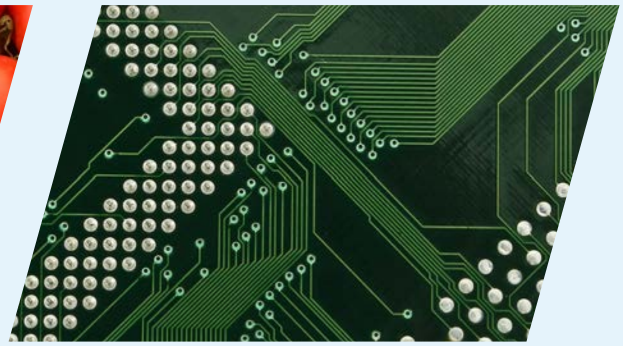
Bi-National Business Linkages Associated with

# FRESH PRODUCE AND PRODUCTION-SHARING:

## Foundations and Opportunities for Nogales and Santa Cruz County



**Prepared for**
Nogales Community Development
Nogales, Arizona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College of Agriculture & Life Sciences
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Dear Partner,

On behalf of the Nogales Community Development (NCD) board of directors I want to thank all of those individuals, businesses and agencies who made this study possible: US Department of Commerce Economic Development Administration, University of Arizona Eller College and Department of Agricultural and Resources Economics, Fresh Produce Association of the Americas, Asociacion de Maquiladoras de Sonora, AC, Arizona Department of Transportation, Greater Nogales-Santa Cruz County Port Authority and Nogales Santa Cruz County Economic Development Foundation as well as businesses and individuals who contributed their time and energy to this endeavor.

In 2012 NCD was awarded a grant by the US Department of Commerce Economic Development Administration (EDA) to start work on the Nogales Innovation Partnership Project (NIPP). Phase one of the NIPP was to complete a study on the economic impact of the Production Sharing (manufacturing/maquiladoras) and Fresh Produce industries have in Santa Cruz County and the region. The enclosed report summarizes the results of this analysis.

This report has been prepared for Nogales Community Development by the University of Arizona Eller College and Department of Agricultural and Resources Economics. We hope these results will spur the realization of business and job opportunities in our region. Once again thank you to all those who participated and assisted with this effort.

Sincerely,

Yvonne Delgadillo

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Executive Director, Nogales Community Development

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## About this report

This report has been prepared for Nogales Community Development by the University of Arizona Eller College and Department of Agricultural and Resources Economics. Funded by EDA Grant 2012, the study constitutes Phase One of the Nogales Innovation Partnership Project (NIPP).

The report summarizes results of analysis of bi-national industry interactions with a focus on two major industries, fresh produce and production sharing (*maquiladora* in Sonora). The analysis identifies existing connections and potential capabilities in Santa Cruz County in economic activities associated with manufacturing, fresh produce and international trade.

The authors thank the Advisory Committee for guidance and support of the project, and to all participants for data and insights into various aspects of cross-border activities.

## Advisory Committee

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## Contents

## Executive Summary

The focus of this analysis has been on fresh produce industry and cross-border trade relations with Sonora's maquiladora sector. The analysis produced measures of their current importance for the local economy in terms of job creation, local wages, tax revenues and total output. Their importance was further evaluated in terms of multipliers as a measure of the ripple effect and their impact on a multitude of local goods and service producing activities.

**Fresh produce industry**. Nogales' fresh produce industry encompasses several activities involved with importation, inspection, transportation, warehousing, and distribution of Mexican grown produce to North American markets. A summary of economic impacts is presented in Box 1.

Box 1

**Fresh Produce Industry generates:**

- $303.4 million direct output in Santa Cruz County
- $134.3 million additional (secondary) output
- 2,644 direct jobs & $146.4 million in wages
- 1,376 secondary jobs & $43.6 million in secondary wages
- $45 million in tax revenues to state and local governments
- TOTAL DOLLAR IMPACT: $437.7 million*

*including wages and tax revenues

**Direct & secondary contribution to Santa Cruz County:**

- 22.3% of total jobs
- 24.8% of total wages
- 33.5% of total output

Every 100 direct jobs in fresh produce industry generate an additional 52 jobs; every $1 in wages to direct employees in fresh produce industry generates an additional $0.29 in wages in other sectors, and every $1 in direct output in fresh produce industry generates an additional $0.44 in other economic sectors in Santa Cruz County.

More than 80 local services ranging from business support services to legal services to commercial equipment leasing, to insurance agencies are related to fresh produce industry. While this suggests an established and intricate network of supporting activities, most of the manufactured supplies such as forklifts and packaging materials are not locally produced. The industry is still highly seasonal resulting in high unemployment rates during summer months.

While the total dollar value of imported fresh produce shows an upward trend, a comparison with other U.S.-Mexico border ports of entry shows Nogales' declining share, particularly vis-à-vis Texas ports of entry. This may be a result of several factors, including the rise in export of fresh produce grown in central Mexico and shipped through Texas border ports of entry, longer growing seasons of central Mexican regions, as well as more convenient border crossings for fresh produce trucks serving midwestern and northeast markets in the U.S.

**Maquiladora related trade activity**. Nogales is Arizona's major port of entry for trade with Mexico; Nogales border port of entry also facilitates import and export of merchandise from other U.S. states, the majority of which is related to the maquiladora sector in Sonora. In addition, the county's economy benefits from the proximity of the maquiladoras south of the border through export of locally manufactured goods and services. A summary of economic impacts is presented in Box 2.

Box 2

**Maquiladora-related trade generates:**

- $206.8 million direct output in Santa Cruz County
- $98.1 million additional (secondary) output
- 1,140 direct jobs & $46.4 million in wages
- 636 secondary jobs & $22.1 million in wages
- $8.7 million in tax revenues to state and local governments
- TOTAL DOLLAR IMPACT: $304.9 million*

*Including wages and tax revenues

**Direct & secondary contribution to Santa Cruz County:**

- 9.8% of total jobs
- 8.9% of total wages
- 23.3% of total output

For every 100 jobs in maquiladora export-related sector an additional 56 jobs are generated in the local economy through ripple effects; every one dollar in direct wages earned in export-related activities and spent locally generates an additional $0.48 in wages, while every one dollar in output (sales) generates an additional $0.47 in additional output in local economy.

About 15 manufacturing and 20 service providing industries were identified as being related to exports to the maquiladora sector in Sonora. In the context of Ambos Nogales, Arizona's Nogales shows comparative advantage in service providing sectors. The largest quantities of various components and materials used in maquiladora operations are being supplied by companies outside Santa Cruz County.

# Introduction

## *Understanding foundations in order to move forward*

With expanding NAFTA trade, increasing economic globalization, and rising significance of border location, the identity of the Nogales, Arizona, community has been profoundly challenged. For the last three decades Nogales grapples with questions like: What role does Nogales play in this increasing economic relationship between Arizona and Sonora, and within the entire North American Free Trade Agreement (NAFTA) region at large? But most of all, the question arises as to how to capitalize on all those developments – increasing trade and global connectivity – to enhance the community's growth while improving the quality of life. Those who remember Nogales 30 years ago must admit that the city and its surrounding areas have experienced tremendous physical development. Statistical data, however, consistently indicate that the city and county lag behind the national and state's growth trends suggesting an intricate combination of local and global factors at play.

## *Purpose of this analysis*

The purpose of this analysis is to provide quantitative measures of Nogales/Santa Cruz County economy in the context of U.S.-Mexico trade relationships. More specifically, the objective is to identify and provide measures of existing bi-national crossborder linkages and uncover those areas where the Nogales community could participate more actively and take advantage of its geographical location.

The focus of the analysis is on the fresh produce industry and maquiladora related trade. These activities constitute the core of bi-national trade related economy. The fresh produce industry developed around a long tradition of importation of fresh produce from Mexico's states of Sonora and Sinaloa; maquiladora related trade activities are an outgrowth of the expansion of a production-sharing model, known in Mexico as the maquiladora sector since the mid-1960s.

## *Specific objectives of the study are*

- Identify what economic activities comprise the "fresh produce industry" in Nogales/Santa Cruz County;
- Identify what activities in Nogales/Santa Cruz County are related to the maquiladora sector in Nogales, Sonora;
- Identify contribution of each activity to local economy in terms of direct jobs, wages, output and tax revenues;
- Estimate secondary impacts on local economy through local purchases of goods and services by businesses and their employees;
- Analyze existing linkages and identify missing links in supply chain;
- Provide industry's perspective on improvements with focus on supply chain and workforce.

### *Methodology*

To accomplish the stated objectives, a combination of approaches were applied that included a detailed analysis of statistical data such as imports and exports through the Nogales Border Port of Entries (BPOE); interviews with industry representatives and administrators of agencies involved with trade and border crossings; collection of additional information from members of the Fresh Produce Association of Americas (FPAA) and Asociacion de Maquiladoras de Sonora, AC via on-line surveys; estimation of economic impacts by means of input-output model of Santa Cruz County, and a review of relevant literature. Where deemed necessary a more detailed explanation of methodology is provided in endnotes.

# Nogales' fresh produce industry: Impact on the Santa Cruz County economy

## Fresh produce industry combines several economic activities

For the purpose of this analysis, fresh produce "industry" is defined as those economic activities that are directly involved in importation, warehousing and distribution of Mexican fresh produce to U.S. and Canadian markets. In terms of the North American Industry Classification System (NAICS), fresh produce industry encompasses: Fresh fruit & vegetable merchant wholesales (NAICS 424); Agents and brokers engaged in wholesaling (NAICS 425); Truck transportation (NAICS 484); Support activities for transportation including freight forwarders and customs brokers (NAICS 488), and Warehousing & storage (NAICS 493).[1] These activities are referred to as the fresh produce industry's "primary activities," and the new money that these activities bring into the local economy comprises the "primary source of income" associated with fresh produce industry's activities.

A number of other activities are also closely related to the fresh produce industry. These activities are referred to as the fresh produce industry's "associated activities." They generate additional money that is brought into the local economy from outside, such as payroll and operational expenses for federal employees with Customs and Border Protection (CBP) at border crossings, collection of truck crossing fees by the Arizona Department of Transportation (ADOT)that are shared with County and City government, and sale of diesel fuel for transportation from Nogales' warehouses to final destinations. These income sources are referred to as fresh produce industry's "associated income sources." [2]

## Direct contribution to Santa Cruz County: jobs, wages and output

### *Fresh produce industry attracts $436.7 million to Santa Cruz County*

Direct monetary contribution of fresh produce industry to the local economy includes: (a) commission fees to shippers/distributors and sales brokers; (b) commission fees to U.S. customs brokers, and (c) transportation fee for trucking services from the border to warehouses. Combined, these three primary economic activities bring an estimated $305 million annually in the local economy.[3] When output in warehouses and storage facilities is added, [4] the primary activities directly contribute to local economy \$329.8 million[5] (Table 1).

The associated activities bring another \$106.8 million; thus, the total direct monetary contribution is \$436.7 million.[6] However, not all that is being earned in Santa Cruz County is being spent in the local economy. When adjusted for leakage,[7] the direct output in Santa Cruz County is \$303.4 million (referred to as "adjusted direct output" in Table 1).[8]

**Table 1. Direct economic contribution of fresh produce industry in Santa Cruz County**

| Activity | Output | Out of County leakage | Adjusted direct output | Direct jobs | Direct wages |
|---|---|---|---|---|---|
| **Primary activities** | **\$ million** | **%** | **\$ million** | | **\$ million** |
| **Shipping/distribution/sale brokerage** | 272.8 | 17.2 | 225.9 | 1,739 | 110.3 |
| **Custom brokerage/freight forwarding** | 14.1 | 0.4 | 14.0 | 165 | 5.7 |
| **Truck transportation to warehouses** | 18.2 | 7.7 | 16.8 | 167 | 7.2 |
| **Warehousing & storage** | 24.8 | 0.0 | 24.8 | 293 | 12.8 |
| **Total primary activities** | 329.8 | | 281.5 | 2,364 | 136.1 |
| | | | | | |
| **Associated activities/income sources** | | | | | |
| **Gas stations** | 100.0 | 85.0 | 15.0 | 209 | 4.3 |
| **Truck permits (Local government)** | 3.0 | 0.0 | 3.0 | 44 | 2.6 |
| **Border inspection (CBP)** | 3.8 | 0 | 3.8 | 27 | 3.4 |
| **Total associated activities** | 106.8 | | 21.8 | 280 | 10.3 |
| | | | | | |
| **Fresh produce direct impact** | **436.7** | | **303.4** | **2,644** | **146.4** |

Source: Estimates of "Output" are based on interviews with industry representatives and adjusted with IMPLAN data for Santa Cruz County; "Leakage," "Direct jobs" and "Direct wages" from IMPLAN model.[9]

### *Fresh produce industry provides jobs for 2,644 persons in Santa Cruz County*

The majority of jobs (1,739) are directly engaged with shipping/distribution/sale brokerage activity; close to 300 work in warehousing and storage facilities, more than 160 each in customs brokerage and local transportation services.[10] More than 200 jobs in local gas stations are associated with fuel sales to trucking companies moving the produce to final markets; an additional 44 local government job and 27 federal government jobs[11] can be directly associated with inspection/facilitation of fresh produce truck border crossings. As summarized in Table 1, the direct job impact in the County is 2,644 jobs.

### *Fresh produce industry contributes \$146.4 million in direct wages in Santa Cruz County*

Shipper/distributor/sales brokerage fees are the major source of labor compensation associated with fresh produce industry, contributing \$110.3 million to local wages. Compared to the County's average, salaries and wages are the highest in the fresh produce industry, although the work tends to be seasonal for the majority employed in shipping, warehousing and distribution activity.[12]

Customs brokerage, freight forwarding, local transportation services and warehousing together contribute another 25.7 million. Federal employees (CBP) contribute $3.4 million in wages, while gas stations reap another $4.3 million. Together, the direct wage impact is $146.4 million annually (Table 1).

***Fresh produce industry directly contributes 23.2% to Santa Cruz County's gross regional product (output), provides jobs for 14.6% of all non-farm employees and accounts for 19.1% of total wages in the County (Table 2).***

**Table 2. Direct economic impact of fresh produce industry as % of Santa Cruz County's jobs, wages and output**

| Activity | Direct jobs | Direct wages | Adjusted Direct Output |
|---|---|---|---|
| | | $ million | $ million |
| **Santa Cruz County total** | 18,051 | 766.1 | 1,305.3 |
| **Fresh produce direct impact** | 2,644 | 146.4 | 303.4 |
| **Fresh produce share of the County** | **14.6%** | **19.1%** | **23.2%** |

Source: Data from IMPLAN model. "Adjusted direct output" is what is re-spent in the local economy.

***Fresh produce industry generates higher output per employee when compared to the average for Santa Cruz County***

Output and earnings per employee are higher than the County's average (Table 3).

**Table 3. Direct economic contribution per employee**

| Activity | Output* per employee | Adjusted direct output** per employee | Direct wages per employee |
|---|---|---|---|
| | $ | $ | $ |
| **Fresh produce industry** | 165,154 | 114,732 | 55,383 |
| **Santa Cruz County average** | **72,311** | **72,311** | **42,443** |

*Gross output for fresh produce industry; ** Output adjusted for leakages.

Source: IMPLAN.

However, the primary activities have pronounced seasonal character. Therefore, despite being a significant source of jobs and wages, the seasonal nature of the industry results in a generally high unemployment rate for the county.

## Secondary impacts of fresh produce industry on the Santa Cruz County economy

As already mentioned, not all that has been earned in Santa Cruz County stays in the County's economy; businesses purchase goods and services from other market areas either because they cannot find them here or because they are offered at a lower price and/or better quality elsewhere.[13] Also, some employees live outside the County and thus take their earnings and spending elsewhere. Due to these leakages, the money that stays in the County is referred to as the "adjusted output," and this figure of $303.4 million is used in connection with IMPLAN model to estimate secondary impacts (jobs, wages and output), including tax revenues to local and state governments.

Secondary economic impacts are generated as businesses purchase goods and services from other local businesses and thus support additional jobs and generate additional wages and output in the local economy.[14] Additional secondary impacts are generated as employees spend direct and indirect wages locally.[15]

**Table 4. Fresh produce industry: Secondary economic impacts in Santa Cruz County**

| **Activity**/Source of income | **Secondary jobs** | **Secondary wages** | **Secondary output** |
|---|---|---|---|
| | | **$ million** | **$ million** |
| **Shipping/distribution/sales brokerage** | 1,066 | 33.9 | 105.8 |
| **Customs brokerage/freight forwarding** | 77 | 2.1 | 7.1 |
| **Truck transportation to warehouses** | 85 | 2.9 | 8.3 |
| **Warehousing & storage** | 62 | 1.9 | 4.1 |
| **Truck permits (Local Government)** | 10 | 0.3 | 1.0 |
| **Border inspection (CBP)** | 13 | 0.4 | 1.4 |
| **Gas stations** | 63 | 2.2 | 6.6 |
| **Total secondary impacts** | **1,376** | **43.6** | **134.3** |

Source: IMPLAN model of Santa Cruz County.

As shown in Table 4, fresh produce industry generates 1,376 secondary jobs and $43.6 million in additional wages in Santa Cruz County through purchases of goods and services from local businesses.

It also generates another $134.3 million in additional output in Santa Cruz County through purchases of goods and services from local businesses.

## Total economic impact of fresh produce industry

***More than 4,000 jobs and $190.1 million in wages in Santa Cruz County are supported directly and indirectly by fresh produce industry.***

The total monetary impact (Table 5) on the County's economy is $437.7 million (including wages and tax revenue impact to state and local governments.) Note, as explained earlier, the direct monetary "contribution" of the fresh produce industry is larger,[16] but due to leakages to other regions, a portion of direct and secondary impacts accrues outside of Santa Cruz County (within and outside Arizona).

**Table 5. Fresh produce industry: Direct and secondary impacts in Santa Cruz County**

| Impact | Jobs | Wages | Output |
|---|---|---|---|
| | | **$ million** | **$ million** |
| **Direct impact** | 2,644 | 146.4 | 303.4 |
| **Secondary impact*** | 1,376 | 43.6 | 134.3 |
| **Total impact** | 4,020 | 190.1 | 437.7 |
| | | | |
| **Share of Santa Cruz County total** | 22.3% | 24.8% | 33.5% |
| | | | |
| **Composite multipliers** | **1.520** | **1.298** | **1.443** |

*Combined indirect and induced impacts.

Source: IMPLAN model of Santa Cruz County.

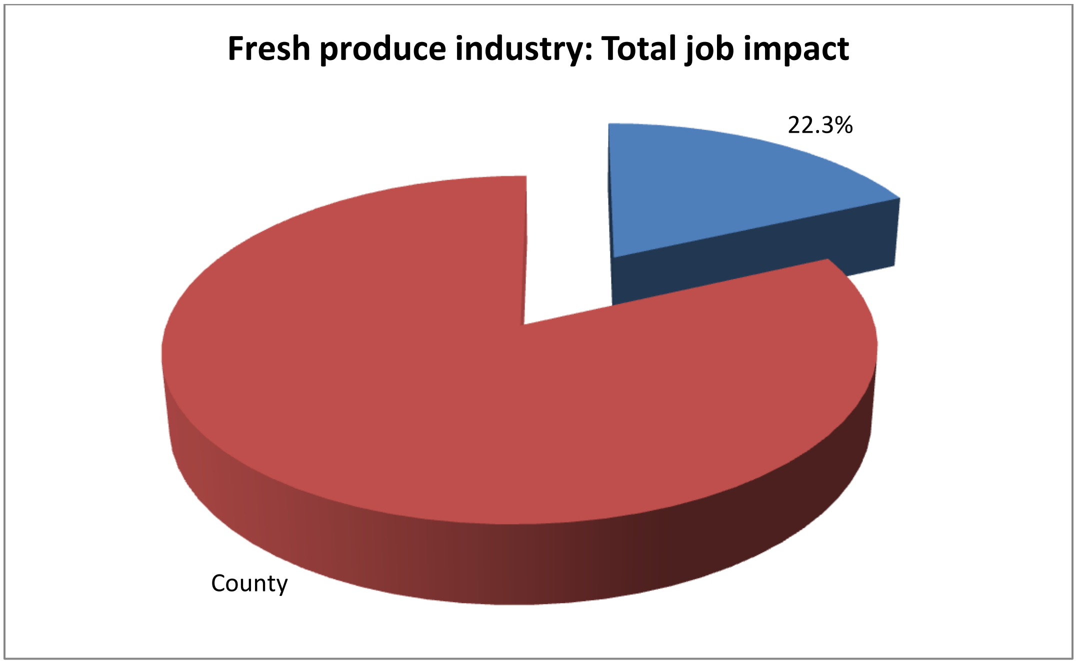
## Composite multipliers

Multipliers are computed as ratios of total and direct impact. The fresh produce industry exhibits the following aggregate multipliers: job multiplier of 1.520; wage multiplier of 1.298, and output multiplier of 1.443 (Table 5). This means, that:

- Every 100 direct jobs in fresh produce industry generate an additional 52 jobs elsewhere in the County (job multiplier of 1.520);[17]
- Every $1 in wages to direct employees in fresh produce industry generates an additional 29 cents in wages in other sectors (wage multiplier of 1.298);[18]
- Every $1 in direct output in fresh produce industry generates an additional 44 cents in other economic sectors in Santa Cruz County (output multiplier of 1.443).[19]

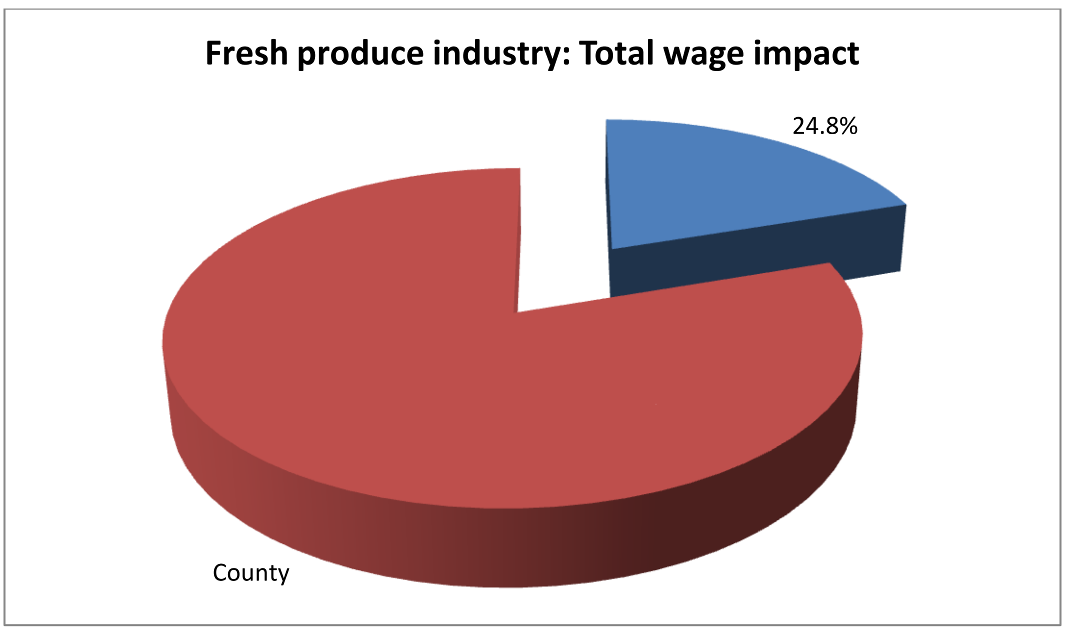
Combining direct impact and multiplier effects, fresh produce industry accounts for 22.3% of county's jobs, 24.8% of total wages, and 33.5% of the total output in Santa Cruz County (Table 5; Figures 1, 2 and 3).

**Figure 1. Fresh produce industry's job impact as share of the County's total employment**



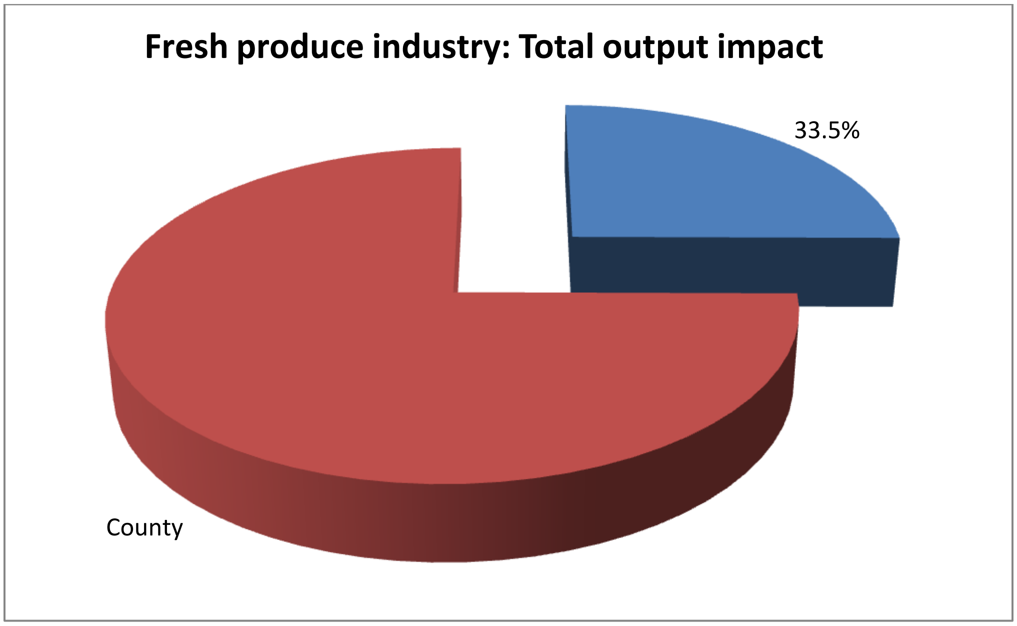

Source: IMPLAN model for Santa Cruz County.

**Figure 2. Fresh produce industry's wage impact as a share of the County's total wages**




Source: IMPLAN model for Santa Cruz County.

**Figure 3. Fresh produce industry's output impact as a share of the County's total output**




Source: IMPLAN model for Santa Cruz County.

## Tax revenue impact

The fresh produce industry generates an estimated $44.9 million annually in state and local taxes (Table 6). *Note: tax revenue impact is included in the total output.*

**Table 6. State and local tax revenue impact**

| Source | Total |
|---|---|
| | $ millions |
| **Employee compensation** | 0.7 |
| **Indirect business tax** | 40.9 |
| **Households** | 2.7 |
| **Corporations** | 0.7 |
| **Total** | **44.9** |

Source: IMPLAN.

Additional taxes are generated through fuel usage, an estimated $1.2 million, and these taxes, like those above, are shared with the State. Thus, total tax revenue to state and local governments exceeds $45 million annually.[20]

## Comparison with 1997 study

Direct comparison of the present economic impact analysis with the 1997 study, *Fresh Produce Industry in Nogales, Arizona: An Economic and Revenue Impact Analysis*,[21] is not possible due to differences in scope of each study as well as different input-output models that were used in estimation procedure. The 1997 study focused on the statewide economic impact, while the current study is limited to economic impacts on the economy of Santa Cruz County. Accordingly, two different models were used. Because a state economy is always more complex than a county economy, statewide multipliers are larger, thus the overall economic impact is always larger for the state than a county.

However, some components of direct economic impact can be compared as shown in (Table 7):

- Dollar value of imported fresh produce through Nogales District has more than doubled (an increase of 153.9%, unadjusted for inflation).
- U.S. customs brokerage commission has doubled (100.9% increase, unadjusted for inflation).
- Shipper/distributor/sales brokerage commission almost doubled (91.4% increase, unadjusted for inflation).
- Trucking fees for transportation from the border to warehouses seem to have been lower than in 1997, although this might be a result of slightly different methodologies between two studies. It is also possible that this reflects changes in the collection of fees, e.g., each time per crossing, or on a prepaid annual basis.
- Border inspection fees in 1997 included some of import duties that were eventually phased out under NAFTA. Current fees include truck crossing fees and fees for Mexican overweight trucks.
- U.S. import duties for Mexican fresh produce were eliminated under NAFTA, and therefore are zero.

**Table 7. Comparison with the 1997 study**

| | 1996 | 2011 | Change |
|---|---|---|---|
| | $ millions | $ millions | % |
| **Custom value of imported produce** | 1,000.0 | 2,539.2 | 153.9 |
| **U.S. import duties** | 33.9 | n.a. | n.a. |
| **U.S. customs brokerage fee** | 7.0 | 14.1 | 100.9 |
| **Border inspection charges (DOT, USDA)*** | 8.2 | 6.0 | (26.3) |
| **Shipper/distributor commission**** | 142.5 | 272.8 | 91.4 |
| **Trucking fees** | 22.5 | 18.2 | (19.2) |
| **Total** | **1,214.1** | **2,850.3** | **134.8** |

*In 2011, includes only fees collected by ADOT from truck permits.

** Includes sales brokerage commission.

Source: Fresh produce industry in Nogales, Arizona: Impacts of a transborder production complex on economy of Arizona. University of Arizona, 1997.

Due to a difference in scope (state vs. county), employment and wage impacts cannot be directly compared. The total job impact estimated in 1997 of close to 11,000 jobs and $244 million in wages applied to entire Arizona, and also included impacts of Arizona's exports of agricultural machinery, seeds and fertilizers to Mexico. An estimated impact of Mexican growers spending in Arizona was also included in 1997 study. Due to a focus on Santa Cruz County in the current study, other sources of potential monetary impacts such as Arizona's export of goods and services were not applicable.

## Linkages with local businesses/economic sectors

### *Shipping/Distribution/Sale brokerage activity impacts 128 industry sectors out of a total of 420 in Santa Cruz County*

Out of the industry sectors that are directly involved with importation and distribution of fresh produce (as shown earlier in Table 1), the shipping/distribution/sales brokerage activity[22] is the most important in terms of direct dollar impact value. It contributes directly an estimated $225.9 million annually to local economy.[23]

Of the $225.9 million, $30.6 million[24] is spent on goods and service purchased from other local businesses, generating indirect economic impacts. The top 20 local business activities associated with the shipping/distribution activity include the following sectors[25] (Table 8a).

**Table 8a. Top 20 local sectors used by shipping/distribution/sales brokerage activity**

| |
|---|
| 1. Wholesale trade businesses |
| 2. Warehousing and storage |
| 3. Real estate establishments |
| 4. Couriers and messengers |
| 5. Business support services |
| 6. Cable and other subscription programming |
| 7. Accounting, tax preparation, bookkeeping, and payroll services |
| 8. Management, scientific, and technical consulting services |
| 9. Transportation and support activities for transportation |
| 10. Monetary authorities and depository credit intermediation activities |
| 11. Nondepository credit intermediation and related activities |
| 12. Telecommunications |
| 13. Legal services |
| 14. Automotive equipment rental and leasing |
| 15. Lessors of nonfinancial intangible assets |
| 16. Food services and drinking places |
| 17. US Postal Service |
| 18. Newspaper publishers |
| 19. Transport by truck |
| 20. Services to buildings and dwellings |

Source: IMPLAN model of Santa Cruz County

The above 20 sectors supply about 80% of the local inputs of (mostly) services used by the industry. In addition, another 20 local sectors (Table 8b) benefit from sales of goods and services to fresh produce industry which range between $100,000 and $350,000 annually.

**Table 8b. Additional 20 local sectors used by shipping/distribution/sales brokerage activity**

| |
|---|
| 21. Office administrative services |
| 22. Automotive repair and maintenance, except car washes |
| 23. State and local government electric utilities |
| 24. Other state and local government enterprises |
| 25. Commercial and industrial machinery and equipment repair and maintenance |
| 26. Other personal services |
| 27. Securities, commodity contracts, investments, and related activities |
| 28. Management of companies and enterprises |
| 29. Commercial and industrial machinery and equipment rental and leasing |
| 30. Maintenance and repair construction of nonresidential structures |
| 31. Motion picture and video industries |
| 32. Independent artists, writers, and performers |
| 33. Other support services |
| 34. Directory, mailing list, and other publishers |
| 35. All other miscellaneous professional, scientific, and technical services |
| 36. Civic, social, professional, and similar organizations |
| 37. Insurance agencies, brokerages, and related activities |
| 38. Architectural, engineering, and related services |
| 39. Radio and television broadcasting |
| 40. Cut and sew apparel contractors |

Source: IMPLAN model of Santa Cruz County.

An additional 88 sectors also benefit from locally spend expenditures with sales below $100,000 annually.

## What's missing in the Nogales region? – the industry's perspective

### *Workforce*

The existing workforce skills in both Nogales, Arizona and Nogales, Sonora (a.k.a. Ambos Nogales) are not adequate in support of the fresh produce industry, although they seem more satisfactory on the Arizona side (Table 9).

**Table 9. Satisfaction with workforce skills in Ambos Nogales**

| | Nogales, Arizona | Nogales, Sonora |
|---|---|---|
| **Yes** | 13 | 9 |
| **Somewhat** | 10 | 10 |
| **No** | 1 | 2 |
| **No answer** | 13 | 16 |
| **Total sample** | 37 | 37 |

Source: Survey of FPAA members, March 2013.[26]

There is a general perception that the region is lacking higher education level workforce. Specifically, there is a need for higher technical and computer skills that are necessary for operations in high-tech globalized markets. Continuing education and personnel training are viewed as possible solutions to increasing the skill/knowledge levels (Table 10).

**Table 10. Needed workforce improvements**

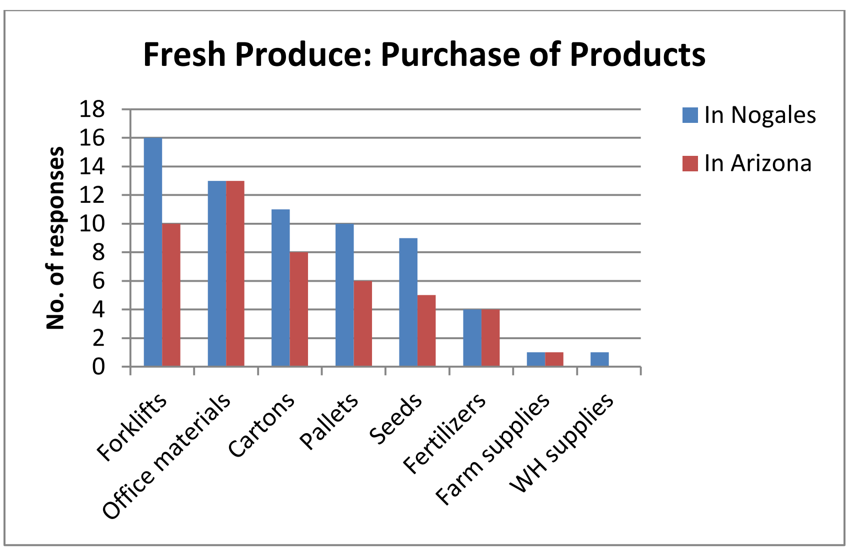
| Skill/knowledge | No. of responses | % of multiple responses |
|---|---|---|
| Higher education | 4 | 25.0 |
| Better computer skills | 3 | 18.8 |
| Better technical skills | 3 | 18.8 |
| Continuing education | 1 | 6.3 |
| English speaking | 1 | 6.3 |
| Trained personnel | 1 | 6.3 |
| Improved customer service | 1 | 6.3 |
| Incentive to enter workforce | 1 | 6.3 |
| Writing skills | 1 | 6.3 |
| **Total responses** | **16** | **100.0** |

Source: Survey of FPAA members, March 2013.

### *Local supply of goods*

The top seven products used by fresh produce industry include forklifts, office materials, cartons, pallets, seeds, fertilizers, and farm supply. While none of the industry actually exists in Nogales, the supplies are available through wholesale businesses. These supplies are also purchased directly from producers/distributors in the rest of Arizona (Figure 4).

**Figure 4. Supply of top inputs to fresh produce industry**




Source: Survey of FPAA members, March 2013.

So, the next step would be to see if there are reasonable conditions for targeting specific businesses to locate (re-locate) in Santa Cruz County, although the proximity of Phoenix and Tucson areas makes such efforts less likely.

### *Local supply of services*

As already demonstrated by the results of the IMPLAN model for Santa Cruz County, the fresh produce industry is associated with a number of local service providers, such as trucking services, repacking, customs and sales brokerage, warehousing, and food safety. Table 11 shows responses by industry representatives.

**Table 11. Supply of services**

| Service | In Nogales/Santa Cruz County | Elsewhere in Arizona |
|---|---|---|
| **Trucking** | 19 | 1 |
| **Repacking** | 17 | |
| **Customs and sales brokerage** | 15 | |
| **Warehousing** | 13 | |
| **Food safety** | 10 | 1 |
| **Accounting** | 1 | |
| **Liability insurance** | 1 | |
| **Payroll and administration** | 1 | |
| **Sale brokerage** | 1 | |
| **Labeling** | | 1 |
| **Health insurance** | | 1 |
| **Web design** | | 1 |
| **Total number of responses** | **78** | **5** |

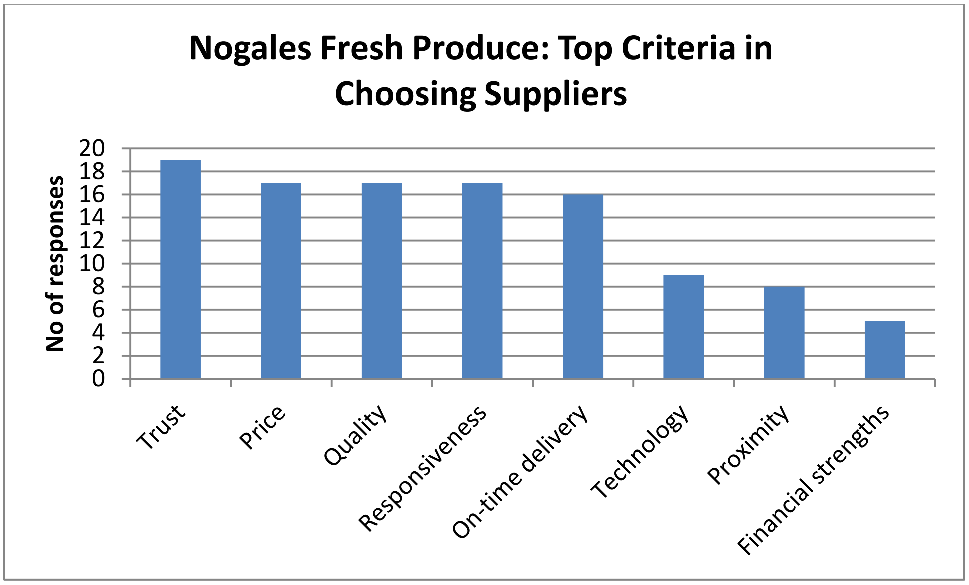
Source: Survey of FPAA members, March 2013

When asked about existing gaps in supply of goods and services, there were no responses. It seems as if the industry relies on established channels of supply through company representation, i.e. wholesale channels. Based on the IMPLAN model it is clear that a number of producers, such as forklift manufacturers do not exist in the County, yet the survey suggested that forklifts were supplied locally, most likely through the wholesale sector.

### *Trust plays important role in choosing suppliers of goods and services*

Partly due to its nature and partly due to business linkages developed over a long time, trust plays an important role in Nogales' fresh produce industry. It is crucial for the relationship between grower and shipper/distributor, but also in relationships with businesses that supply goods and services (Figure 5).

**Figure 5. Top criteria for choosing suppliers of goods and services**



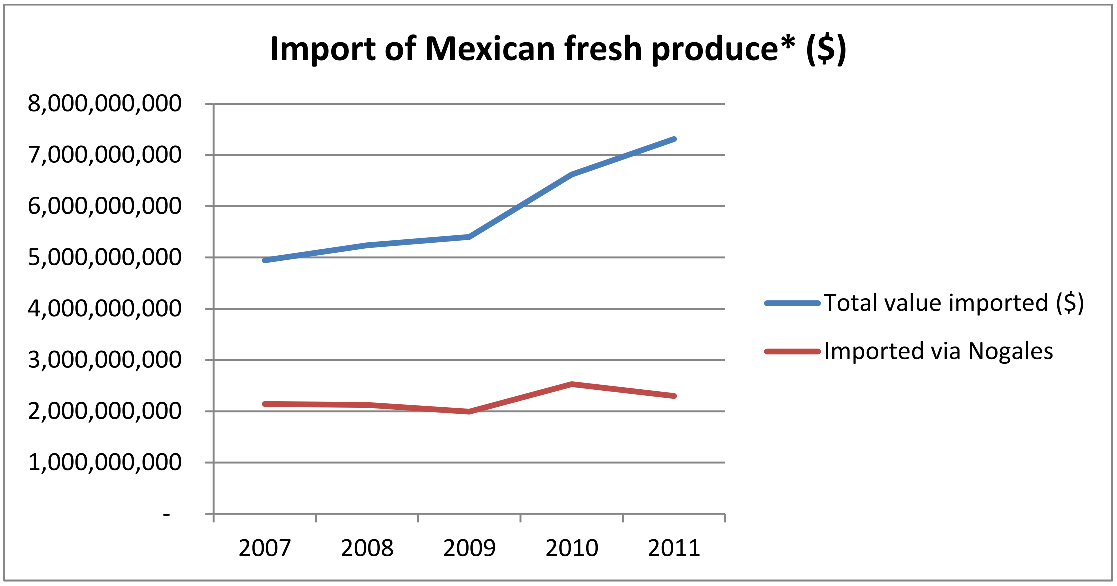

Source: Survey of FPAA members, March 2013. Survey was mailed to 70 members, of which 36 responded, although not to all questions. The main purpose was to obtain qualitative information (issues, ideas and perspectives), and not necessarily a statistical significance

## Challenges

### Declining share of total U.S. imports of fresh produce

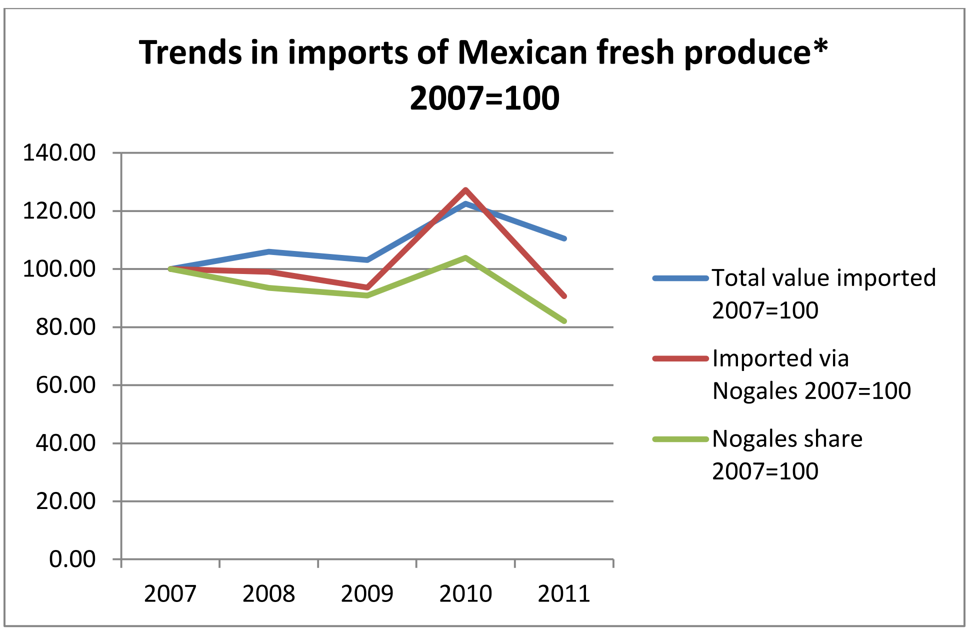
The value of imported Mexican agricultural products (via Nogales District) doubled between 2002 and 2011, from $1.26 billion in 2002 to $2.53 billion in 2011. However, import of Mexican fresh produce through Arizona BPOE was lagging behind a general trend.  For example, the value of all U.S. imports of agricultural products from Mexico increased 110% compared to 38% increase through Nogales District in the same period 2004-2011. Figures 6 and 7 compare Nogales District with imports through all BPOEs.

**Figure 6. Value ($) of imported fresh produce from Mexico**




Source: BTS RITA, Commodity by BPOE.

**Figure 7. Trends in imports of Mexican fresh produce, 2007 = 100**




Source: BTS RITA, Commodity by BPOE.

## Competition with Texas border ports of entry

Border crossings of fresh fruits and vegetables at Hidalgo (including McAllen and Pharr), Texas have increased relative to those at Nogales, Arizona in recent years. Bureau of Transportation Statistics does not disaggregate products beyond the categories "Fresh Vegetables and Roots" and "Fresh Fruits and Nuts" so the composition of products in these categories is not known. Nonetheless, general trends indicate growth in both weight and value of fresh products crossing at Hidalgo relative to Nogales, particularly beginning in 2009.

Focusing on the value of fresh vegetables (Table 12), Nogales' share of crossing declined every year until 2012. Yet while the share has declined, the general trend in value of fresh vegetables crossing at Nogales has increased.

**Table 12. Fresh vegetables and roots, annual value ($ in millions)**

| Year | Nogales, AZ | Hidalgo, TX | 2-Port Total | Nogales % Total |
|---|---|---|---|---|
| **2007** | 1,546 | 275 | 1,822 | 84.9% |
| **2008** | 1,540 | 314 | 1,854 | 83.1% |
| **2009** | 1,314 | 370 | 1,683 | 78.0% |
| **2010** | 1,637 | 542 | 2,179 | 75.1% |
| **2011** | 1,600 | 712 | 2,311 | 69.2% |
| **2012** | 1,797 | 704 | 2,501 | 71.8% |

Source: BTS RITA.

The share of value of fresh fruits and nuts crossing at Nogales has also declined (Table 13). General trends in value of fresh fruits are less pronounced than for fresh vegetables. Hidalgo crossings have roughly doubled in the six-year period while Nogales crossings have increased by about one third.

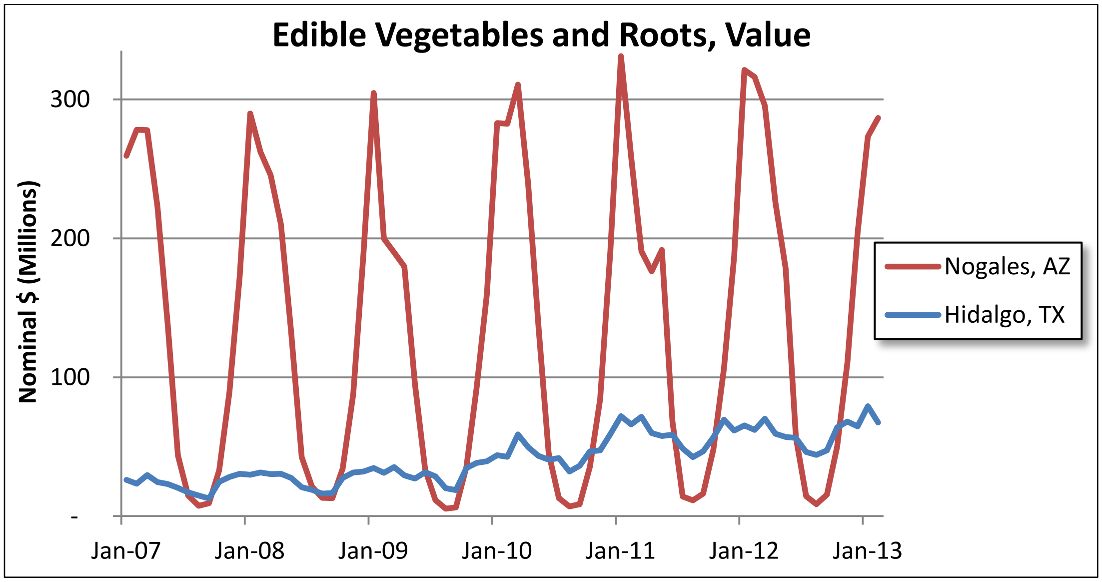
**Table 13. Fresh fruits and nuts, annual value ($ in millions)**

| Year | Nogales, AZ | Hidalgo, TX | 2-Port Total | Nogales % Total |
|---|---|---|---|---|
| **2007** | 598 | 552 | 1,150 | 52.0% |
| **2008** | 585 | 618 | 1,202 | 48.6% |
| **2009** | 676 | 686 | 1,363 | 49.6% |
| **2010** | 896 | 813 | 1,708 | 52.4% |
| **2011** | 697 | 1,018 | 1,715 | 40.7% |
| **2012** | 810 | 1,107 | 1,916 | 42.3% |

Source: BTS RITA.

Monthly crossing statistics indicate less seasonality in crossings at Hidalgo (Figure 8). By contrast, crossings at Nogales peak around $300 million from January through March but fall below $15 million from July through September. Less seasonality in crossings at Hidalgo reflects a diverse range of production regions in Mexico providing products throughout the year.

**Figure 8. Monthly shipments through Nogales, Arizona and Hidalgo, Texas**




Source: BTS RITA.

One implication of the prominent seasonality of Nogales crossings is that the share of crossings from January through March is much higher than the annual share. In Table 14, Nogales' share has declined from about 90% to about 80% during the January-March shipping period. But the nominal value of fresh vegetables crossing at both ports has grown appreciably.

**Table 14. Value of shipments January-March ($ in millions)**

| Year | Hidalgo, TX | Nogales, AZ | Nogales Share |
|---|---|---|---|
| **2007** | 26 | 272 | 91.2% |
| **2008** | 31 | 266 | 89.7% |
| **2009** | 34 | 231 | 87.3% |
| **2010** | 48 | 292 | 85.8% |
| **2011** | 70 | 260 | 78.8% |
| **2012** | 66 | 311 | 82.5% |

Source: BTS RITA.

## Competition with Florida tomato growers

Tomatoes comprise about 23% of the total fresh produce imports through the Nogales District.[27] The continuing dispute with Florida tomato growers could have profound impact on the Nogales fresh produce industry.[28]

# Nogales/Santa Cruz County: Maquiladora related economy

Since its early beginnings in 1965 in Nogales, Sonora, the maquiladora sector has become the major engine of economic growth in the state of Sonora. Although during the last three decades a significant growth of industry has taken place in the rest of Sonora (Hemosillo, Empalme, Guaymas and Ciudad Obregon), the border city of Nogales is still the leading location with the largest number of maquiladoras in Sonora.

Several past studies[29] showed significant and positive economic impacts of the maquiladora sector on the economy of Arizona. The Majority[30] of Arizona's exports of manufacturing products and services to Mexico are linked to the maquiladora sector and thus account directly and indirectly for a large number of jobs in Arizona.

### *Major changes in the maquiladora sector since 1990s*[31]

- Increased competition of low-cost labor in China caused some of the older assembly plants to close in Nogales, Sonora and relocate oversees;
- Increasing utilization of technical and engineering skills as the sector transforms from simple assembly lines to more complex production;
- "New maquiladora model" that utilizes Sonora's skilled workforce causes some Arizona companies to move technical and engineering departments south of the border (reducing those in Arizona), but allowing Arizona's companies to stay globally competitive;
- Emerging aerospace sector in the Empalme-Guaymas area with links to Arizona's aerospace industry;
- Expanding automotive industry in the Hermosillo region;
- Stronger linkages between maquiladora industry and institutions of higher education in Sonora supported by both federal and state funding with a purpose to better match education and industry needs.[32]

## Maquiladora sector in Nogales, Sonora

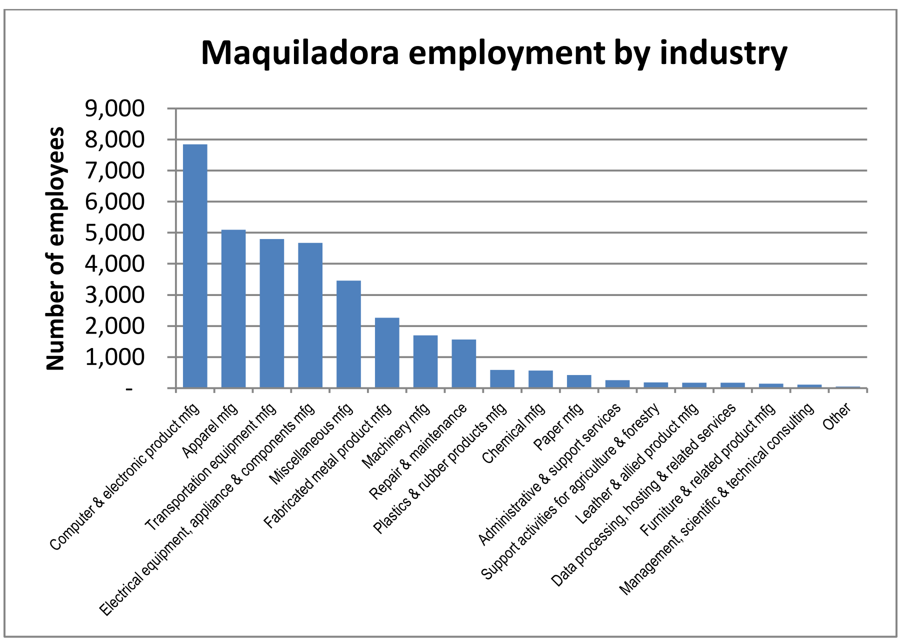
At present, the maquiladora sector in Nogales, Sonora is about 34,000 jobs strong and has more than 100 plants.[33] Three industry sectors account for more than 50% of all employment: computer and electronic product manufacturing (23.0%), apparel manufacturing (15.0%), and transportation equipment manufacturing, including components and parts for aerospace industry (14.1%). When electrical equipment and components manufacturing (13.7%), and miscellaneous manufacturing (10.2%) are added, these five industry sectors account for 76% of the maquiladora sector (Table 15, Figure 10).[34] Other sectors represented include fabricated metal product manufacturing; machinery manufacturing, repair of equipment; plastics and rubber products manufacturing, chemical manufacturing, and paper products manufacturing. The additional ten sectors are represented with employment of less than 1% of the total.

**Table 15. Maquiladora sector in Nogales, Sonora: Employment by industry**

| NAICS code | Description | Number of employees | % share |
|---|---|---|---|
| ***334*** | Computer & electronic product mfg | 7,843 | **23.0** |
| ***315*** | Apparel manufacturing | 5,100 | **15.0** |
| ***336*** | Transportation equipment manufacturing | 4,802 | **14.1** |
| ***335*** | Electrical equipment, appliance & components mfg | 4,675 | **13.7** |
| ***339*** | Miscellaneous manufacturing | 3,463 | **10.2** |
| ***332*** | Fabricated metal product manufacturing | 2,269 | **6.7** |
| ***333*** | Machinery manufacturing | 1,699 | **5.0** |
| ***811*** | Repair & maintenance | 1,565 | **4.6** |
| ***326*** | Plastics & rubber products manufacturing | 583 | **1.7** |
| ***325*** | Chemical manufacturing | 565 | **1.7** |
| ***322*** | Paper manufacturing | 423 | **1.2** |
| ***561*** | Administrative & support services | 261 | **0.8** |
| ***115*** | Support activities for agriculture & forestry | 185 | **0.5** |
| ***316*** | Leather & allied product manufacturing | 175 | **0.5** |
| ***518*** | Data processing, hosting & related services | 175 | **0.5** |
| ***337*** | Furniture & related product manufacturing | 138 | **0.4** |
| ***541*** | Professional, scientific & technical services | 111 | **0.3** |
| | Other | 46 | **0.1** |
| | **Total** | **34,074** | **100.0** |

Source: NAICS designation by authors based on *Index Nogales*. Asociación de Maquiladoras de Sonora, A.C. Included are both members and non-members. Employment figures are the average of minimum and maximum employment levels.

**Figure 10. Maquiladora employment in Nogales, Sonora by industry sector**



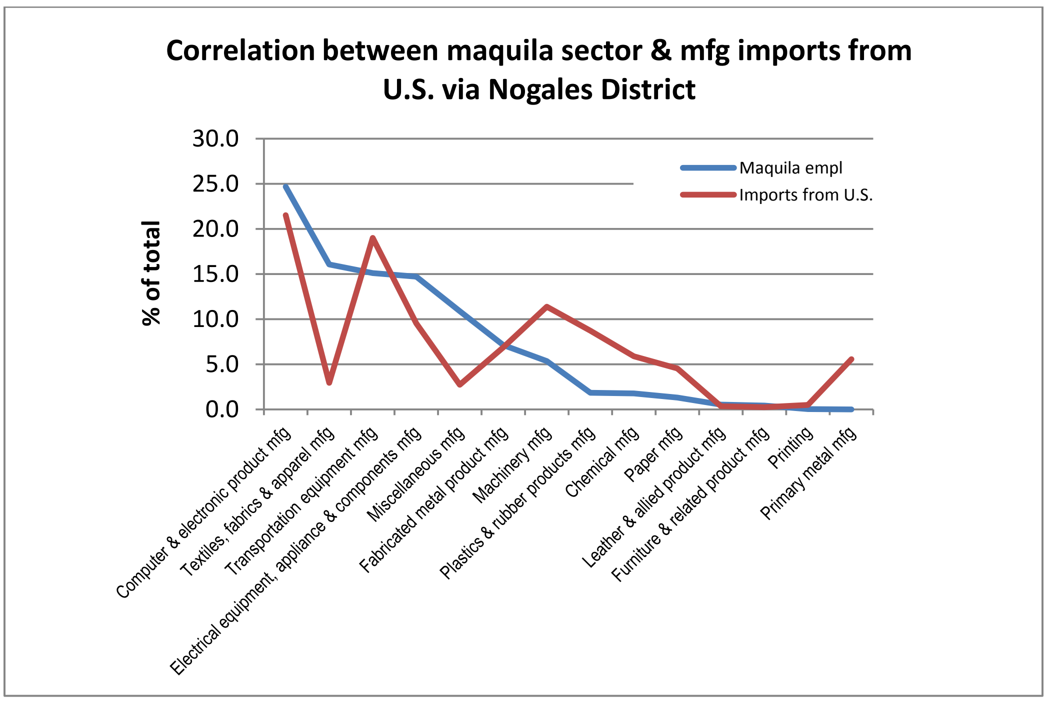

Source: NAICS designation by authors based on *Index Nogales*. Asociación de Maquiladoras de Sonora, A.C. Included are both members and non-members. Employment figures are the average of minimum and maximum employment levels.

It is interesting to note that the apparel industry, which employs more than 5,000 workers and ranks second in terms of its share of total employment (15%), is principally related to manufacturing production of various textile (mostly disposable) garments and other accessories used in hospitals. The third ranking transportation equipment manufacturing with more than 4,800 workers (14.1% of total) encompasses manufacturing of various components for auto industry (from harnesses, wiring components, and cables, to brakes and radios), and a growing production and assembly of various products for aerospace industry. Most of the remaining sectors have a long tradition in Nogales, Sonora, such as fabricated metal products, machinery manufacturing, plastic and rubber products, leather and allied products, and other. Administrative and support services, and management and technical consulting are natural outgrowth of the industry's needs.

## Maquiladora sector and import/export trade of manufacturing commodities

On average,[35] about $6.6 billion worth of manufacturing products head south to Mexico and another $10 billion worth of manufacturing products from Mexico crosses the Arizona border in the opposite direction. Figure 11 compares the composition of the Nogales maquiladora sector by industry type with the composition of imported manufacturing products from U.S. through the Nogales District.

**Figure 11. Imports from U.S. and maquiladora sector in Nogales, Sonora**

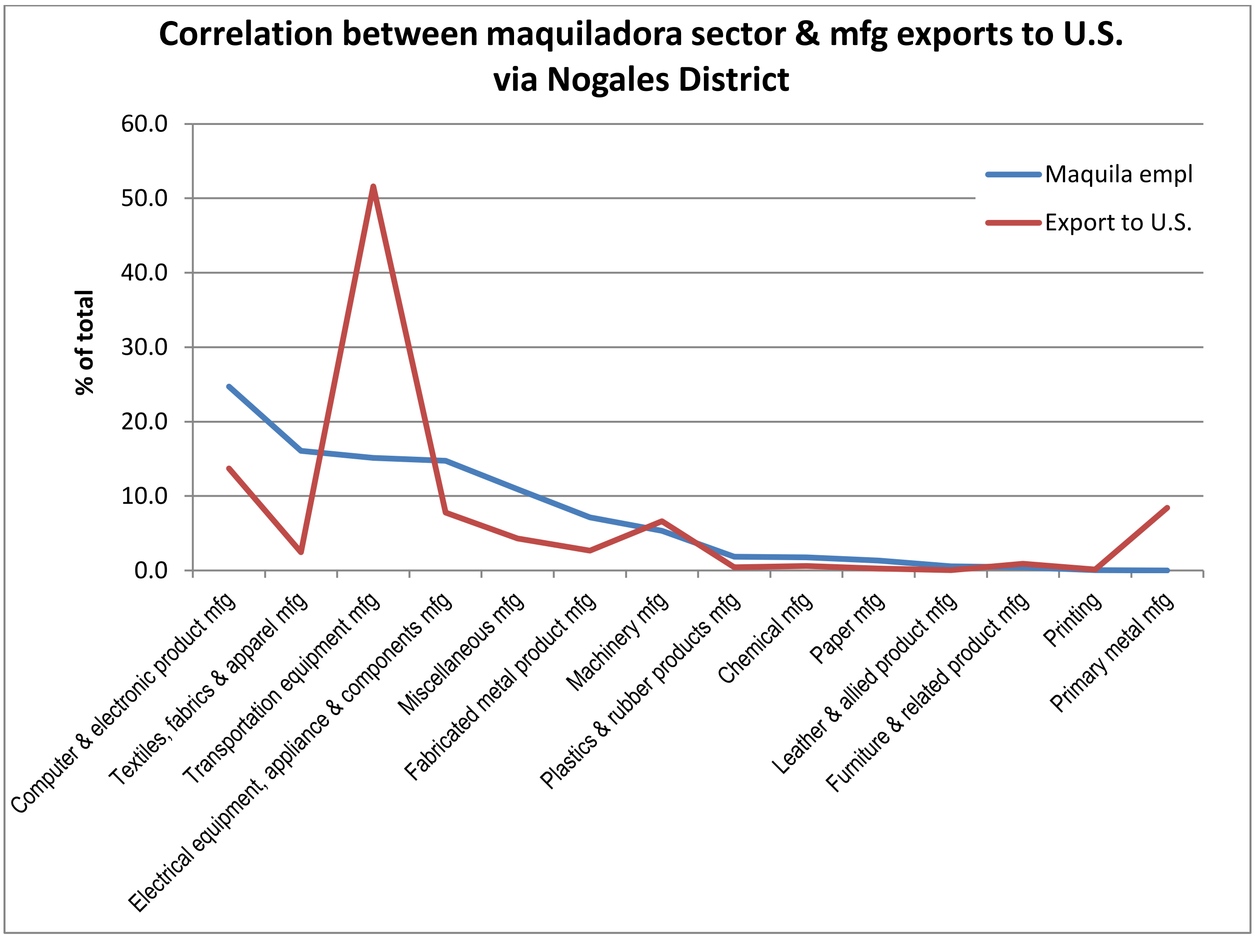



Source: Authors based on *Index Nogales*, Associación de Maquiladoras de Sonora, A.C.; for trade (3-year average) from USTRADEONLINE.

Although not a perfect match, there is a visible correlation between types of imported manufacturing products and industrial composition of maquiladoras, most notably in computer and electronic product manufacturing. The relatively low import value of textile and apparel components, on the other side, suggests that the inputs are either of Mexican origin, or imported from other countries, most likely China.[36] Transportation products are to a great extent shipped to Sonora's main automotive industry which is concentrated in the Hermosillo region. Other imports from U.S., like machinery, plastics and rubber products, and some primary metal manufacturing reflect shipments to markets other than maquiladora sector.

Figure 12 shows the correlation between maquiladora industry in Nogales and export of Mexican manufactured products to U.S. through the Nogales District.

**Figure 12. Export to U.S. and maquiladora sector in Nogales, Sonora**




Source: Authors on *Index Nogales*, Associación de Maquiladoras de Sonora, A.C.; for trade (3-year average) from USTRADEONLINE.

Except for transportation products, the composition of exported manufactured products more closely resembles the industrial composition of the maquiladora sector. Transportation products – the big outlier —reflects the importance of Nogales BPOE for export of cars assembled in Hermosillo and shipped via Nogales to North American markets.

### *Nogales, Arizona: From "Twin plant" concept to "Near-shoring" to "Co-production" to "Regional and local supply chain" to "Cross-border industry cluster"*

The "Twin plant" concept of the mid-1960s envisioned a production model in border cities along the U.S.-Mexico border where the U.S.-based company (parent) would keep the production and distribution operations, while only assembly operations would be performed south of the border. With few exceptions in metropolitan regions of San Diego-Tijuana and El Paso-Ciudad Juarez, the twin plant concept never fully realized. Instead, it was mainly large companies from non-border states that established their maquiladora operations in Mexico. Most U.S. border cities, including Nogales, benefited mostly from the establishment of front offices and some distribution centers of out-of-state parent companies.

The development of the so-called second- and third-tier maquiladoras followed the expansion and transformation of the maquiladora sector from simple assembly to more complex production operations. Increasing demand for on-time delivery, together with more stringent border crossing procedures after 9/11 terrorist attack that affected cross-border wait times, encouraged location and relocation of suppliers closer to maquiladoras. The majority of these newer maquiladoras and maquiladora-related businesses are a mix of locally and foreign-owned operations.

## Maquiladora sector related employment in Ambos Nogales

A comparison of the maquiladora sector in Nogales, Sonora and matching industry sectors in Nogales, Arizona (Santa Cruz County) has revealed that the Nogales, Arizona industrial structure has been influenced by maquiladora activity south of the border (Table 16, Figure 13). For example, the following three sectors – computer and electronic product manufacturing (NAICS 334), transportation equipment manufacturing (NAICS 336), and electrical equipment and components manufacturing (NAICS 335) – are obviously related to the maquiladora sector south of the border.

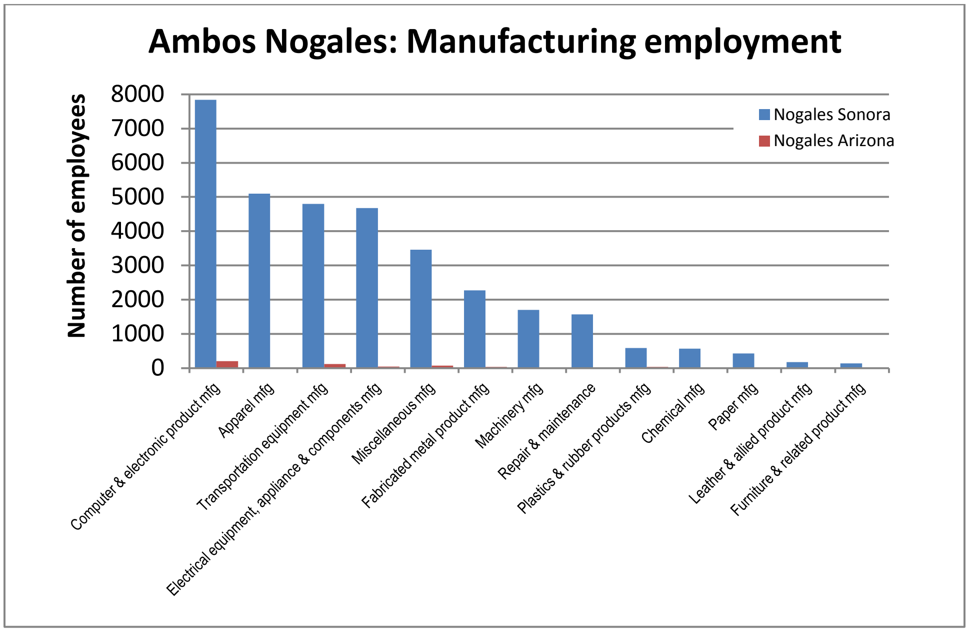
**Table 16. Ambos Nogales: Manufacturing employment by industry sector**

| NAICS | Industry sector<br>Ranked by employment in maquiladora industry in Nogales, Sonora | Nogales Sonora | Nogales Arizona |
|---|---|---|---|
| **334** | Computer & electronic product manufacturing | 7,843 | 198 |
| **315** | Apparel manufacturing | 5,100 | 0 |
| **336** | Transportation equipment manufacturing | 4,802 | 117 |
| **335** | Electrical equipment, appliance & components mfg | 4,675 | 46 |
| **339** | Miscellaneous manufacturing | 3,463 | 71 |
| **332** | Fabricated metal product manufacturing | 2,269 | 34 |
| **333** | Machinery manufacturing | 1,699 | 0 |
| **811** | Repair & maintenance | 1,565 | 14 |
| **326** | Plastics & rubber products manufacturing | 583 | 31 |
| **325** | Chemical manufacturing | 565 | 0 |
| **322** | Paper & paper products manufacturing | 423 | 0 |
| **316** | Leather & allied product manufacturing | 175 | 0 |
| **337** | Furniture & related product manufacturing | 138 | 4 |
| **323** | Printing | 13 | 7 |
| | **Total number of employees** | **33,310** | **522** |

Source: Authors based on *Index Nogales,* Asociación de Maquiladoras de Sonora, A.C. (included are both members and non-members); for Nogales, Arizona employment from IMPLAN model of Santa Cruz County.

However, as Figure 13 clearly shows, Santa Cruz County's industrial structure is far from a true "twin plant," "co-production," or "cross-border industry cluster" model. There are some objective reasons and challenges of this situation such as the mere size of Nogales, Arizona's economy and its proximity to larger metro areas of both Tucson and Phoenix. Another important factor is the fact that decisions about input of components and services are still vested in the parent company. As will be seen later, the majority of Nogales, Sonora maquiladoras are owned and operated by out-of-Arizona parent companies.

**Figure 13. Ambos Nogales: Employment in manufacturing industries related to maquiladora sector**




Source: Authors based on *Index Nogales,* Asociación de Maquiladoras de Sonora, A.C. (included are both members and non-members); for Nogales, Arizona employment from IMPLAN model of Santa Cruz County.

## Location of parent companies

Whereas the maquiladora sector has become more complex in terms of input of local and regional supply chain, the key decisions are still made by parent companies, including supply decisions.

**Table 17. Maquiladoras in Nogales, Sonora by location of parent company**

| With U.S. parent company located in: | Number of maquiladora plants | % distribution |
|---|---|---|
| **Santa Cruz County** | 22 | 20.4 |
| **Santa Cruz County & other state** | 6 | 5.6 |
| **Phoenix-Tucson metro area** | 12 | 11.1 |
| **Other Arizona** | 1 | 0.9 |
| **California** | 9 | 8.3 |
| **Other U.S. states** | 29 | 26.9 |
| **No information available** | 29 | 26.9 |
| **Total** | **108** | **100.0** |

Source: Authors based on *Index Nogales*, Asociación de Maquiladoras de Sonora, A.C.
(Both members and non-members are included).

About 20% of all maquiladoras in Nogales, Sonora are linked to parent companies across the border in Santa Cruz County, and another 5.6% have offices in Santa Cruz County and also a parent company in another state. About every 9 or 10th maquiladora (11.1%) is linked to parent company in Phoenix and Tucson metro areas. More than a third of all maquiladoras (35.2%) is owned and operated by parent companies outside Arizona (Table 17); California, Illinois and Massachusetts top the list of out-of-state parent companies.

In a survey of Sonora's maquiladoras, *The Maquiladora Industry in the Arizona-Sonora Region: Impacts and Trends*,[37] conducted in 2000, 59% reported "little or no input on purchasing decisions by the maquiladora, with final decisions made by the parent company." Only 13% at that time reported that "all purchasing decisions [were] made by the maquiladora with little or no input from the parent company." When asked about expected changes in extent of involvement in purchasing decisions, a full 54% did not expect any changes, although 37% expected increasing responsibility by maquiladoras. Thus, this remains a work in progress for economic developers: how to tap into the maquiladora sector and increase local supply of components and services.

## Locally supplied services

Table 18 provides information about types of services (and a few products) that are related to maquiladoras in Nogales by companies in both Sonora and Arizona.[38] The majority of services are supplied by companies located in Nogales, Sonora, but this may be due to nature of membership. Survey results later in the report will shed more insights on this topic.

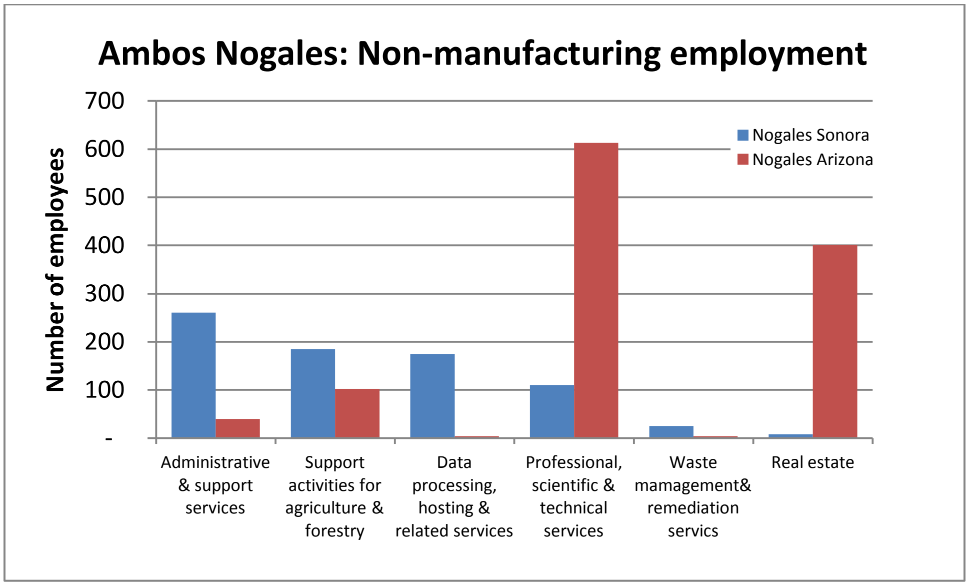
**Table 18. List of services and supplies to maquiladoras, by location**

| Maquiladora Associates by type of service | Nogales, Sonora | Nogales, Arizona | Rest of Sonora | Rest of Arizona |
|---|---|---|---|---|
| Customs brokerage | x | x | | |
| Wholesale trade | x | x | | |
| IT service, support, outsourcing, training | x | | | x |
| Temporary employment agency | x | x | | |
| Hotel & service Industry | x | x | | |
| Corrugated packaging | | | | x |
| Material handling service, sales and parts | | x | | x |
| Logistics services | | x | x | |
| Professional consultants | | | x | |
| Business, consulting, advisors | x | | | x |
| Plating, metal finishing & masking, aerospace & commercial products | | | x | |
| Medical supplies | | | | |
| Retail, wholesale & service of all General Motors products | | x | | |
| Food service, industrial kitchen equipment, rental for events | x | | | |
| Natural gas for industries | | | | |
| Warehousing services | x | | | |
| Financial services | | | | |
| Car rental services | x | | | |
| Legal services | x | | | |
| Sale & service copy & print equipment | x | | | |
| Manufacturers' representatives | | | | |
| Security services | | | x | |
| Recycle services | x | | | |
| Education (degrees, certificate programs & seminars) | x | | | |
| Training & consulting services on EHS matters | x | | | |
| Number of types of services | 14 | 7 | 4 | 4 |

Source: Authors based on *Index Nogales*, Asociación de Maquiladoras de Sonora, A.C.

In terms of services, Nogales, Arizona shows comparative advantages, especially in the area of professional services (Figure 14).

**Figure 14. Ambos Nogales: Employment in services industries related to maquiladora sector**




Source: Authors based on *Index Nogales,* Asociación de Maquiladoras de Sonora, A.C. (included are both members and non-members); for Nogales, Arizona employment from IMPLAN model of Santa Cruz County.

## Economic impact of maquiladora-related manufacturing and service industries

### Direct contribution

***Maquiladora-related exports generate 1,140 jobs directly and $46.4 million in wages in Santa Cruz County.***

Using the information contained in the IMPLAN model, about 15 manufacturing industries and 20 service industries in the Santa Cruz County economy can be identified as having direct connection with the maquiladora sector in Sonora,[39] as listed in Table 19.

**Table 19. Exporting industries in Santa Cruz County**

**Manufacturing industries**

- ✓ Totalizing fluid meters and counting devices manufacturing
- ✓ Other aircraft parts and auxiliary equipment manufacturing
- ✓ All other miscellaneous electrical equipment and component manufacturing
- ✓ Sporting and athletic goods manufacturing
- ✓ Unlaminated plastics profile shape manufacturing
- ✓ Surgical appliance and supplies manufacturing
- ✓ Other electronic component manufacturing
- ✓ Turned product and screw, nut, and bolt manufacturing
- ✓ Machine shops
- ✓ Motor vehicle parts manufacturing
- ✓ Musical instrument manufacturing
- ✓ Sign manufacturing
- ✓ Crown and closure manufacturing and metal stamping
- ✓ Other fabricated metal manufacturing
- ✓ Wood kitchen cabinet and countertop manufacturing

**Service industries**

- ✓ Transportation support services
- ✓ Transport by truck
- ✓ Retail Stores - Gasoline stations (diesel fuel)
- ✓ Automotive equipment rental and leasing
- ✓ Warehousing and storage
- ✓ Securities, commodity contracts, investments, and related activities
- ✓ Nondepository credit intermediation and related activities
- ✓ Legal services
- ✓ Monetary authorities and depository credit intermediation activities
- ✓ Management of companies and enterprises
- ✓ Architectural, engineering, and related services
- ✓ Facilities support services
- ✓ Management, scientific, and technical consulting services
- ✓ Scientific research and development services
- ✓ Commercial and industrial machinery and equipment rental and leasing
- ✓ Accounting, tax preparation, bookkeeping, and payroll services
- ✓ Data processing, hosting, ISP, web search portals and related services
- ✓ Insurance carriers
- ✓ Environmental and other technical consulting services
- ✓ Waste management and remediation services

Source: Authors based on IMPLAN model of Santa Cruz County.

Table 20 summarizes direct contribution of these sectors in terms of jobs, wages and output.[40] Direct number of jobs is 1,140 with $46.4 million in wages, and the total output is $206.8 million.

**Table 20. Direct contribution of maquiladora-related export activities**

| Export activity | % export related | Jobs | Wages $ millions | Output $ millions | Average per job |
|---|---|---|---|---|---|
| **Manufacturing** | 100.0 | 499 | 21.3 | 141.5 | 42,604 |
| **Services*** | 11.3 | 641 | 25.1 | 65.3 | 39,152 |
| **Total** | | 1,140 | 46.4 | 206.8 | 40,702 |
| **% of Santa Cruz County** | | 6.3 | 6.1 | 15.8 | 42,442 |

*Includes CBP inspection of truck crossings.
Source: Authors based on IMPLAN model of Santa Cruz County.

## Secondary impacts

### *Maquiladora-related exports generate additional 636 jobs and $22.1 million in secondary wages*

As mentioned earlier, secondary economic impacts are generated as businesses purchase goods and services from other local businesses and thus support additional jobs and generate additional wages and output in the local economy. Additional secondary impacts are generated as employees spend direct and indirect wages locally. Through these ripple effects, $98.1 million in additional output is generated in Santa Cruz County.

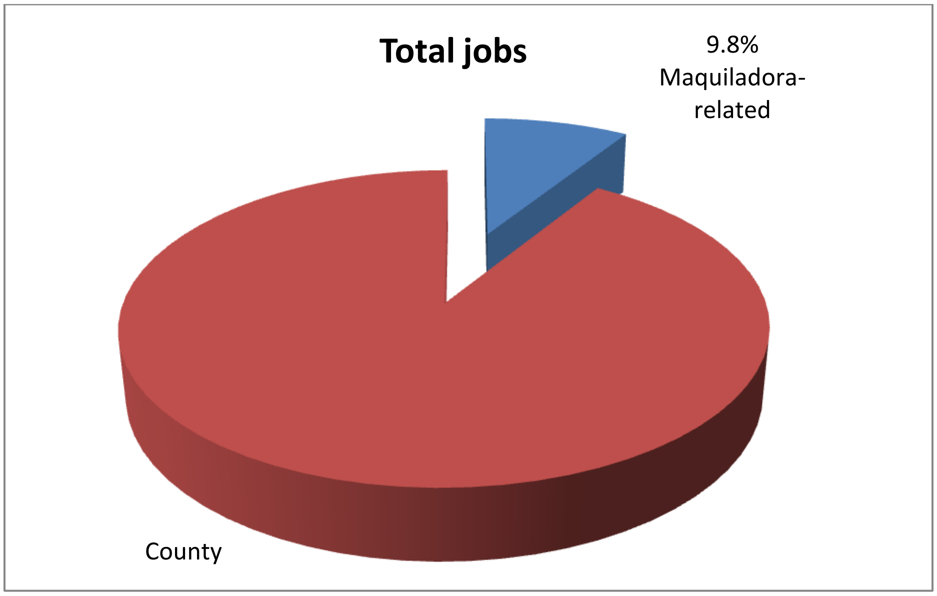
**Table 21. Direct and secondary contribution of maquiladora-related export activities***

| | Jobs | Wages $ millions | Output $ millions |
|---|---|---|---|
| **Direct** | 1,140 | 46.4 | 206.8 |
| **Secondary** | 636 | 22.1 | 98.1 |
| **Total** | 1,776 | 68.5 | 304.9 |
| **% of Santa Cruz County total** | 9.8% | 8.9% | 23.4% |
| **Composite multipliers** | **1.558** | **1.477** | **1.474** |

*Includes CBP inspection of truck crossings.
Source: IMPLAN model of Santa Cruz County.

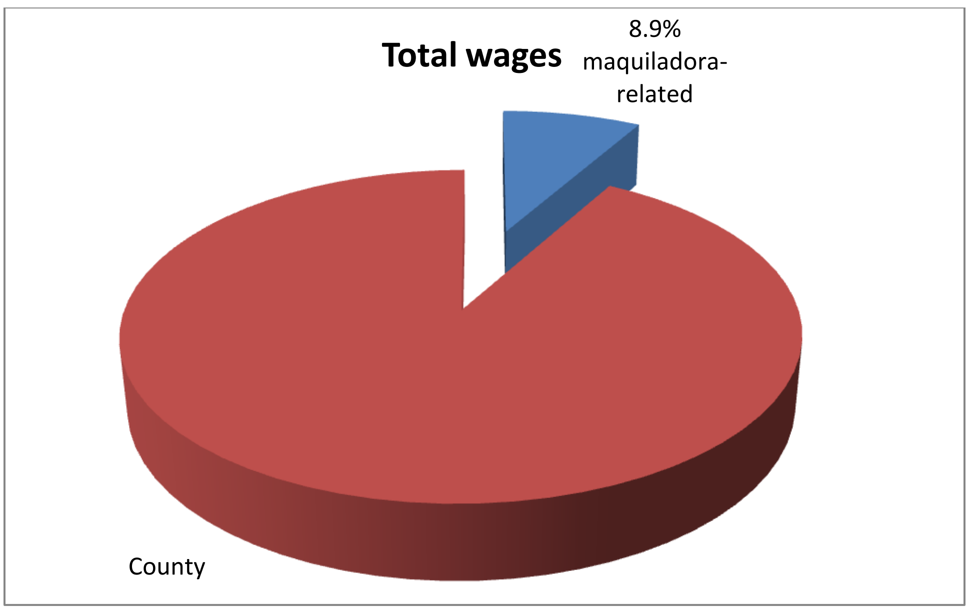
Combining direct and secondary impacts, the maquiladora-related exports generate 1,776 jobs with $68.6 million in wages. The total dollar impact is $304.9 million (Table 21). This impact accounts for 9.8% of County's jobs, 8.9% of total wages, and 23.4% of the total output in Santa Cruz County (Figures 15, 16 and 17).

**Figure 15. Maquiladora-related job impact as share of the County's total employment**



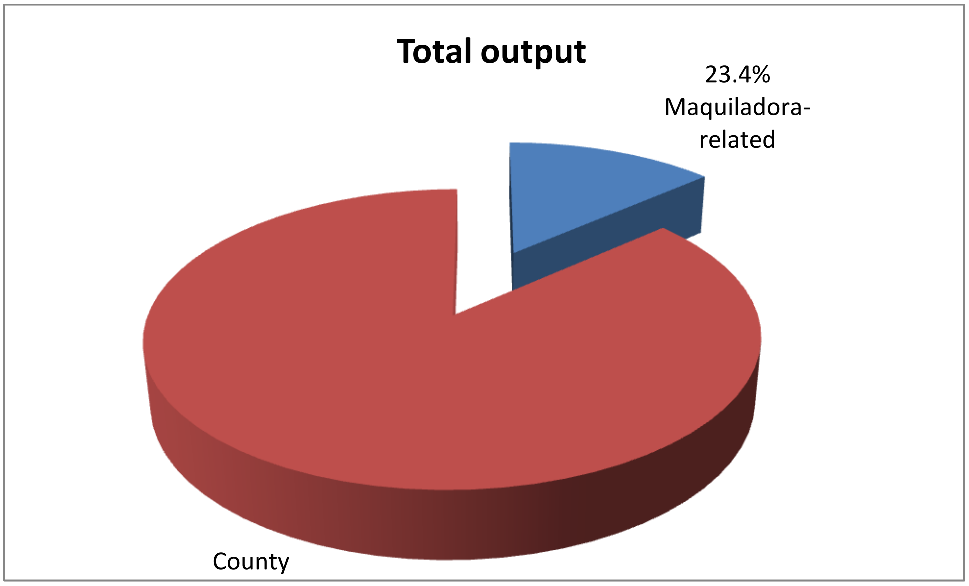

Source: IMPLAN model for Santa Cruz County.

**Figure 16. Maquiladora-related wage impact as share of the County's total wages**




Source: IMPLAN model for Santa Cruz County.

**Figure 17. Maquiladora-related job impact as share of the County's total output**




Source: IMPLAN model for Santa Cruz County.

## Composite multipliers

The maquiladora-related export activities exhibit the following composite multipliers: job multiplier of 1.558; wage multiplier of 1.477, and output multiplier of 1.473 (Table 21). This means, that:

- For every 100 jobs in export-related sector additional 56 jobs are generated in the local economy through ripple effects generating a total job impact of 1,776 jobs.
- Every one dollar in direct wages earned in export-related activities and spent locally generates an additional $0.48 in wages. The total wage impact is $68.5 million.
- Every one dollar in output (sales) generates an additional $0.47 in additional output in local economy. The total output, which includes wages and tax revenues, is $304.9 million.

## Tax revenue impact of maquiladora-related exports

The maquiladora related economic activities generate an estimated $8.7 million annually in tax revenues. Table 22 shows combined tax revenue impact to state and local governments. [41]

**Table 22. State and local tax revenue from maquiladora-related activities**

| Source | Total |
|---|---|
| | $ millions |
| **Employee compensation** | 0.1 |
| **Indirect business tax** | 7.2 |
| **Households** | 1.1 |
| **Corporations** | 0.3 |
| **Total** | **8.7** |

Source: IMPLAN model of Santa Cruz County.

Note that tax revenues, as well as wage impacts are included in the output.

## Industry perspective on regional issues: workforce, location, supply chain, and border crossings

An anonymous on-line survey of maquiladora plants in Nogales, Sonora, and their suppliers was conducted during period March-May 2013.[42] Because of relatively small samples, the analysis will focus on qualitative information instead on statistical significance of information obtained through surveys.

## Maquiladoras[43]

### Workforce

The "availability of appropriately skilled workforce in Sonora" is listed as the number one need for the success of the Nogales maquiladora operations. In contrast, "availability of appropriately skilled workforce in Arizona" has not been seen among top needs. It is less important than "availability of local supplies," "transportation infrastructure," or "border crossing time." More than 80% of respondents indicated satisfaction with Sonoran workforce skills (as it relates to their maquiladora operation), compared to 54% satisfaction with workforce skills on the Arizona side. About half of respondents provided comments to the question about major workforce gaps (Table 23), and about the same number offered suggestions regarding training activity (Table 24).

**Table 23. What are major workforce gaps today?**

| |
|---|
| Quality, in general |
| Quality management |
| Difficulty finding technically skilled workforce such as machine mechanics, electro mechanics, automation technicians, packaging engineers |
| Inadequate education attainment, in general |
| Inadequate critical thinking and problem solving skills |
| Lack of skilled machinists |
| Lack of programmers |
| Difficulty finding skilled warehouse workers |
| Inadequate knowledge of legal and supply chain process |
| Unfamiliarity with world class concepts and techniques (in automotive sector) |
| Inadequate administration skills |

Source: Survey of maquiladoras in Nogales, Sonora, 2013.

When specifically asked about improvement needs in Nogales, Sonora, and Nogales, Arizona, there are some common needs, such as raising educational levels of workforce, including proficiency in English language. There are also some differences between the two regions. The Nogales, Sonora, needs include more technical training, training in automation, and high-tech engineering training. The Nogales, Arizona, needs are more in terms of management skills, especially so-called lean management; security, and logistics, and computer skills. Improvements were also recommended in two areas where Nogales, Arizona, has a long tradition, but needs to catch up with new developments: warehousing/distribution and customer services. The recommendations include improvements in both technical and customer skills (Table 24).

**Table 24. What training activities are needed for improvement of the quality of workforce?**

| Activity |
|---|
| Quality control |
| Lean manufacturing |
| Quality management tools (six sigma tools) |
| Packing engineering |
| Leadership and management |
| Programming |
| CNC operators and programmers |
| Molding operators |
| Tool makers |
| Mold repair |
| Security |
| Computer skills |
| Project management |
| Production equipment maintenance |
| Infrastructure equipment maintenance |

Source: Survey of maquiladoras in Nogales, Sonora, 2013.

## Importance of location: advantages, challenges and frustrations

In evaluating the importance of location in choosing Nogales, Sonora, the respondents most frequently mentioned low cost of labor in combination with availability of labor force (31% of respondents). Next is the proximity to the U.S., in general or U.S. markets, in particular (26% of respondents). Safety in comparison with other border towns was mentioned as second advantage of locating in Nogales, Sonora. Proximity to Phoenix, Arizona and southern California were also mentioned among second ranked reasons. Favorable business environment and support from authorities were mentioned as a second or third reason.

When asked "How important was the supply base in Arizona in deciding on a maquiladora operation," the responses suggested that for a half of surveyed maquiladoras it was either very important (26%) or somewhat important (21%). For the rest it was either unimportant or irrelevant.

Proximity to Nogales, Arizona, has been important for 56% of respondents. This corresponds with a high number of maquiladoras in the sample who have either parent company or a front office in Nogales, Arizona. Proximity to Tucson does not seem to have any relevance; 44% specifically responded that neither Nogales nor Tucson was relevant for the operation of their maquiladora plants in Nogales, Sonora.

Two top frustrations related to location are border crossings, and more specifically, wait times to cross the border (33% of "number one" frustrations), and limited supply of skilled workforce (33% of "number one" frustrations). Security threats follow in distance (2 responses), with one response each for limited education, supplier location and inadequate government services (water, public transportation).

Further list of frustrations includes lack of competitive industrial parks in Nogales, Sonora; the nearest international airport being located as far as Tucson; lack of carrier services; and difficulty finding local suppliers.

## Supply chain assessment

Price and quality are top criteria in selecting current suppliers; quality was number one criterion for 44% of respondents, and price was number one criterion for 39%. When their first- and second-place importance is added, these two criteria influenced the selection of suppliers in more than 70% of the cases. On-time delivery comes as the third most important criterion, followed by domestic content laws (laws under which components and products can take advantage of NAFTA when re-exported to the U.S. or Canada). In terms of their importance, these primary selection criteria have not changed since the last study in 2000, *The Maquiladora industry in the Arizona-Sonora region: Impacts and trends*[44] (Table 25). On the other hand, domestic content and proximity seem to play a relatively more important role than a decade ago.

**Table 25. Importance of supplier selection criteria, comparison with 2000 study**

| Criterion | Rank 2013 | Rank 2000 |
|---|---|---|
| Quality | 1 | 1 |
| Price | 2 | 2 |
| On-time delivery | 3 | 3 |
| Domestic content | 4 | 6 |
| Financial strength | 5 | 8 |
| Proximity | 6 | 9 |
| Engineering capability | 7 | 7 |
| Responsiveness | 8 | 4 |
| Technology | 9 | 5 |

Source: Survey 2013; V. Smith-Daniels and V. Pavlakovich-Kochi, *The Maquiladora industry in the Arizona-Sonora region: Impacts and trends,* 2000.

When asked if there were any products or services which were currently not supplied by Nogales, Arizona firms, but for which maquiladoras had an interest in locating there, about half of them answered the question and provided the following ideas (Table 26).

**Table 26. Which products and services, currently not supplied by Nogales, Arizona firms are of interest to maquiladoras? (Industry sector in parentheses)**

| Product/Service |
|---|
| Industrial supplies (*e.g.*, for pens and recycle bags) |
| Packaging supplies (*e.g.*, for mechanical assembly; sensors and harnesses for aerospace) |
| Paints and plastics for molding (*e.g.*, for mechanical assembly; sensors and harnesses for aerospace) |
| Plastics and fabric (*e.g.*, for matrix printers) |
| Cable manufacturing products (*e.g.*, for electronic cables and connectors) |
| Electronic components (*e.g.*, for manufacturing of semiconductor products) |
| Cross docking operations (*e.g.*, for manufacturing of electronic equipment) |
| Crossing carriers (*e.g.*, for manufacturing of electronic equipment) |
| Plastic molded/metal stamped products (*e.g.*, for electronic products for automotive industry) |
| Glass formation (*e.g.*, for water meters manufacturing) |
| Metal formation and plating (*e.g.*, for water meters manufacturing) |

Source: Survey of maquiladoras in Nogales, Sonora, 2013.

The same question was posted regarding supply of products and services in Nogales, Sonora. As shown in Table 27, a majority of products and services of interest to maquiladoras are the same as those in Table 26. This suggests that from the perspective of maquiladora operations it does not matter whether suppliers are located either north or south of the border in the Ambos Nogales region, assuming that the main criteria for the selection of suppliers – as indicated earlier -- are met.

**Table 27. Which products and services, currently not supplied by Nogales, Sonora firms are of interest to maquiladoras? (Industry sector in parentheses)**

| Product/Service |
|---|
| Plastics and fabric (*e.g.*, for matrix printers) |
| Cable manufacturing products (*e.g.*, for electronic cables and connectors) |
| Electronic components (*e.g.*, for manufacturing of semiconductor products) |
| Cross docking operations (*e.g.*, for manufacturing of electronic equipment) |
| Crossing carriers (*e.g.*, for manufacturing of electronic equipment) |
| Plastic molded/metal stamped products (*e.g.*, for electronic products for automotive industry) |
| Molding resins (*e.g.*, for water meters manufacturing) |
| Service providers (*e.g.*, for pens and recycle bags) |
| Certified compressor technicians (*e.g.*, for pens and recycle bags) |
| Titanium and stainless steel machine shop (*e.g.*, for mechanical assembly; sensors and harnesses for aerospace) |

Source: Survey of maquiladoras in Nogales, Sonora, 2013.

The currently missing products and services (as listed in Tables 26 and 27) present opportunities for suppliers to locate in the Ambos Nogales region.

## Assessment of most important needs to the success of maquiladora operations

Survey participants were asked to evaluate eight common needs in terms of their importance to the success of the Nogales, Sonora, maquiladora operation. As shown in Table 28, availability of appropriately skilled workforce in Sonora; availability of local suppliers in Sonora; and proximity to U.S. suppliers in Arizona were selected as the top three needs.

**Table 28. How important are the following needs to the success of maquiladora operations in Nogales, Sonora**

| Need | Rank (Average score) |
|---|---|
| Availability of appropriately skilled workforce in Sonora | 1 (8.61) |
| Availability of local suppliers in Sonora | 2 (5.89) |
| Proximity to U.S. suppliers in Arizona | 3 (5.72) |
| Border crossing times | 4 (5.28) |
| Transportation infrastructure | 5 (4.94) |
| Government support | 6 (4.33) |
| Availability of appropriately skilled workforce in Arizona | 7 (4.22) |
| Availability of industrial parks in Nogales, Sonora | 8 (4.11) |

Source: Survey of maquiladoras in Nogales, Sonora, 2013.

Clearly, the availability of "appropriately skilled" labor force in Nogales, Sonora, is the key need. This is more refined in the assessment of capabilities for long term competitiveness.

## Assessment of capabilities for long term competitiveness

Low cost production is seen as the most important need for a long-term competitiveness of Nogales maquiladora operations, followed by on-time delivery and availability of high skilled workers (Table 29). Table 29 ranks the most important capabilities-based competitive factors. Direct comparison with 2000 study is not feasible due to different methodologies applied in questionnaire.[45]

**Table 29. Importance of capabilities-based needs for long-term competitiveness of maquiladora operations**

| Capability-based need | Rank (Average score) |
|---|---|
| Low-cost production | 1 (7.84) |
| On-time delivery | 2 (7.21) |
| Availability of highly skilled workforce | 3 (6.53) |
| Supplier relations | 4 (5.84) |
| More efficient border crossing procedure | 5 (5.11) |
| On-sight design/development | 6 (4.95) |
| Transportation networks | 7 (3.21) |
| Proximity of U.S. corporate office | 8 (2.79) |

Source: Survey of maquiladoras in Nogales, Sonora, 2013.

However, despite differences in methodologies, it can be concluded that the locational advantage of low cost labor inputs in Sonora remains critical to the competitive position of maquiladora operations.[46] The difference is that while in the past it was primarily low cost of low skill labor, today it increasingly includes low cost of skilled and highly skilled labor force. This is reflected in "availability of highly skilled workforce" being listed as the third most important factor. On-time delivery remains high among capabilities-based competitive factors. Supplier relations seem to become relatively more important than a decade ago. So does the importance of efficiency of border crossings which reflects a drastic change in border crossing procedures following terrorist attacks of 9/11/2001.

## Maquiladora suppliers[47]

Participants in the survey included suppliers of varied products and services, from fabricated metal and aerospace manufacturing to distributors of electrical and electronic materials, to shelter services and warehousing, distribution and customs brokerage. The majority of these companies were located in Nogales, Arizona, and of those about 40% also had their business located in Nogales, Sonora.

### Workforce

The "availability of appropriately skilled workforce" in both Sonora and Arizona is listed as the number one need for the success of suppliers of products and services to maquiladoras. When asked if the workforce in the region had adequate skills for their operation, 54% responded positively with respect to Nogales, Arizona, and 50% with respect to Nogales, Sonora. About a half of survey participants identified gaps in current workforce situation ranging from specific type of skilled worker to generally "skilled" (Table 30). One respondent commented on the challenge of attracting and keeping qualified people in services industry (such as accountants) in competition with Arizona's metro area.

**Table 30. What are major workforce gaps today in goods/services supply companies?**

| Type of workers needed |
|---|
| Skilled outside sales people |
| Accountants |
| Customs brokers |
| Qualified and experienced engineers |
| Machine operations technicians |
| Electrical-mechanical assembly operators |
| Skilled laborers |

Source: Survey of Nogales, Sonora maquiladora suppliers, 2013.

The list of suggested training activities for improvement of the quality of workforce in the supplying companies adds a few specific items to the training activities suggested by maquiladoras earlier (Table 31).

**Table 31. What training activities are needed for improvement of the quality of workforce in goods/services supply companies?**

| Activity |
|---|
| **Manufacturer product knowledge training to sales people** |
| **Use company supported programs to allow employees to take courses and improve knowledge/skills** |
| **Effective supervision** |
| **Training programs for technicians in machining area** |
| **On-job training** |
| **Customer service training** |
| **Training in lean manufacturing** |
| **Trade schools** |

Source: Survey of Nogales, Sonora maquiladora suppliers, 2013.

Recommendations with respect to Nogales, Sonora include: training toward generally more workforce with industrial knowledge, hands-on experience, more CNC technicians and maintenance technicians. There was also a recommendation for bi-national permits that would allow skilled workers to work on both sides of the border, as needed. Suggested improvements related to the workforce in Nogales, Arizona, included training especially in customs and warehousing, industrial knowledge, and programing. Establishment of trade schools was seen as one venue to reduce a gap between industry needs and current workforce situation.

## Locational advantages for suppliers of maquiladora operations

The survey participants listed a number of advantages of being located in the Ambos Nogales region, as shown in Table 32. While some represent general advantages of border location, others indicate a competitive advantage of Ambos Nogales region in comparison with other border cities.

**Table 32. Advantages of the Ambos Nogales location**

| No. 1 advantage | No. 2 advantage | No. 3 advantage |
|---|---|---|
| Proximity to warehousing | Transportation network | Security (compared to other border cities) |
| Proximity to U.S. | Ease of travel | Connectivity |
| Proximity to border | Workforce availability | Large number of manufacturing facilities |
| Foreign trade zone | Border distance | Proximity of UPS, FedEx and other major freighters |
| Proximity to customers | Proximity to Tucson airport | |
| Border crossing times | | |

Source: Survey of Nogales, Sonora maquiladora suppliers, 2013.

## Assessment of most important needs to the success of maquiladora suppliers

Survey participants were asked to evaluate nine relevant needs in terms of their importance to the success of their business as supplier to Nogales, Sonora, maquiladoras. As shown in Table 33, availability of appropriately skilled workforce in Sonora is considered the most important. The availability of appropriately skilled workforce in Arizona, together with transportation infrastructure seems to be more important to suppliers, while border crossing times are ranked number 4 by maquiladoras and their suppliers.

**Table 33. How important are the following needs to the success of your business with the maquiladora operations?**

| Need | Rank (Average score) |
|---|---|
| Availability of appropriately skilled workforce in Sonora | 1 (8.13) |
| Availability of appropriately skilled workforce in Arizona | 2 (6.60) |
| Transportation infrastructure | 3 (6.27) |
| Border crossing times | 4 (6.00) |
| Proximity to U.S. supplies in Arizona | 5 (5.93) |
| Availability of local supplies in Sonora | 6 (5.60) |
| Availability of industrial parks in Sonora | 7 (5.60) |
| Foreign trade zone in Nogales, Arizona | 8 (4.93) |
| Government support | 9 (4.07) |

Source: Survey of Nogales, Sonora maquiladora suppliers, 2013.

## Assessment of capabilities for long term competitiveness

While the low cost production was identified as the most important capability-based factor for long-term competitiveness of maquiladora operations, for their suppliers it is the on-time delivery of inputs (Table 34).

**Table 34. Importance of capabilities-based needs for long-term competitiveness of maquiladora suppliers**

| Capability-based need | Rank (Average score) |
|---|---|
| On-time delivery of inputs | 1 (6.81) |
| Low cost production | 2 (6.75) |
| Supplier relations | 3 (6.69) |
| On-site design and development capabilities | 4 (5.63) |
| Availability of highly skilled workforce | 5 (5.50) |
| More efficient border crossing procedures | 6 (5.50) |
| Transportation networks | 7 (3.75) |
| Proximity to U.S. corporate office | 8 (3.19) |

Source: Survey of Nogales, Sonora maquiladora suppliers, 2013.

## Needs to improve logistic capabilities of maquiladora operations and their suppliers

Finally, both groups of survey participants provided their perspectives on the needs for improvement of logistic capabilities.

**Table 35. What are the most important needs to improve logistic capabilities of maquiladoras and their suppliers?**

| Need | Maquiladoras Rank (average score) | Suppliers Rank (average score) |
|---|---|---|
| Availability of affordable/appropriate warehousing space in Nogales, Arizona | 1 (6.53) | 2 (6.93) |
| Availability of local suppliers | 2 (6.29) | 5 (5.00) |
| Inbound/outbound expedited freight shipments | 3 (5.88) | 6 (4.80) |
| Efficient border crossings | 4 (5.88) | 1 (7.53) |
| Availability of third-party logistics firms to coordinate supply chain | 5 (5.71) | 3 (6.13) |
| Availability of cross-border transportation carriers | 6 (5.47) | 7 (4.20) |
| Supply chain security | 7 (4.82) | 8 (3.73) |
| Supply of appropriate workforce | 8 (3.41) | 4 (5.13) |

Source: Survey of Nogales, Sonora maquiladora suppliers, 2013.

## Summary: Foundations and opportunities

The focus of this analysis has been on fresh produce industry and cross-border trade relations with Sonora's maquiladora sector. The analysis produced measures of their current importance for the local economy in terms of job creation, local wages, tax revenues and total output. Their importance was further evaluated in terms of multipliers as a measure of the ripple effect and their impact on a multitude of local goods and service producing activities. Survey of industry representatives provided insights into existing gaps between the workforce situation and industry needs as well as their perspectives on missing links in the region's supply chain.

Fresh produce industry encompasses several activities involved with importation, inspection, transportation, warehousing, and distribution of Mexican grown produce to North American markets. The industry has a strong presence in the local economy; it provides jobs for 2,644 persons in Santa Cruz County directly, and supports another 1,376 persons in other sectors through purchase of goods and services from local businesses. Fresh produce industry accounts for a total monetary impact of $437.7 million of which $190 million are wages and $45 million are state and local government taxes. Of the total jobs in Santa Cruz County 22.3% depend directly or indirectly on the fresh produce industry; so do 24.8% of total wages and 33.5% of total output. Every 100 direct jobs in fresh produce industry generate an additional 52 jobs; every $1 in wages to direct employees in fresh produce industry generates an additional $0.29 in wages in other sectors, and every $1 in direct output in fresh produce industry generates an additional $0.44 in other economic sectors in Santa Cruz County.

The concentration of about 100 maquiladora plants in Nogales, Sonora with an average of 34,000 employees, impacts the economy of Santa Cruz County in several ways. The Nogales BPOE facilitates import-export trade between U.S. based companies and assembly/production facilities south of the border including supplies shipped from Arizona companies. In addition, a number of businesses in

Nogales/Santa Cruz County export manufacturing products and services to maquiladoras. The economic impact of the maquiladora related activities is 1,140 direct jobs and 636 secondary jobs with a total wage impact of $68.6 million. The total monetary impact, which includes wages and $8.7 million in tax revenues to state and local governments, is $304.9 million. This represents 9.8% of the County's jobs, 8.9% of total wages and 23.4% of total output. For every 100 jobs in maquiladora export-related sector an additional 56 jobs are generated in the local economy through ripple effects; every one dollar in direct wages earned in export-related activities and spent locally generates an additional $0.48 in wages, while every one dollar in output (sales) generates an additional $0.47 in additional output in local economy.

The economic impact figures demonstrate profound importance of the fresh produce industry and maquiladora-related trade activity in the economy of Santa Cruz County. Together, these two economic activities provide employment for 3,784 direct jobs, and with the secondary impact included, support close to 5,800 jobs in Santa Cruz County. Every three out of 10 jobs in Santa Cruz County are related directly or indirectly to fresh produce industry and maquiladora-related trade activity. The combined monetary contribution to the County's total output is $742.6 million, out of which $258.5 million are wages and $53.7 million tax revenues to state and local governments. Out of every dollar earned in the County, $0.34 is earned directly or indirectly in fresh produce industry and maquiladora-related trade activity.

Common challenges to both economic activities include inadequate availability of skilled workforce and wait times for truck border crossings. In addition to these, each activity faces specific challenges. One of the fresh produce industry's major challenges is its pronounced seasonal variability. By being concentrated in the winter part of the year, the industry contributes to a high unemployment rate for local workforce during summer months. Unlike the fresh produce from Sinaloa and Sonora -- the basis of Nogales fresh produce industry – agricultural production for U.S. and Canadian markets in central Mexico is all year-round activity which feeds year-round activity to Texas border ports of entry. Therefore, efforts should be directed on how to extend the growing season through application of innovative technologies and new kinds of vegetables and fruits. In that respect it would be beneficial to explore relationships with universities in Sonora, such as *Instituto Tecnológico de Sonora* (ITSON) that has developed several pilot programs for application of new technologies and plant types.[48] A traditionally close relationship between agricultural committees within the Arizona-Mexico Commission and *Comisión Sonora-Arizona* may also provide a useful venue in that direction.

Aside from workforce, the inputs from the local economy are mostly various services and substantial inventory of warehousing facilities to the fresh produce industry. Heavy equipment (such as forklifts), packaging materials, seeds and fertilizers are supplied by companies outside Santa Cruz County. Whereas it may not be feasible to establish all of the production in Santa Cruz County, these missing industries are worth examining more closely for potential opportunities. Given the long tradition of fresh produce industry in the region and the experience of maquiladora sector in Sonora, some opportunities may be found in this area.

In relation to the maquiladora sector in Nogales, Sonora, the economy of Santa Cruz County has not realized a full potential of its proximity to 100 or so maquiladora operations. In part this is a function of the mere size of Santa Cruz County's population, and partly an effect of the proximity to a much larger and economically stronger Tucson metro area, which serves as the location of parent companies and a supplier of manufacturing components and services. However, for a number of key services, border location matters and Nogales/Santa Cruz County should be able to use it as a competitive advantage.

In moving toward this direction, a number of challenges need to be responded to. A major one is the quality and availability of workforce, as identified in surveys of maquiladora operations and their suppliers. Short-term needs such as special-skill workforce could be resolved through a closer collaboration between private sector employers and educational institutions with support of government agencies. A number of successful programs have already been in place, such as a training program for forklift operators in Nogales, Arizona, through Nogales Community Development (NCD). Another example is the effort focused specifically on youth job readiness in Nogales and Santa Cruz County which spelled out specific strategies in collaboration with employers' assessment of entry level job readiness.[49] In Nogales, Sonora, a number of federal and state funded technological institutes and universities were recently established with a specific purpose to respond to the industry needs.[50] Long(er)-term needs require building well educated labor force for the 21$^{st}$ century economy, in addition to mostly short-term training programs designed to respond to industry's immediate needs.

Based on a better understanding of existing foundations and challenges, the following strategies are suggested to turn some of the challenges into opportunities for growth and development:

- Strengthening of what already exists and what works (warehousing, distribution);
- Attract what is missing, especially in services industry (including those services that can be conducted electronically and thus are unaffected by border congestion and wait time);
- Explore possibilities for the extension of fresh produce season through new technologies and/or new vegetable and fruit sorts;
- Encourage development of infrastructure (*e.g.*, modern warehousing);
- Promote free trade zone;
- Explore collaborative models for small and medium businesses in Nogales, Arizona and Nogales, Sonora to utilize binational markets (following the findings and recommendations by Thunderbird School of Global Management[51]);
- Work with federal and state government to continue improving border infrastructure and crossing procedures;
- Invest in education to build a more knowledgeable, educated workforce (medium- and long-term);
- Establish training programs for specific and immediate needs; in Nogales, Sonora, strengthen emerging collaboration between industry and HEI (*e.g.*, *instituto tecnológico* model); in Nogales, Arizona, learn from the Sonora model;

- Nogales/Santa Cruz County has a long tradition in facilitation of crossborder trade of both fresh produce and manufacturing products; the "best practices" could be identified and packaged as training programs for local and out-of-area participants;
- Promote both sides, *i.,e*, the Ambos Nogales region.

## Nogales/Santa Cruz County: a larger picture

As the findings of this analysis are debated, it is necessary to consider a larger picture. Figure 18 illustrates the fact that the economy of Nogales is profoundly affected by four regions of influence: (a) what happens on a global region level; (b) what happens on a megaregional level within the NAFTA trade area; (c) what happens on a bi-national plane within the CANAMEX Corridor and the Arizona-Sonora Region, and (d) what happens on the local community level spanning the international boundary. Major trends and challenges are identified bellow together with sources that addressed them in more detail.

### *Major trends on the global region level*

- An emerging "Golden Triangle Model" with three key components: "Manufacture in China, Package for Retail in Mexico, Export to U.S."[52] The model implies that wages in China are still lower than in Mexico, but wages and air-freight costs from China continue to rise; consequently supply chain strategies are playing a bigger role to Mexico's advantage.
- The Trans-Pacific Partnership (TPP) negotiations may achieve completion in 2013 and are the largest and most important trade talks taking place anywhere in the world.[53] A possible amalgamation of these "Pacific Track" and "Asia Track" arrangements into a comprehensive Free Trade Area of the Asia Pacific may have profound impact on the western coast regions of both U.S. and Mexico.

### *Winds of change in the NAFTA area*

- U.S.-Mexico bilateral trade has grown exponentially ($400 billion in 2010)[54];
- New era in U.S.-Mexico ties as a result of a new administration in office; opportunity to rebalance the bilateral relationship with a focus on creation of jobs and improving the competitiveness of manufacturing on both sides of the border[55];
- Mexico's growing middle class has become an increasingly important market for U.S. products[56];
- Increasing co-manufacturing: growth in Mexico or the U.S. will boost exports from both countries[57];
- Change in perception of Mexico: Mexico is looked upon more as a business partner than a source of intractable problems (issues of security and migration)[58].
- Building and completion of North American highway system (e.g., highway Mazatlan via Durango to Texas border).

### *Trends to watch in the Arizona-Sonora Region*

- The North American winter-vegetable industry is highly integrated (i.e., Mexican production supplies a large part of U.S. winter consumption needs)[59];
- The Arizona-Sonora Region is the hub of the "fresh produce highway;"
- Aerospace manufacturing in Sonora – emerging cross-border aerospace industry cluster;
- Expanding automobile industry in Sonora (hub in Hermosillo)[60];
- Development of Arizona's economic "powerhouse" – Sun Corridor, connecting the State's two major growth centers – Phoenix and Tucson metropolitan areas;
- New models of cross-border production sharing: near-shoring vs. off-shoring;
- Importance of BPOE: The 21st Century Border Management Joint Declaration (May 2010) to coordinate border infrastructure; but major obstacles/challenges: poor infrastructure, inadequate staffing levels and heavy focus on security. [61]

### *Challenges and opportunities at the level of bi-national local community*

- Long history of cross-border economic relationships with Mexico (Sonora, Sinaloa);
- Primary BPOE for Arizona's trade with Mexico;
- Primary BPOE for U.S. imports of Mexican fresh produce;
- Location adjacent to the largest pool of maquiladora operations in Sonora;
- Increasing role of U.S. imports of Mexican-assembled transportation equipment (Ford facility in Sonora);
- Cross-border outshopping (of mainly border residents of Sonora);
- Presence of federal agencies associated with international border (Customs and Border Protection); but
- Lack of awareness of commercial opportunities;[62]
- Distorted perception against the border region;[63]
- Lack of self-understanding as a part of a larger region (Arizona-Sonora; Sun Corridor);
- Lack of dreaming BIG (accumulated human, financial and knowledge capital in cross-border trade, communication, bi-national business building).

**Figure 18. Factors and trends affecting Nogales/Santa Cruz County economy**

**GLOBAL REGION**

**GLOBAL REGION**

Golden Triangle Model (3)

- Likely economic impact of Trans-Pacific Partnership and Asia-Pacific Integration (4)

**NAFTA REGION**

**NAFTA REGION**

- New era in U.S.-MX ties (2)
- MX growing middle class (2)
- Increasing co-manufacturing (2)
- Changing perception of MX

BI-NATIONAL REGION

(Arizona-Sonora Region)

**BI-NATIONAL REGION**

- Highly integrated cross-border winter-vegetable industry
- Hub of fresh produce highway
- Emerging cross-border aerospace cluster
- Automotive hub in Hermosillo
- Arizona's Sun Corridor
- Production-sharing; near-shoring vs. off-shoring

**Nogales**

**LOCAL BI-NATIONAL COMMUNITY**

(Ambos Nogales)

**AMBOS NOGALES**

- Crossborder outshopping
- Crossborder work commuting
- Rapid growth of Nogales, Sonora
- Proximity to maquiladoras (supply chain; outsourcing)

**Challenges:**

- Perception of border region
- Dreaming BIG
- Awareness of commercial opportunities
- Being part of a larger region

## Notes:

[1] Corresponding IMPLAN sectors are: 319 (combination of NAICS 424 and 425), 335, 338, and 340.
[2] These three activities are identified in IMPLAN model as 326 (gasoline stations), 437 (local government) and 439 (federal, non-military government).
[3] Estimates of direct monetary contribution are based on combination of information obtained through interviews with shippers/distributors and brokers; 3-year averages of dollar value of imported fresh produce; and estimates of the share of fresh produce truck border crossings. The results were compared and adjusted with estimates of output by sector from IMPLAN model for Santa Cruz County.
[4] Source: IMPLAN model for Santa Cruz County.
[5] However, due to leakage (purchase of goods and services from outside the County), and some employees living and spending outside the County, not all of $329.8 million actually stays in Santa Cruz County.
[6] These numbers apply to average annual contribution based on 3-year averages.
[7] "Leakage" is money that leaks out from a local economy through purchases of goods and services that are not produced locally. For example, forklifts and packaging material are not manufactured in Santa Cruz County and therefore must be purchased from firms such as those in Phoenix or Yuma. Gas stations have a high "leakage" since all fuel is being imported. The IMPLAN model does not provide direct measure of leakage; instead, for each industry sector it estimates a so-called regional purchase coefficient (RPC) which measures the percent of local demand that is supplied locally. Thus, the leakage is computed as "100 – RPC."
[8] About 31% leaks out to other regions. Source: IMPLAN model.
[9] IMPLAN (Impact M for Planning) is a widely used modeling system originally developed by USDA Forest Service, now operated by the Minnesota IMPLAN Group (MIG). It is based on input-output methodology that traces how economic sectors in a regional (state or county) economy are interconnected through purchases and sales of products and services. Based on these relationships, the model traces how any change in one part of the economy ripples across the entire economy.
[10] Based on estimated direct monetary contribution of each economic activity via IMPLAN model of Santa Cruz County.
[11]Source: Nogales Community Development.
[12] Wages are estimated via IMPLAN model of Santa Cruz County, based on estimated output.
[13] This is in particular the case with fuel. Although an estimated $100 million worth of diesel fuel is purchased at gas stations in Santa Cruz County, 85% of revenues leaks out to other states.
[14] These impacts are commonly referred to as the indirect impacts.
[15] These impacts are referred to as induced impacts.
[16] The total contribution, which includes initial direct contribution of $429.8 million (before leakages) plus secondary impact in Santa Cruz County, amounts to $561.7 million.
[17] Job multiplier is obtained by dividing the total job impact of 4,020 by direct number of jobs (2,644).
[18] Wage multiplier is obtained by dividing the total wage impact of $190.1 million by direct wages of $146.4 million.
[19] The output multiplier was obtained by dividing the 'adjusted total output' of $437.7 million and 'adjusted direct output' of $303.4 million (adjusted for leakage). Estimates of leakages are produced by IMPLAN model.
[20] IMPLAN modeling system does not estimate city and county tax revenues separately. To estimate the tax portion that accrues to the City of Nogales and Santa Cruz County it would require a separate study.
[21] V. Pavlakovich-Kochi, A.H. Charney, A.C. Vias and A. Weister, *Fresh Produce Industry in Nogales, Arizona: Impacts of a Transborder Production Complex on the Economy of Arizona, An Economic and Revenue Impact Analysis.* The University of Arizona: Office of Economic Development. Prepared for The City of Nogales, Arizona, 1997.
[22] NAICS 424, IMPLAN 319.

[23] Represents a 3-year average (upper range) of estimated shipper/distributors' commission; estimates based on interviews with shippers/distributors in comparison with IMPLAN generated output.
[24] These are estimates of indirect impacts (i.e., inter-business purchases of goods and services) obtained via IMPLAN model for Santa Cruz County.
[25] As defined in IMPLAN model of Santa Cruz County
[26] The questionnaire was constructed by the University of Arizona team and distributed to FPAA membership from the FPAA office using Monkey Survey on-line software. The questionnaire was preceded with a letter by Lance Jungmeyer, FPAA's President encouraging the membership to response. The survey was anonymous.
[27] Source: USDA FAS, 2011, based on metric tons.
[28] A recent study written by Arizona State University's Tim Richards found that if Mexican imports are excluded from the U.S. market, retail prices during the December-May timeframe can be expected to rise by 97.9% for hothouse round, 96.9% for hothouse vine, 61.3% for grape tomatoes, 217.2% for roma, and 52.1% for field tomatoes. See also T. Karts, "Florida, FPAA exchange salvos in tomato dispute," *The Packer*, 1/24/2013.
[29] V. Pavlakovich-Kochi, "Maquila industry in Sonora, Mexico: Impacts on the Arizona Economy," *Arizona's Economy* (Jan. 1988); V. Pavlakovich-Kochi: "Exporting: Big opportunities for small businesses," *Arizona's Economy* (March 1989); V. Pavlakovich-Kochi, "Arizona-Sonora maquiladora connection: Flourishing in the late 1980s," *Arizona's Economy* (July 1989); V. Pavlakovich-Kochi and H. Kim, "Outshopping by maquila employees: Implications for Arizona's border communities," *Arizona Review* (Spring 1990); V. Pavlakovich-Kochi and A.L. Silvers, "Maquila industry impacts of the spatial redistribution of employment," *Journal of Borderlands Studies*, (Fall 1994); V. Pavlakovich-Kochi, "Sensitivity of Arizona's manufacturing industries to peso devaluation," *Borderlands: Regional Economic Perspectives Research Paper Series* 1995-1, The University of Arizona Office of Economic Development; V. Pavlakovich-Kochi, "Arizona's exports to Mexico: Beyond and above official export statistics," *BBVA Research, U.S. Regional Outlook* (2nd Quarter 2010); V. Smith-Daniels and V. Pavlakovich-Kochi, "The maquiladora industry in the Arizona-Sonora Region: Impacts and trends," Report to Arizona-Mexico Commission, (Sept. 2000).
[30] There is no official statistics on exports/imports associated with Mexico's maquiladora sector. Based on comparison of the composition of non-agricultural exports and imports in combination with maquiladora locations suggests that a majority of Arizona's non-agricultural products are associated with the maquiladora sector in Sonora.
[31] The maquiladora sector has profoundly changed since the early days when free re-export of assembled components was limited to foreign-owned assembly plants. Correspondingly, Mexico's official statistical agency INEGI stopped publishing data on maquila industry; instead, it has been combined with all other industry for export (*industría de exportación*). Despite these changes, "maquiladora" is still in use as a designation of still mostly foreign-owned plants.
[32] J. Puuka et al. 2013, *Higher education in regional and city development in Sonora, Mexico 2012*, OECD report; www.oecd.org/publishing
[33] Source: *Index Nogales*. Associación de Maquiladoras de Sonora, A.C. Includes both members and non-members.
[34] Based on the description of the product, as reported in *Index Nogales*, Asociación de Maquiladoras de Sonora, A.C., each maquiladora was assigned both a 3-digit IMPLAN code and a 4-digit NAICS code, according to our best knowledge.
[35] Three-year average based on 2009-2011 data; source: USTRADEONLINE.
[36] After China entered the World Trade Organization (WTO) it profoundly affected the textile industry in Mexico by flooding markets with both competitively low cost of materials and labor.
[37] V. Smith-Daniels and V. Pavlakovich-Kochi, *The maquiladora industry in the Arizona-Sonora region: Impacts and trends*, produced for The Arizona-Mexico Commission, September 2000.
[38] The list is limited only to companies that are associated with the Maquiladora Association.
[39] These are sectors contained in the IMPLAN model of Santa Cruz County. They were identified based on the analysis of maquiladora sector in Nogales, Sonora (as described earlier) in combination with export data by sector in the IMPLAN model.
[40] Data for employment, wages and output are from the IMPLAN model of Santa Cruz County. For manufacturing sectors an assumption was made that these manufacturing sectors would not have been in the County had it not been for the maquiladora sector; therefore their entire employment (and associated wages and output) was

defined as 100% export oriented. For the service provider sectors, the portion of employment (and associated wages and output) was estimated based on the ratio of domestic and foreign export data from the IMPLAN model. For the following four service industries that also serve fresh produce industry – transportation support services; transport by truck; warehousing/storage, and gasoline stations (sale of diesel fuel) – the portion associated with maquiladora-related trade was computed as "100% - % share of fresh produce industry" as defined in the first part of the Report.

[41] IMPLAN modeling system does not estimate city and county tax revenues separately. To estimate the tax portion that accrues to the City of Nogales and Santa Cruz County it would require a separate study.

[42] The questionnaire was constructed by the University of Arizona team in collaboration with the board members of the Nogales Community Development and Nogales-Santa Cruz County Economic Development Foundation. The leadership of the *Associación de Maquiladoras de Sonora* assisted in the distribution of questionnaires via *SurveyMonkey* software to their members and associates.

[43] A total of 19 maquiladora representatives sent back their responses; this represents about 33% of the membership, and close to 20% of the total number of maquiladoras in Nogales. Based on *Index Nogales*, Associación de Maquiladoras de Sonora (information provided includes 61 members and 47 nonmembers).

[44] V. Smith-Daniels and V. Pavlakovich-Kochi, *The maquiladora industry in the Arizona-Sonora Region: Impacts and trends*, prepared for The Arizona-Mexico Commission, The University of Arizona Office of Economic Development, and The Arizona State University Center for Business Research: 2000.

[45] The 2000 study applied a factor analysis method to identify underlying dimensions based on a more comprehensive set of questions. Thus, for example, "low-cost production" in 2000 study represents a construct consisting of several related measure, while in 2013 study it is a single variable. Therefore, a direct comparison of results of these two studies is not feasible.

[46] A composite variable "low-cost production" in 2000 study was listed as the second most important factor just next to "profitability." V. Smith-Daniels and V. Pavlakovich-Kochi, *The maquiladora industry in the Arizona-Sonora Region: Impacts and trends*, prepared for The Arizona-Mexico Commission, The University of Arizona Office of Economic Development, and The Arizona State University Center for Business Research.

[47] A total of 18 responses were collected from suppliers of components and services to maquiladoras. Because they represent a larger pool of local businesses of which only a small number is associated with the *Associación de Maquiladoras de Sonora,* it is impossible to determine percentage representation.

[48] ITESM created DIAPYME, an agribusiness park promoting business model and pilot projects for agricultural activities. ITSON is located in Ciudad Obregón, but also runs five other campuses in Sonora. See: J. Puukka et al., *Higher education in regional city development: Sonora, Mexico 2013.* OECD Publication.

[49] A. Donelson, *Nogales and Santa Cruz county Youth Job Readiness Inventory and Strategic Plan*, 2008. Prepared for Nogales Community Development.

[50] "Capacity building for regional development," p.215-257 in J. Puukka et al., *Higher education in regional city development: Sonora, Mexico 2013*. OECD Publication.

[51] "Arizona-Mexico Small and Medium-sized Business Connections," presented to the Maricopa Association of Governments by Consultants from Thunderbird School of Global Management, in Phoenix, December 2012.

[52] Maquila Reference. 2012. The golden triangle: Mexico, China & the U.S. http://www.maquilareference.com, accessed on 12/3/2012.

[53] P.A. Petri, M. G. Plummer, and F. Zhai (2012), The Trans-Pacific partnership and Asia-Pacific Integration; A Quantitative Assessment. Washington, DC: The Peterson Institute for International Economics.

[54] NACTS (2012), Realizing the Full Value of Crossborder Trade with Mexico. Executive Summary. ASU: North American Center for Transborder Studies and New Policy Institute.

[55] A. Selee and C. Wilson (2012), Getting ready for a new era in U.S.-Mexico ties. Special to CNN. December 3. http://www.cnn.com 12/3/2012

[56]A. Selee and C. Wilson (2012), Getting ready for a new era in U.S.-Mexico ties. Special to CNN. December 3. http://www.cnn.com accessed on 12/3/2012

[57] A. Selee and C. Wilson (2012), Getting ready for a new era in U.S.-Mexico ties. Special to CNN. December 3. http://www.cnn.com accessed on12/3/2012

[58] A. Selee and C. Wilson (2012), Getting ready for a new era in U.S.-Mexico ties. Special to CNN. December 3. http://www.cnn.com accessed on 12/3/2012

[59] L. Calvi and V. Barrios (1999), Marketing Winter Vegetables from Mexico, Journal of Food Distribution Research, Vol. 30 (March): 50-62.

[60] "Mexico auto production rates with word's best" by Joseph Trevino, Arizona Daily Star, September 23, 2012.

[61] NACTS (2012), Realizing the Full Value of Crossborder Trade with Mexico. Executive Summary. ASU: North American Center for Transborder Studies and New Policy Institute. http://nacts.asu.edu/projects; Accessed on 11/7/2012.

[62] Thunderbird School of Global Management (2012). Arizona-Mexico Small and Medium-Sized Business Connections. Report prepared by Consultants from Thunderbird School of Global Management and presented at MAG EDC Meeting, December 4, 2012, Phoenix, AZ.

[63] Thunderbird School of Global Management (2012). Arizona-Mexico Small and Medium-Sized Business Connections. Report prepared by Consultants from Thunderbird School of Global Management and presented at MAG EDC Meeting, December 4, 2012, Phoenix, AZ.

# Survey of Fresh Produce (FP) Industry in Nogales, AZ

**Purpose of this survey**

This survey is a part of the Nogales Innovation Partnership Project (NIPP) conducted by the Nogales Community Development Corporation in collaboration with the University of Arizona. The purpose of the NIPP project is to identify the resource and training needs of existing and prospective businesses in the fresh produce/wholesale trade/transportation and warehousing sectors, and implement a strategy that capitalizes upon these sectors' bi-national industry linkages to create employment opportunities in the region. The project is partially funded by the EDA grant.

Your cooperation is greatly appreciated!

Nogales Community Development Corporation
Contact person: *name/phone/e-mail*

## BUSINESS OPERATION

1. What is your company's main type of business:

(a) ____Distributor
(b) ____Customs broker
(c) ____Sales broker
(d) ____Transportation/logistics
(e) ____Other (please specify) ________________________________

2. In what year was your company in Nogales/Santa Cruz County established? ___________
3. If your company primarily operates elsewhere in Arizona, please state the location. _________

## EMPLOYMENT

4. What was your company's total number of employees in 2012 in Nogales, AZ (please circle)

a) ____Less than 10
b) ____10-25
c) ____26-50
d) ____51-75
e) ____75-100
f) ____101-150
g) ____More than 150

5. What % of the total number of employees were seasonal employees? ____________
6. What is average duration of work for seasonal employees in your company? _______months; _________ weeks
7. Number of employees in 2011 – was it: Approximately same as in 2012 ( ); Higher than in 2012 ( ), or less than in 2012 ( )

**PURCHASE OF GOODS AND SERVICES**

8. Which services does your company purchase from other companies located in Nogales/Santa Cruz County (please circle all and add additional):

    a) ____Trucking from the border to the warehouse
    b) ____US customs brokerage
    c) ____Sales brokerage
    d) ____Trucking to buyer(s) in Arizona
    e) ____Trucking to buyer(s) outside Arizona
    f) ____Food safety or technical services
    g) ____Repacking
    h) ____Outsourced warehousing services (in-and-outs)
    i) ____Other (specify) ________________________________
    j) ____None are from Nogales/Santa Cruz County

9. Which of services does your company purchase from companies located in rest of Arizona (Phoenix, Tucson etc.)
    a) ____Trucking from the border to the warehouse
    b) ____US customs brokerage
    c) ____Sales brokerage
    d) ____Trucking to buyer(s) in Arizona
    e) ____Trucking to buyer(s) outside Arizona
    f) ____Food safety or technical services
    g) ____Repacking
    h) ____Outsourced warehousing services (in-and-outs)
    i) ____Other (specify) ________________________________
    j) ____None are from the rest of Arizona

10. Which products does your company purchase from companies located in Nogales/Santa Cruz County?
    a) ____Cartons for packaging
    b) ____Seeds
    c) ____Fertilizers
    d) ____Pallets
    e) ____Forklifts or skids
    f) ____Office materials
    g) ____Other (specify) ___________________________________________
    h) ____None of the above from Nogales/Santa Cruz

11. Which products does your company purchase from companies located elsewhere in AZ?

i) ____Cartons for packaging
j) ____Seeds
k) ____Fertilizers
l) ____Pallets
m) ____Forklifts or skids
n) ____Office materials
o) ____Other (specify) ________________________________________
p) ____None of the above from elsewhere in Arizona

**WORKFORCE**

12. Does the workforce in Nogales/Santa Cruz have adequate skills for your business operations? (a) YES ___; (b) somewhat ___; (b) No ___
13. Does the workforce in Nogales, Sonora have adequate skills for your business operations? (a) YES ____; (b) Somewhat ____; (c) NO ____
14. What are your major workforce gaps today?
    ________________________________________________________________________________
15. What improvements related to the workforce would you like to see?
    ________________________________________________________________________________

**SUPPLIERS RELATIONS**

16. Please identify top 5 important criteria in selecting your current suppliers to support your company's operations:

    (a) ____Price
    (b) ____Quality
    (c) ____On-time delivery
    (d) ____Financial strengths
    (e) ____Proximity
    (f) ____Responsiveness
    (g) ____Technology
    (h) ____Trust
    (i) ____Other

17. Are there any products or services which are currently not supplied by Nogales/Santa Cruz County firms, but for which you have an interest in locating suppliers in the region?
    ________________________________________________________________________________

*Thank you!*

**Any identifying information will be removed from your reply to ensure the anonymity of your responses.**

# The Nogales Manufacturing Survey 2013
# (Maquiladora sector)

**Purpose of this survey**

This study constitutes Phase One of the Nogales Innovation Partnership Project (NIPP) conducted by the Nogales Community Development Corporation in collaboration with the University of Arizona. The purpose of the NIPP project is to identify the resource and training needs of existing and prospective businesses in the manufacturing/manufacturing services, wholesale trade/transportation and warehousing sectors, and implement a strategy that capitalizes upon these sectors' bi-national industry linkages to create employment opportunities in the region. The project is partially funded by the EDA grant.

Your cooperation is greatly appreciated!

Nogales Community Development Corporation
Contact person: *name/phone/e-mail*

## A. Maquila Operations

A1. Where is your parent company located (city/state)________________________________________

A2. (*If parent company is not located in Arizona*): Does your parent company have any facilities (office space, warehouse, etc.) located in Arizona? No _____ Yes _____ If YES, in what city ___________

A3. In what year were your firm's operations in Nogales, Sonora established? __________

A4. What is the primary category of business for your Sonora's maquila operations (*e.g., electronic/electrical equipment and components; fabricated metal products; wholesale trade, etc. OR 4-digit NAICS code*) ________________

A5. What are the primary products/services of your maquiladora operations? ________________________________________________________________________________

A6. What are the 3 most important needs to the success of your Nogales maquiladora operation(s)? (*Please rank them according to importance; "1" being the most important*)

______Availability of appropriately skilled workforce in Sonora
______Availability of appropriately skilled workforce in Arizona
______Availability of local suppliers in Sonora
______Proximity to U.S. suppliers in Arizona
______Government support
______Availability of industrial parks in Nogales, Sonora
______Transportation infrastructure
______Border crossing times
______Other (please specify) ________________________________________________

## B. Markets and Customers

B1. What are the top 3 markets of your total production/services during 2012?
____________________________________________________________________________________

B2. What is % share of Arizona markets? _____________

B3. Please identify 5 most important capabilities to your maquiladora's long term competitiveness (*please rank by importance*) :

_____Low-cost production
_____Supplier relations
_____On-time delivery of inputs
_____On-site product design and development capabilities
_____Availability of highly skilled workforce
_____More efficient border crossing procedure
_____Proximity of U.S. corporate office
_____Transportation networks
_____Other (*please specify*) ________________________________________________

## C. Logistics

Please tell us about your current logistics capabilities:

C1. What is % share of input (products/services) of total supply chain from companies in Sonora: ______

C2. What is % share of input (products/services) of total supply chain from companies in (a) Nogales/Santa Cruz County ______ ; (b) Tucson _______, and (c) other Arizona _______

C3. Please specify the most important inputs of products/services from
(a) Nogales/Santa Cruz County: ____________________________________________________;
(b) Tucson __________________________________________________________________,
and (c) other Arizona _________________________________________________________

C4. Does your operation have warehousing facilities in (circle all that applies):
(a) Nogales/Santa Cruz County; (b) in Tucson, (c) other Arizona.

C5. What are the most important needs to improve your logistics capabilities? (*Please rank by importance*)
   a. ____Availability of affordable/appropriate warehousing space in Nogales, Arizona
   b. ____Availability of third-party logistics firms to coordinate supply chain
   c. ____Availability of local suppliers

d. ____Inbound/outbound expedited freight shipments
e. ____Availability of cross-border transportation carriers
f. ____Efficient border crossings
g. ____Supply of appropriate workforce
h. ____Supply chain security
i. ____Other (*specify*)______________________________________________________

## D. Workforce

D1. Does the workforce in the Nogales region have adequate skills for your operations?
(a) Nogales, Arizona (   ) YES; (   ) NO; (b) Nogales, Sonora (  ) YES; (  ) NO.

D2. What are your major workforce gaps today?

____________________________________________________________________________________

____________________________________________________________________________________

D3. What training activities do you need to improve the quality of your workforce?

____________________________________________________________________________________

____________________________________________________________________________________

D4. What improvements related to the workforce would you like to see in the Nogales, Sonora region?

____________________________________________________________________________________

____________________________________________________________________________________

D5. What improvements related to the workforce would you like to see in the Nogales, Arizona region?

____________________________________________________________________________________

____________________________________________________________________________________

## E. Location advantages/challenges

E1. At the time of your initial location decision, how important was the supply base in Arizona in deciding on a maquiladora operation in Sonora?
___Very important; ___Somewhat important; ___Not important; ___ Not applicable

E2. What are top 3 advantages of this location?

____________________________________________________________________________________

____________________________________________________________________________________

_______________

E3. What are top 3 frustrations associated with this location?

________________________________________________________________________________
________________________________________________________________________________
______________

E4. For your operation, what is more relevant: _____Proximity to Nogales, Arizona; ____Proximity to Tucson; ____Neither is particularly relevant

## F. Supplier Relations

F1. Please identify top 5 most important criteria in selecting your current suppliers to support your operation:

a. ____Price
b. ____Quality
c. ____On-time delivery of components
d. ____Domestic content laws
e. ____Financial strength
f. ____Proximity
g. ____Engineering capability
h. ____Responsiveness
i. ____Technology
j. ____Other

F2. What challenges have you encountered when doing business in the region?

________________________________________________________________________________
________________________________________________________________________________
________

F3. Are there any products or services which are currently not supplied by Nogales, Arizona firms, but for which you have an interest in locating suppliers in Arizona? (*If yes, please list items below*)

________________________________________________________________________________
________________________________________________________________________________
_____________

F4. Are there any products or services which are currently not supplied by Nogales, Sonora firms, but for which you have an interest in locating suppliers in Sonora? (*If yes, please list items below*)

________________________________________________________________________________
________________________________________________________________________________
_____________

THANK YOU!

**Any identifying information will be removed from your reply to ensure the anonymity of your responses.**

# The Nogales Manufacturing Survey 2013
# (Goods & Services Suppliers)

**Purpose of this survey**

This study constitutes Phase One of the Nogales Innovation Partnership Project (NIPP) conducted by the Nogales Community Development Corporation in collaboration with the University of Arizona. The purpose of the NIPP project is to identify the resource and training needs of existing and prospective businesses in the manufacturing/manufacturing services, wholesale trade/transportation and warehousing sectors, and implement a strategy that capitalizes upon these sectors' bi-national industry linkages to create employment opportunities in the region. The project is partially funded by the EDA grant.

Your cooperation is greatly appreciated!

Nogales Community Development Corporation
Contact person: *name/phone/e-mail*

## A. Operations

A1. Where is your company located (please circle both if applicable):
(a) Nogales, Arizona; (b) Nogales, Sonora.

A2. In what year was your firm's operations established in
(a) Nogales, Arizona _______; (b) Nogales, Sonora __________

A3. What is the primary category of your business (description or *4-digit NAICS code):*
(a) in Nogales, Arizona _____________________________________________________________;
(b) Nogales, Sonora _____________________________________________________________

A4. What are the primary products/services that you supply to maquiladora operations?
_________________________________________________________________________________

A5. What are the 3 most important needs to the success of your business with the maquiladora operation(s)? (*Please rank them according to importance; "1" being the most important*)

______Availability of appropriately skilled workforce in Sonora
______Availability of appropriately skilled workforce in Arizona
______Availability of local suppliers in Sonora
______Proximity to U.S. suppliers in Arizona
______Government support
______Availability of industrial parks in Nogales, Sonora
______Free trade zone in Nogales, Arizona
______Transportation infrastructure

______Border crossing times
______Other (please specify) ___________________________________________________

## B. Markets and Customers

B1. What are the top 3 markets of your total production/services during 2012?
____________________________________________________________________________________
____

B2. What is % share of Arizona markets? _____________

B3. Please identify 5 most important capabilities to your maquiladora's long term competitiveness (*please rank by importance*) :

_____Low-cost production
_____Supplier relations
_____On-time delivery of inputs
_____On-site product design and development capabilities
_____Availability of highly skilled workforce
_____More efficient border crossing procedure
_____Proximity of U.S. corporate office
_____Transportation networks
_____Other (*please specify*) _____________________________________________________

## C. Logistics

Please tell us about your current logistics capabilities:

C1. Does your operation have warehousing facilities in (circle all that applies):
(a) Nogales/Santa Cruz County; (b) in Tucson, (c) other Arizona.

C2. What are the most important needs to improve your logistics capabilities? (*Please rank by importance*)

a. ____Availability of affordable/appropriate warehousing space in Nogales, Arizona
b. ____Availability of third-party logistics firms to coordinate supply chain
c. ____Availability of local suppliers
d. ____Inbound/outbound expedited freight shipments
e. ____Availability of cross-border transportation carriers
f. ____Efficient border crossings
g. ____Supply of appropriate workforce
h. ____Supply chain security
i. ____Other (*specify*)_____________________________________________________

## D. Workforce

D1. Does the workforce in the Nogales region have adequate skills for your operations?
(a) Nogales, Arizona (     ) YES; (    ) NO;  (b) Nogales, Sonora (   ) YES; (   ) NO.

D2. What are your major workforce <u>gaps</u> today?

______________________________________________________________________________

______________________________________________________________________________

D3. What training activities do you need to improve the quality of your workforce?

______________________________________________________________________________

______________________________________________________________________________

D4. What improvements related to the workforce would you like to see in the <u>Nogales, Sonora</u> region?

______________________________________________________________________________

______________________________________________________________________________

D5. What improvements related to the workforce would you like to see in the <u>Nogales, Arizona</u> region?

______________________________________________________________________________

______________________________________________________________________________

## E. Location advantages/challenges

E1. What are top 3 advantages of Nogales' location?

______________________________________________________________________________

______________________________________________________________________________

______________

E2. What are top 3 frustrations associated with this location?

______________________________________________________________________________

______________________________________________________________________________

______________

E3. For your operation, what is more relevant: _____Proximity to maquiladora sector in Nogales, Sonora; ____Proximity to Tucson; ____Neither is particularly relevant

## F. Business Relations

F1. What challenges have you encountered when doing business in the region?

________________________________________________________________________________
________________________________________________________________________________
________

F2. Are there any products or services which are currently not supplied by Nogales, Arizona firms, but for which you have an interest in locating suppliers in Arizona? (*If yes, please list items below*)

________________________________________________________________________________
________________________________________________________________________________
_____________

F3. Are there any products or services which are currently not supplied by Nogales, Sonora firms, but for which you have an interest in locating suppliers in Sonora? (*If yes, please list items below*)

________________________________________________________________________________
________________________________________________________________________________
_____________

*Thank you!*

**Any identifying information will be removed from your reply to ensure the anonymity of your responses.**