacturing as an important cluster but input-output analysis showed that this cluster possesses extensive linkages both backward and forward

especially with the Logistics and Transportation and light manufacturing clusters. This is in addition to the opportunity to reduce its own leakages.

To enrich the selection process, we mapped the economic landscape. Mapping economic landscapes also called field of influence is a relatively new tool developed by Sonis, Hewings, and Guo . It captures the influence of both backward and forward linkages in a single measure that provides the relationship of one industry to all the other industries. The technique employed for this study derives a "Multiplier Product Matrix" (MPM) from computed backward and forward linkages then maps the clusters to form an economic landscape. This economic landscape provides a graphic representation of the structural makeup of the local economy and facilitates the identification of the most important clusters.

Figure 12 presents the results of inter-cluster linkage analysis for the Cameron County region. Three clusters previously identified: Health Care Services, Hospitality and Tourism, and Transportation Logistics were confirmed. They possess significant linkages and provide the greatest likelihood for job and wealth creation.

See Miller and Blair (1985) for a comprehensive discussion on input output analysis.

BEA [http://www.bea.gov/papers/pdf/IOmanual\\_092906.pdf](http://www.bea.gov/papers/pdf/IOmanual_092906.pdf)

Michael Sonis, G.J.D Hewings, and J.Guo " Input-Output Multiplier Product Matrix", Discussion paper, 94-T-12 (revised, 1997), Regional Economics Applications Laboratory, University of Illinois.



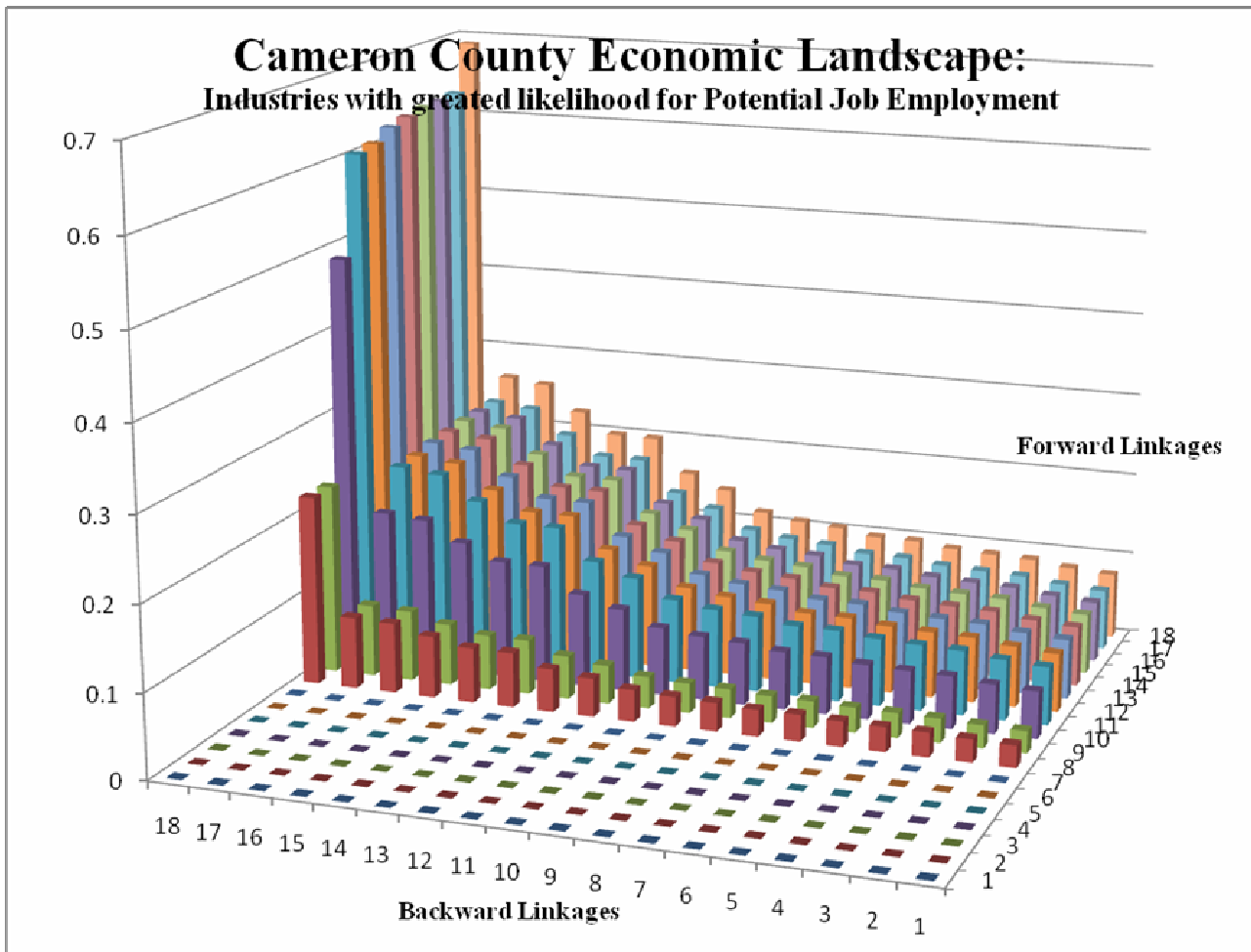


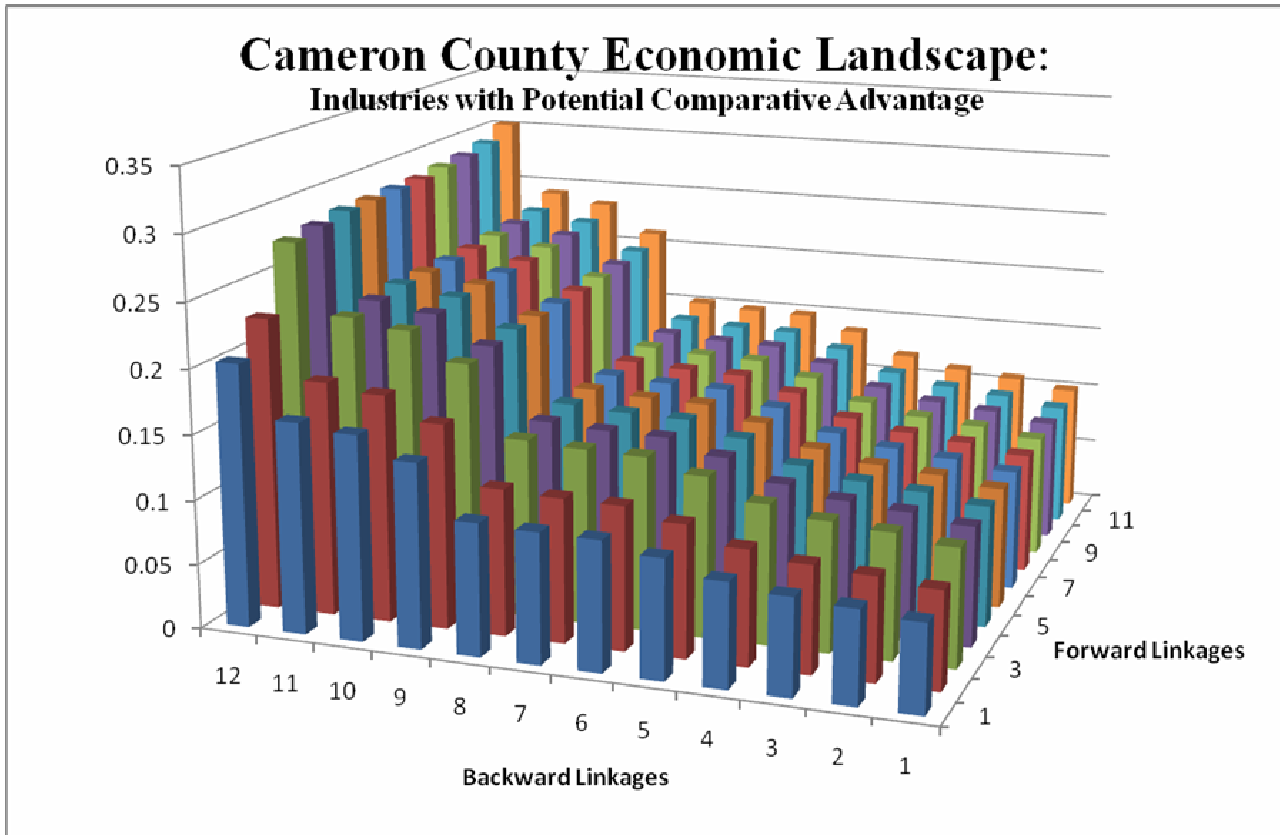
Figure 2: Cameron County Economic Landscape: Greatest Likelihood for Employment

- 1 Maintenance and repair of highways- streets- bridges
- 2 Manufacturing and industrial buildings
- 3 Other maintenance and repair construction
- 4 Maintenance and repair of farm and nonfarm residences
- 5 Highway- street- bridge- and tunnel construction
- 6 Water- sewer- and pipeline construction
- 7 New multifamily housing structures- all
- 8 Other new construction
- 9 New residential additions and alterations- all
- 10 Maintenance and repair of nonresidential buildings
- 11 Commercial and institutional buildings
- 12 Education
- 13 New residential 1-unit structures- all
- 14 Financial & Real estate
- 15 Retail trade
- 16 Hospitality
- 17 Logistics
- 18 Health services



Additionally, Figure 13 maps the clusters with potential comparative advantage and ranks them in terms of their importance to the local economy based on their linkages. Industries with extensive linkages have large coefficient (on the vertical axis). Heavy and Light Manufacturing clusters have the potential to generate significant wealth beside the potential for high paying jobs.

Figure 13 shows industries with potential comparative advantage based on their linkages within the local economy. The most important sectors (not present in figure 12) are light and heavy manufacturing. These are sectors where the region has a comparative advantage and represent natural sectors to expand and specialize in. Spending in these sectors generates more economic activity than equal spending in other sectors. Cluster Selection



- 1 Utilities
- 2 Other mfg
- 3 Plastic, Rubber and related
- 4 Metals and metal work
- 5 Machine mfg
- 6 Ship Building
- 7 Agriculture
- 8 Wholesale Trade
- 9 Retail trade
- 10 Auto and aircraft parts
- 11 Hospitality
- 12 Other services



Cameron County has a multitude of clusters to consider as motors for economic growth and development. These clusters have different levels of sophistication, specialization, and integration. In this section we identify five clusters that we believe offer the greatest likelihood for economic growth and development. The identification of these clusters is based on the analysis performed in the previous section using Location Quotient technique, Shift-Share analysis, and Input-Output/Economic Landscape analysis.

### Five Clusters Selected

The five clusters identified are Healthcare, Logistics, Hospitality and Tourism, Light Manufacturing and Heavy Manufacturing. The first three clusters offer the greatest likelihood for potential job opportunities. The Healthcare and Logistics clusters are both fast growing at the national and local level. Both clusters pay relatively high wages. Based on our analysis, they are both important local clusters. Hospitality and Tourism is also a fast growing cluster both at the national and local level. Although it is an important sector, the average salary in this cluster is relatively low.

The Light Manufacturing and Heavy manufacturing clusters are clusters with potential comparative advantage. These two clusters are wealth-generating clusters and could be cornerstones for sustainable economic development and the revitalization of the region.

### Impact Analysis

Impact analysis was conducted using IMPLAN and a Regional General Equilibrium Model. IMPLAN (Impact Analysis for PLANing) is an econometric modeling system developed by applied economists at the University of Minnesota and the U.S. Forest Service. The IMPLAN system is a widely used, nationally recognized tool that provides detailed purchasing infor-

mation for 528 industrial sectors and uses a friendly media for customizing input output models to specific application (Minnesota IMPLAN group, Inc. 1997). The IMPLAN economic impact model, traces the flow of goods and services, income, and employment among related sectors of the economy, estimates direct, indirect, and induced effects of an economic activity in a specific region. The IMPLAN modeling system combines the U.S. Bureau of Economic Analysis' Input-Output Benchmarks with other data to construct quantitative models of trade flow relationships between businesses and between businesses and final consumers. The IMPLAN input-output accounts capture all monetary market transactions for consumption in a given time period. The IMPLAN input-output accounts are based on industry survey data collected periodically by the U.S. Bureau of Economic Analysis and follow a balanced account format recommended by the United Nations. IMPLAN uses Regional Purchase Coefficients (RPC) to predict regional purchases based on an economic area's particular characteristics. The Regional Purchase Coefficient represents the proportion of goods and services that will be purchased regionally under normal circumstances, based on the area's economic characteristics described in terms of actual trade flows within the area.

The economic impact analysis of a set of selected projects in each of the clusters identified showed that the heavy manufacturing cluster has the single largest economic impact on the region. Investing in a steel mill will create 4,338 jobs: 730 direct, 1,525 indirect (within the cluster), and 2,083 induced, or outside the cluster. The steel mill will also generate an additional \$12.4 million in property tax revenue for the City, a 36% increase over the current tax revenue, \$2.5 million, or a 3.8% increase in sales tax revenue, and \$1.1 million in fines and fees. The average salary for steel mill workers is \$81,657, four times higher than the current average income in Brownsville. The average salary for the cluster (direct and indi-

rect) is \$53,226, 2.7 times the average income in Brownsville. The steel mill will raise average income in the city by \$2,111 an improvement of 10.7%.



