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Texas Manufacturing Plants That Export

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Exports of manufactured goods brought more than \$60 billion into the Texas economy in 1995, according to the official export figures of the Texas Department of Commerce, and the state's manufactured exports are growing about 15 percent each year. The official export data are rich with industrial detail, but reveal little about how individual establishments and metropolitan areas are linked to the global economy.

The *Directory of Texas Manufacturers (DTM)*, published by the Bureau of Business Research, provides a unique resource for analyzing otherwise perplexing questions about the export activities of manufacturing plants and metropolitan areas. An established annual survey with an unusually high response rate makes the *DTM* a reliable resource for this type of analysis.

Exporters by Metropolitan Area

Nearly one-quarter of Texas manufacturers export their goods. Manufacturers in metropolitan areas are significantly more involved in exporting than those plants in less urbanized parts of the state. As shown in table 1, Brazoria, with its strong base in chemical production, leads Texas metropolitan areas in the percentage of manufacturers that export: it is the state's only metropolitan area in which more than a third of its manufacturing plants are exporting. Houston and Beaumont-Port Arthur, with their extensive port facilities

and petrochemical manufacturing complexes, also rank high among the state's metropolitan areas that export. Border metropolitan areas like Brownsville-Harlingen-San Benito and El Paso with their close ties to Mexico's maquiladoras are no surprises at the top of this list. Instead, the surprises may well be the rankings of the Dallas, Fort Worth-Arlington and Austin-San Marcos areas. Despite strong manufacturing bases in the sophisticated world of high technology, these three metropolitan areas fall outside the top ten and below the state average in their percentages of exporting plants. If anything, perhaps this suggests a degree of untapped export potential in these regions.

Exporters by Plant Size

Perhaps the most striking and identifiable trend in the *DTM* data is the relationship between manufacturing plant size and exports (table 2). Manufacturers with fewer than 20 employees are the least likely to export. More than one-third of those plants with employment levels of 50 or more are exporting. Among the largest manufacturers (250 or more employees), more than half are involved in exporting.

Exporters by Industry

An analysis of the *DTM* data by industry produces a ranking very similar to the official export data of the Texas Depart-

ment of Commerce. In both instances, the chemical industry (SIC 28) tops the list as the state's most export-oriented. The *DTM* (table 3) indicates that some 37 percent of the state's chemical plants are exporting.

Texas Department of Commerce data show that the chemical industry exported more than \$14 billion in goods in 1995—nearly one-quarter of the state's manufactured exports. ♦

Table 1
Exporting Manufacturing Plants in Texas, by Metropolitan Area
(ranked as a percentage of total)

Rank	Metropolitan area	Number of plants	Number exporting	Exporters as a percentage of total
1	Brazoria	143	49	34.3
2	Brownsville-Harlingen-San Benito	151	49	32.5
3	Houston	3,438	1,078	31.4
4	Odessa-Midland	280	79	28.2
5	El Paso	396	109	27.5
6	Beaumont-Port Arthur	290	77	26.6
7	Longview-Marshall	262	68	26.0
8	Wichita Falls	126	32	25.4
9	San Antonio	952	237	24.9
	Waco	213	53	24.9
10	San Angelo	89	22	24.7
11	Dallas	3,184	753	23.6
	Fort Worth-Arlington	1,635	386	23.6
12	McAllen-Edinburg-Mission	150	34	22.7
13	Laredo	41	9	22.0
14	Austin-San Marcos	1,043	228	21.9
	Tyler	155	34	21.9
15	Killeen-Temple	121	26	21.5
16	Corpus Christi	206	41	19.9
17	Texarkana	58	11	19.0
18	Galveston-Texas City	110	20	18.2
19	Bryan-College Station	82	14	17.1
20	Sherman-Denison	126	21	16.7
21	Abilene	114	18	15.8
	Lubbock	215	34	15.8
22	Amarillo	158	19	12.0
23	Victoria	55	5	9.1
	Nonmetropolitan areas	2,512	406	16.2
	Total	16,305	3,915	24.0

Source: 1997 *Directory of Texas Manufacturers*, Austin: Bureau of Business Research.

Nearly one-quarter of Texas manufacturers export their goods.

Table 2
Exporting Manufacturing Plants in Texas by Employment Size
(ranked as a percentage of total)

Rank	Employment size	Number of plants	Number exporting	Exporters as percentage of total
1	5,000 and over	6	6	100.0
2	1,000 to 4,999	101	60	59.4
3	500 to 999	188	103	54.8
4	250 to 499	375	202	53.9
5	100 to 249	1,187	465	39.2
6	50 to 99	1,451	860	36.0
7	20 to 49	2,985	860	28.8
8	10 to 19	2,823	601	21.3
9	1 to 9	6,251	887	14.2
	Employment not reported	938	206	22.0
	Total	16,305	3,912	24.0

Table 3
Exporting Manufacturing Plants in Texas by Industry
(ranked as a percentage of total)

Rank	SIC	Industry	Number of plants	Number exporting	Exporters as percentage of total
1	28	chemicals & allied products	1,169	434	37.1
2	33	primary metal industries	408	129	31.6
3	36	electronic equip. & components	1,144	314	27.4
4	22	textile mill products	110	29	26.4
5	30	rubber & misc. plastics	1,247	318	25.5
6	38	scientific instruments	860	212	24.7
7	35	machinery & computers	3,108	748	24.1
8	34	fabricated metal products	2,965	624	21.0
9	26	paper & allied products	484	93	19.2
10	23	apparel	840	150	17.9
11	31	leather & leather products	181	24	13.3
12	20	food & kindred products	1,057	140	13.2
13	37	transportation equipment	636	82	12.9
14	24	lumber & wood products	889	110	12.4
15	29	petroleum refining	227	28	12.3
16	25	furniture & fixtures	723	75	10.4
17	32	stone, clay, glass, & concrete	1,183	110	9.3
18	39	misc. manufacturing industries	1,208	90	7.5
19	27	printing & allied industries	2,717	196	7.2
20	13	products from natural gas	158	6	3.8
		21 tobacco products	2	0	
		Total	16,305	3,912	24.0

Source: 1997 Directory of Texas Manufacturers, Austin: Bureau of Business Research.

The chemical industry exported more than \$14 billion in goods in 1995—nearly one-quarter of the state's manufactured exports.

High-Technology Networks and Exports in Texas

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In the 1970s a new enthusiasm emerged for local interfirm linkages. Studies from Italy, Germany, Denmark, Spain, France, among others, describe successful local linkages between small- and medium-size firms that produced export records. These linkages developed informally where there was an absence of leading large firms, and the resulting innovations contributed significantly to regional growth and employment.

In contrast to this European model of small- and medium-size firm linkages, Japanese firms built local networks based on links between large and small firms in the 1980s. The just-in-time system promoted by Japanese firms (mainly the automobile industry) requires a significant exchange of information between suppliers and their long-time customers. The need to deliver goods and components on a just-in-time basis favors the emergence of local networks of firms, and many scholars have associated the Japanese automobile industry's increasing shares in international markets with its industrial organization based on local interfirm networks.

Industrial networks are also in evidence in the United States. For example, Silicon Valley, like the innovative industrial districts of Europe, owes its success to local networks of mainly small-and-medium size high-technology firms. In addition, the linkages between large and small high-technology firms contributed to the success of several high-technology sectors in Los Angeles, where large production units have come to depend on the dense networks of small producers found throughout the region.

Local Versus Nonlocal Linkages in Texas Firms

The success of local networks in the international market highlights the importance of supporting policies that promote local linkages between firms. Scholars and practitioners theorize that strong local linkages would help firms sell in international markets, but there is no consensus on the "exclusive" role of local (versus nonlocal) networks in the success of firms

in international markets. *How important are local versus nonlocal networks in the export performance of Texas firms?*

Data about the effects of networks on firms' exports were gathered from 178 high-technology firms in the metropolitan areas of Dallas, Fort Worth, Houston, Austin, and San Antonio.¹ To measure the relative importance of local and nonlocal networks on exports, we listed four types of manufacturing establishment networks: (1) business contacts with *local* firms in the same activity; (2) *local* nonbusiness, social, or cultural networks; (3) *local* business contacts with firms in other business activities; and (4) business contacts with firms in the same activity located *elsewhere in the United States*.

All 178 establishments rated contacts with firms in the same activity most important, with more firms citing nonlocal contacts as more important than local contacts. The 98 exporting establishments identified contacts with foreign firms as the most important interaction specifically related to their exporting activities, indicating that foreign contacts open new opportunities to penetrate foreign markets and learn new ways to do business.

Symmetric Versus Asymmetric Networks in Texas Firms

One of the most important benefits for firms within a network system is increased access to information. In the case of *symmetric* networks—those established between firms of similar sizes—access to information benefits *all* firms in the network. There is, however, no consensus on whether the benefits of *asymmetric* networks—those between firms of relatively different sizes—extend to all the firms in the network. For example, a link with a large firm can increase a small firm's access to knowledge (e.g., about new technologies), but it can also increase the large firm's control over a small firm's key decisions, including the decision to sell in the international market.

Do asymmetric networks increase the export capacity of all the firms in the network? The answer to this question is of

particular importance in Texas where networks in the largest metropolitan areas are characterized by a mix of small and large high-technology firms. In our research with Texas high-tech firms, we assumed that information exchanges are stronger between firms involved in long-term relationships (defined as firms with contracts longer than one year). Thirty-five respondents from our sample indicated that they have a long-term contract with another *larger* high-tech firm located in the *same city*. As expected, they stated that the most important benefit of a local network with a larger high-tech firm is access to information. However, when eighteen exporting firms were asked to rank from 1 to 5 (1 being greatly expanded and 5 being greatly reduced) how this asymmetric relationship affects their ability to export, the average score was 2.47, suggesting that the asymmetric relationship has had little effect on their ability to export. From this we concluded that the information they claim to enjoy from their long-term relationship with a larger firm is not necessarily about foreign markets, but rather about how to produce more efficiently (i.e., information about new technologies and new knowledge). In short, local asymmetric networks do contribute to the ability of small network firms to export, albeit only indirectly, by making them more competitive.

Conclusion

Our sample of high-tech firms suggests that cooperative networks in Texas are scattered geographically rather than localized primarily within each high-tech region. It also indicates that U.S. nonlocal networks generally benefitted these businesses most, while foreign networks were the most important in furthering export activities. Thus, in promoting exports of high-technology firms, policymakers should focus on strategies designed to increase foreign contacts.

However, because firms must be highly competitive to succeed in the international market, policymakers should also focus on helping these businesses strengthen

networks with establishments in other U.S. metropolitan areas. Such linkages provide information that enhances competitiveness and therefore complements the process of selling in international markets.

Note

1. Questionnaires were sent to firms in four-digit SIC code subsectors within the industrial sectors of machinery and equipment (SIC 35), electronics (SIC 36), and instruments and related products (SIC 38). In services, these included computers (SIC 737), engineering and architecture (SIC 871), management and public relations (SIC 874), and research, development, and testing (SIC 873). Firms were identified with the help of District Export Councils in Dallas and San Antonio, the Austin Software Council, the Bureau of Business Research, and international business directories. Usable responses were obtained from 178 firms, representing a response rate of approximately 20 percent.

We are grateful to all the managers and engineers who responded to our questionnaire; without their participation, this research would not have been possible. Susan Adams provided valuable research assistance. We also thank the Center for the Study of Western Hemispheric Trade, University of Texas at Austin, for partially funding this project.

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