

**Informal Transborder Recycling on the U.S.-Mexico Border:
the *cartoneros* of Nuevo Laredo**

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Summary – For years, Mexicans from the city of Nuevo Laredo have collected cardboard in Texas and taken it to Mexico for recycling. Qualitative and quantitative research was conducted in the area in 1994. It was found that the cartoneros have a higher median income and greater access to public utilities than the general population of Nuevo Laredo. Cardboard collecting shows strong backward and forward linkages with the formal sector as well as with the international economy. The informal recovery of cardboard in the area illustrates the ongoing international economic integration between Mexico and the U. S.

Key words - informal sector, scavenging, recycling, cardboard, North America, Mexico

Introduction

For a number of years, even before the idea of a free trade agreement was advanced, the United States and Mexico have been undergoing a gradual process of economic integration (Weintraub, 1990). Trade, investment and financial transactions illustrate the increasing interdependence between Mexico and the U.S. The North American Free Trade Agreement, NAFTA, will probably accelerate that integration process (Lang and Ohr, 1995).

In this paper I look at the informal recycling of cardboard carried out in Laredo and Nuevo Laredo ('Los Dos Laredos'). Los Dos Laredos constitute one of the bi-national sets of "twin cities" that exist along the U. S.-Mexico border. See Map 1.

This paper is based on my dissertation research, which included qualitative research and a survey among scavengers. The results discussed here, however, refer only to cardboard recycling. In this study, I argue that, contrary to some assertions, scavenging

is not an occupation that operates on the margins of society. I suggest that scavenging has direct forward and backward linkages with the formal economy, and with the international economy as well. I also propose that cardboard collecting in Los Dos Laredos exemplifies the ongoing process of economic integration between Mexico and the United States.

Economic Integration of Laredo and Nuevo Laredo

The process of economic integration between Mexico and the U. S. has long been evident on their common border. In Los Dos Laredos, for instance, signs of economic integration are apparent soon after the present borderline was defined. In 1848, when the town split into two as a result of the Guadalupe-Hidalgo Treaty, ferries began transporting people and goods across the Río Bravo (or Rio Grande) between Los Dos Laredos (Hinojosa, 1983). The state of Tamaulipas created a free-trade zone in Nuevo Laredo in 1861 and immediately merchants in Laredo, Texas opened stores to take advantage of the benefits derived from investing there (Sánchez, 1981).

During the 1860s Los Dos Laredos benefited from the active trade stimulated by the U. S. Civil War and Mexican exports of food, alcohol, clothing and cotton. Also during the Civil War, unionists recruited Mexicans and Mexican-Americans on both sides of the border. Those recruits became known as *enganchados* (Thompson, 1991). It was also at this time that the Laredo electric and water utilities expanded operations providing service to Nuevo Laredo in 1888 and 1890, respectively (Sánchez, 1981). That expansion in their operations across the border suggests that the Laredo utilities considered Nuevo Laredo a segment of their market.

For the late nineteenth century, evidence also suggests an integration of the labor market in the area. During the 1880s destitute Mexican immigrants constituted most of the miners at the ‘Santo Tomás’ coal mine in Laredo, and approximately 200 Nuevo Laredo men, then known as *barrileros*, hauled water from the Rio Grande in donkey carts for Laredo residents’ daily needs. During elections in the 1880s, Laredo political parties ‘imported votes’ by bringing Nuevo Laredoans to illegally cast their ballots for a fee (Thompson, 1991) .

Thus, poor Mexicans from the interior have been migrating to Los Dos Laredos for over a century, attracted by the possibility of a better life on the border. Mexicans have provided relatively inexpensive labor for agriculture, industry and services, while Americans have provided capital as well as demand for various goods and services. The recovery of cardboard in Laredo by Nuevo Laredo residents illustrates the ongoing international economic integration between Mexico and the United States.

Cardboard Collecting in Historical Perspective

The informal recovery of waste materials in Los Dos Laredos is hardly new. It has

existed for decades. The use of ‘scavenger carts’ in Laredo at the end of the nineteenth century has been mentioned in the literature (Thompson, 1991). But is not clear who the scavengers were –whether poor Texans or Mexicans– what kind of materials they collected or to what use the items salvaged from the waste stream were destined. It is likely that those scavengers in Laredo at the turn of the century were poor Mexicans, since Mexican border residents were allowed to work legally in the U. S. side of the border until the mid-1920s (Cruz, 1990).

Mexican scavengers have been crossing the border to Laredo in order to collect corrugated cardboard at least since the 1940s, and possibly earlier, as noted above. The cardboard collectors are locally known as *cartoneros*. According to the oldest active *cartonero* in Los Dos Laredos today, there were ‘many’ cartoneros collecting cardboard in Laredo in the 1940s –when he started collecting cardboard for a living– and he reported that he had engaged in the recovery of other items at the open dump then existing in Laredo. In those years, the cartoneros used push carts to transport the cardboard, since U. S. authorities would not allow horse carts entering from Mexico for sanitary reasons. Horse carts were then commonly used by scavengers recovering materials in Nuevo Laredo. Horse carts are still used today in Nuevo Laredo by the so-called *carretoneros*, informal refuse collectors operating in low-income areas not served by the city sanitation crews (Medina, 1997).

Several informants in Los Dos Laredos report that in 1956, Enrique Tomás Lozano, a Nuevo Laredo catholic priest, brought together a group of cartoneros. He then contacted Laredo authorities, and reached an informal agreement, which sanctioned the cartoneros’ activities, resulting in a mutually-beneficial relationship: it would provide poor Mexicans with a steady income and it would help keep Laredo clean. His efforts would later result in the creation of a *cartoneros’* cooperative, the *Sociedad Cooperativa de Recuperadores de Materiales de Nuevo Laredo*, one of the few scavengers’ coops that currently exists in Mexico (Medina, 1997).

Cardboard collecting in Los Dos Laredos has undergone both quantitative and qualitative changes over the last five decades. Due to the higher volume of retail sales in Laredo, which results in more cardboard boxes being discarded by stores, a larger amount of cardboard is available today for the cartoneros than fifty years ago. In fact, Laredo has the highest per capita retail sales rate in the United States: while its income per capita is \$7,300, its retail sales rate amounts to \$12,300 per person per year (Althaus, 1993). Such an active retailing sector generates large amounts of cardboard boxes, which contain the merchandise sold at the stores.

Furthermore, the assembly plants known as *maquiladoras*, which today constitute an important source of cardboard, did not exist in the 1940s. The *maquiladoras* receive shipments of the parts and components to be assembled in cardboard boxes, which then must be disposed of. In past years the *maquiladoras* were required by U. S. and Mexican law to dispose of their wastes in the U. S. However, Mexican regulations

enacted in 1989 allow *maquiladoras* to dispose of or recycle their non-toxic wastes in Mexico (Anon., 1990). Nuevo Laredo *maquiladoras* accumulate the cardboard from the shipments received and donate it to charities. The charities, in turn, sell the cardboard to dealers or to the *cartoneros'* cooperative, and use the revenue for their programs. The *maquiladoras'* cardboard donations are tax-deductible (Medina, 1997).

Since scavenging is an informal occupation¹, no official records or statistics exist on the number of people involved in it. Therefore, it is not possible to estimate the volume of cardboard recovered that has been recycled in the past, nor is it possible to estimate the number of *cartoneros* and the fluctuations in quantities and individuals engaged in this activity throughout the years. Nevertheless, *cartoneros* and middlemen reported a cyclical pattern in the availability of cardboard in Laredo: more cardboard has been generated during periods of economic growth in Mexico. And the amount of cardboard available has dropped in the aftermath of the Mexican peso devaluations that have occurred over the last two decades.

Even though no federal laws regulate the *cartoneros'* activities, they must comply with all the regulations that impinge on their operations. Middlemen and *cartoneros* reported that the Mexican government has sometimes hindered the recovery of cardboard in Laredo. In the 1960s, for instance, the government banned the importation of discarded cardboard into the country. Despite the ban, the *cartoneros* smuggled the cardboard by throwing the cardboard into the river from the American side and other individuals retrieved it downstream on the Mexican side.

In the mid-1980s a quota system was established, which required a permit (*permiso de internación*) in order to transport the cardboard from Nuevo Laredo to the paper mills in Monterrey. In the late-1980s Mexican sanitary authorities required that discarded cardboard be sprayed with pesticides prior to its entry into the country. The quota system was eliminated in 1992 as a result of the liberalization of economic policy carried out by the Salinas administration. At present, no limits exist on the amount of discarded cardboard that can be imported into Mexico, but an import tariff of 10 % is levied by the Federal Government, and the process must be conducted by a Mexican customs broker or '*agente aduanal*' (Medina, 1997).

Cartoneros reported receiving a friendlier reception and more tolerant attitude to their activities from U. S. authorities than from Mexican authorities. In addition to the legal barriers to their occupation previously discussed, the *cartoneros* sometimes face hostile Mexican Customs officials, who contend that the *cartoneros* smuggle various goods into Mexico. Not one *cartonero* interviewed reported to have had problems with U. S. officials, while 70 % indicated they have had some kind of problem with Mexican officials. I interviewed several local officials from the Laredo police department, the Laredo Municipal Court, the Laredo Bridge System, the Director of Public Works and the Laredo Recycling Coordinator. They are all aware of the Mexican cardboard collectors' activities, and indicated the absence of problems with the *cartoneros*. For

instance, in the last 11 years no *cartonero* has been brought to court for violating local ordinances. The Laredo officials interviewed expressed their support for the continuing operation of the *cartoneros*, since in their view, the *cartoneros* provide a useful service to the city.

Cardboard Recovery and the Formal Sector

Several variables have created and influenced the recovery of cardboard in Los Dos Laredos. The market conditions for old corrugated cardboard in Mexico and the United States differ markedly. While the U. S. possesses vast forestry resources and plays a dominant role in the world's paper industry, Mexico produces less than 40 % of its domestic demand for wood pulp (Espinosa, 1994). Furthermore, the U. S. forestry industry uses advanced technology, reaps the benefits of large economies of scale, receives governmental subsidies, and has integrated vertically with the paper industry. The more than 3,000 local recycling programs throughout the U. S. have steadily increased the volume of cardboard available to the paper industry for recycling, while the number of paper mills that can process it has not expanded significantly (Jaffe, 1995). The domestic demand for cardboard depends –at a large extent– on the strength of the U. S. economy. The result of the previous factors has been a wide fluctuation in the industrial demand and prices of cardboard in the U. S. market. For example, in 1994 New York City had to pay dealers \$ 25 per ton in order to have its source-separated cardboard picked up, while in 1995 the city was being paid \$ 60 per ton, due to the changing market conditions (Anon., 1995).

On the other hand, due to various factors, the Mexican paper industry shows a steady demand for discarded cardboard and other grades of wastepaper. The Mexican paper industry has suffered a chronic shortage of raw materials since the first paper mill was established in 1590 in the vicinity of Mexico City. Throughout the seventeenth, eighteenth and nineteenth centuries the Mexican paper industry made paper from old rags (mostly white linen rags, since bleaching had not been developed yet). The rags collected in colonial Mexico (New Spain) were in short supply due to the fact that inhabitants used their clothes as long as possible, and discarded them infrequently and in small quantities. During that period, rag collectors were known as *traperos*.

The recovery of discarded rags for papermaking during the seventeenth and eighteenth centuries was of such economic importance that commanded royal attention. Felipe III of Spain, for instance, authorized the *Reglamento de Libre Comercio de Indias* (free trade law between the Spanish Crown and its territories in the Americas) in 1778, which exempted from the payment of taxes the rags collected in the Spanish possessions in the Americas. That *Reglamento* attempted to encourage Mexican *traperos* to increase their gathering of rags, which would be exported to Spain, transformed into paper, and part of the paper sent back to New Spain (Lenz, 1990).

In the early twentieth century the Mexican paper industry began making paper from

wood pulp, but the switch from rags to pulp did not alleviate the shortage of raw materials. Mexican Indians own most of the forested areas in the country, but many lack deeds or their ancestral rights to the land have not been recognized. The lack of definition of property rights has led to the plundering of forestry resources by outsiders, as well as reluctance from investors to put their money into commercial timber plantations (Cortez, 1993). Moreover, the remaining woodlands in the country are located in remote and inaccessible areas, requiring the construction of expensive access roads, which account for about 50 % of a logging project's total costs (Lenz, 1990). The Mexican government does not subsidize the construction of access roads. Finally, the small scale of logging operations and the use of outdated technology drives up the cost of the timber obtained to such degree that the prices of domestic forest products often exceed international prices (Anon., 1993). The previous factors translate into an insufficient domestic supply of pulp: Mexican logging operations provide 40 % of the country's consumption of fiber (Espinosa, 1994).

Due to the impracticality of achieving backward vertical integration with the forestry sector, the Mexican paper industry has undertaken vigorous efforts to increase the use of recycled fiber. In 1984, the Mexican paper industry used 58.3 % wastepaper as a fiber source, while in 1993 it had increased to 73.8 %. Correspondingly, primary fiber (wood pulp and sugar cane bagasse) utilization decreased from 41.7 % in 1984 to 26.2 % in 1993 (Espinosa, 1994). The consumption of the cardboard collected by the *cartoneros* in Los Dos Laredos illustrate these efforts.

The *cartoneros'* activities represent important cost savings for the Mexican paper industry: the cardboard collected by the *cartoneros* cost them 300 Mexican pesos a ton in June 1994, while the ton of U. S. market pulp cost the equivalent of 2250 pesos plus transportation costs. See Table 1. By engaging in recycling, the paper industry not only saves in raw materials: the construction and operating costs of a paper mill consuming wastepaper can be as low as 1.5 % of that of a plant using pulp (CEPAL, 1992). Faced with such a large difference in costs, the Mexican paper industry has integrated vertically with scavengers via middlemen. Approximately 620 tons per month are recovered informally in Los Dos Laredos, with a monetary value of U. S. \$ 53,125 (at the Mexican peso- U. S. dollar prevalent at the time) (Medina, 1997).

As a result of NAFTA, market barriers to trade in most paper and paperboard will be phased out; tariffs on corrugated boxes will be eliminated in the year 2,000; and tariffs on most converted paper products will be phased out in the year 2,003 (Jaffe, 1995). The Mexican paper industry is trying to survive by upgrading its processes and by lowering its costs, which means maximizing the use of wastepaper and cardboard collected by scavengers (Medina, 1997). Figure 1 shows the flow of cardboard recovery in Los Dos Laredos.

Global structures and processes of change affect the *cartoneros* in Los Dos Laredos. Firstly, as East Asian manufactures displace products made in the U. S., merchandise

arrives in Laredo shipped in cardboard boxes. Boxes from that geographical area have become increasingly available in Laredo. The higher the percentage of Asian boxes arriving in Laredo, the lower the *cartoneros'* income will tend to be, due to the lower price paid for it compared to U. S. cardboard. Secondly, the higher the number of *maquiladoras* and the higher their production levels, the more cardboard boxes are available for recycling. Thirdly, the interplay of factors that determine the global demand and supply of paper has an effect on the *cartoneros*. For instance, a strike of mill workers in British Columbia in 1992 caused the price of pulp to go up. The Mexican industry raised the price of cardboard paid to the *cartoneros*, as an incentive to increase the amount of cardboard collected and avoid the payment of the still higher prices of North American market pulp.

Socioeconomic Characteristics of the *Cartoneros* and Recovery Patterns

I conducted a survey among *cartoneros* in Nuevo Laredo during the Summer of 1994. Since *cartoneros* must sell the collected cardboard in order to survive, and they collect cardboard in various areas and at different times, I decided that the interviews would take place just outside the middlemen's warehouses. I used a systematic sampling method, in which every other *cartonero* arriving to sell cardboard was asked to participate in the survey. The questionnaire was anonymous (their names were not requested) in order to elicit more reliable answers. Thirty questionnaires were applied among *cartoneros*, which represented approximately 60 % of the cartonero population existing during my field research.

During the period in which I conducted research there were approximately 50 Nuevo Laredo individuals who regularly crossed the border in order to collect cardboard in Laredo. Cardboard collecting constitutes a predominantly male occupation: only one female cardboard collector exists in the area. The cardboard boxes discarded by stores in Laredo are rather large and bulky so that a vehicle is needed to transport them to the Nuevo Laredo middlemen. The cheapest vehicle to transport cardboard, and the most commonly used by the cartoneros, is a three-wheeled cart called *tricicleta*. In July 1994, *tricicletas* could be purchased for 650 Mexican pesos (approximately \$ 185 at the exchange rate prevailing at that time). Maneuvering a full-loaded *tricicleta*, which may contain up to 400 Kg (880 lb.), of cardboard, requires physical strength. In fact the only female collector usually receives help from her teenage children negotiating the traffic and steering the *tricicleta*.

Cartoneros were paid 0.12-0.15 Mexican pesos per kilogram for U. S. cardboard, which they call *cartón americano*, and 0.06-0.08 Mex. pesos per kilogram for Asian cardboard (mostly from Japan, China, Hong Kong, Singapore, Taiwan, and South Korea), called *cartón amarillo*. Mexican cardboard commands the same price as the Asian. The price differential is due to the higher fiber content of U. S. cardboard, compared to Asian and Mexican cardboard, which reflects the more intensive recycling in the Far East and in Mexico. In fact, *cartoneros* sometimes ignore Asian cardboard, leaving it behind to be

picked up by the Laredo Sanitation crews, and concentrate instead on collecting U. S. cardboard.

Based on the survey results, one can conclude that the typical *cartonero* is a male who is 40 years old, has four years of formal education, is married, knows how to read and write (Spanish) and collects cardboard in Laredo. The average *cartonero* has been collecting cardboard in the area for 13 years, and works 8-9 hours a day, six days a week (Monday through Saturday). Eighty per cent of the *cartoneros* transport cardboard in *tricicletas*, while 20 % own pick up trucks. Ninety per cent of the *cartoneros* interviewed reported to collect cardboard on a full-time basis, year round, while the rest engage in it only during certain times of the year.

Forty-six per cent of the *cartoneros* interviewed reported also collecting aluminum cans in order to supplement their income. The *cartoneros* have other sources of income as well: they perform odd jobs for Laredo store owners, cleaning up sections of stores or running errands for a tip. *Cartoneros* also help Mexican smugglers pack various goods –particularly electronics– which are then taken across the border into Mexico, obtaining extra cash. The *cartoneros* enjoy additional benefits from operating on the U. S. side of the border: they retrieve discarded furniture, appliances, building materials and food with expired consumption date but that is still in edible condition. The *cartoneros* salvage all those items for their own consumption. This recovery of materials from the waste stream for the *cartoneros*' self-consumption does not involve cash, does not entail a productive use by industry and can thus be arguably considered a marginal activity.

Over 90 % of the *cartoneros* have only collected cardboard since they became scavengers. The most common areas where cardboard recovery takes place are the Laredo downtown commercial district and shopping centers, with 66 % of the *cartoneros* working there. Most *cartoneros* (70 %) follow a fixed route in their collection activities. Most *cartoneros* have previous work experience, were born elsewhere in Mexico, forty per cent of them in the state of San Luis Potosí (located in north central Mexico) alone, and then moved to Nuevo Laredo.

Table 2 presents some socioeconomic characteristics of *cartoneros*. They earned a median weekly income of 270 Mexican pesos in July 1994 (approximately U. S.\$ 77.14). The Mexican minimum wage at the time was 91.62 pesos. Thus, the *cartoneros* earned three times the minimum wage, which puts them in the top 5 % of income earners in the city of Nuevo Laredo (Medina, 1997). The average *cartonero* has been collecting cardboard for 13 years, which suggests that it is a stable occupation. Cardboard collecting has enabled them to raise a family, since 83 % of them reported to be married and have children.

Table 3 presents a comparison between *cartoneros* and the general population of Nuevo Laredo. It can be observed that the *cartonero* population differs in several respects from the general population of the city. Migrants from elsewhere in Mexico constitute a

higher percentage of the *cartoneros*' population than in the city; their literacy rate is lower and the number of years of formal education at school is lower than that of the general population. A far higher percentage of *cartoneros* are not affiliated to the Mexican socialized medicine system (IMSS) than the rest of the labor force in the city. Despite their lower educational achievements, the *cartoneros* enjoy greater access to public utilities and a higher median weekly income than the Nuevo Laredo population as a whole. Moreover, 73 % of the *cartoneros* are homeowners. Furthermore, nearly 60 % of the cardboard collectors interviewed considered their standard of living as 'fair' or 'good'. Consequently, the *cartoneros* can hardly be considered as poor.

Approximately 60 % of the *cartoneros* interviewed considered, at some point in their lives, to become illegal immigrants in the U. S. And 25 % of them reported to have worked in the U. S. in the past. Middlemen and warehouse employees revealed that a high turnover employee exists at the dealers' warehouses. Middlemen employ individuals who have been captured by the Border Patrol in the U. S. and deported to Mexico. By working at the middlemen's warehouses, those deportees survive and are able to save money. As soon as they have saved enough, they attempt to cross the border again and work illegally in the U. S. These facts suggest that cardboard collection and processing is composed, to a large extent, by Mexicans who originally wanted to work in the U. S., by men who were deported from the U. S. or who returned voluntarily to Mexico, and by individuals who are trying to get back into the U. S.

Environmental Impact of *Cartoneros*' Activities

The recovery of cardboard in Los Dos Laredos renders several environmental benefits. Cardboard recycling reduces energy and water use and lessens water and air pollution, compared with the production of cardboard from wood pulp. See Table 4. Moreover, the diversion of cardboard saves landfill space, extending the life of the local landfills. Assuming that each ton of cardboard that is recycled saves 106 cubic feet,² then the space savings from the recycling of cardboard amounts to 65,720 cubic feet per month.

The *cartoneros* also pick up aluminum cans and other items they find in waste bins and littered on the streets as well as on illegal garbage dumps existing on both sides of the border. By engaging in these activities, they help clean up the urban area (Medina, 1997).

Future of cardboard collecting?

Cardboard collecting in Los Dos Laredos is not static. As previously discussed, cardboard collecting is affected by and dependent on Laredo/Nuevo Laredo local ordinances, U. S. and Mexican regulations, as well as the interplay of factors that determine the global supply and demand for paper products.

Laredo authorities' tolerance of *cartoneros* could change in the near future. Texas Senate Bill 1340, enacted in 1993, mandates all municipalities in the state of Texas to reduce the amount of solid wastes disposed of at landfills by 40 % (Cárdenas, 1993). The city of Laredo launched a city-wide recycling program on January 1st, 1994, using the blue bag concept. In spite of the city's efforts, two potential problems stand in the way towards achieving the 40 % diversion goal. The city lacks an integrated waste management plan and no waste reduction or composting components have been considered. Instead, the city will attempt to attain the 40 % goal by recycling only. The first obstacle is the low quality of the newsprint used by the leading local newspaper. The former Laredo Recycling Coordinator states that paper mills in Texas and in Mexico refused to buy the newsprint collected by the city due to its low fiber content (Medina, 1997).

The second problem the city faces is the stealing of materials from the blue bags by scavengers. Since aluminum cans are light, easy to transport and in demand by industry, scavengers simply open the bags placed curbside and retrieve the cans before the bags are picked up by the Laredo Sanitation crews.

The absence of a buyer for the newsprint and the stealing of cans from the blue bags diminishes the amount of recyclables collected through the program and reduces the revenue that could be obtained from the sale of materials. Laredo authorities could decide to conduct a crackdown on scavengers, or even impose a ban on scavenging, in order to document a larger reduction of the city's waste stream and to increase revenues (Medina, 1997). As a result of persistent scavenging and loss of revenue, 220 cities and 33 counties in California have anti-scavenging provisions (Lacey, 1994).

Cardboard collecting also occurs in Nuevo Laredo, but scavengers face a more hostile environment there. Nuevo Laredo ordinances prohibit scavenging on the streets and impose fines of up to the equivalent of one week's minimum wage income. Even though the ordinance is rarely enforced, it provides local police officers the possibility of demanding bribes from the scavengers to avoid prosecution. Scavengers interviewed reported to have been subject to extortion from police officers.

Dumpsite scavenging, long a tradition at the Nuevo Laredo dump, is also under attack. On March 1994, the city awarded Setasa – a subsidiary of ICA, the largest construction company in Mexico – a concession for the collection and disposal of municipal solid wastes. Setasa, fearing that scavenging would obstruct the new landfill operations, announced that it would no longer allow scavengers in it. Cardboard arriving at the Nuevo Laredo dump was also recovered by scavengers operating there (Medina, 1997).

Theoretical Implications: Are Scavengers 'Self-Employed Proletarians' or 'Pockets of Peasants Engaged in Hunting-Gathering'?

Despite the fact that scavenging occurs throughout the developing world, it has received scant attention from scholars. Scavengers are often portrayed in the media as

being poor and on the margins of society. That view is shared by scholars, such as Lomnitz (1987) and Souza (1980), who have considered Mexican and Brazilian scavengers, respectively, as marginal groups and argue that scavenging shows weak or nonexistent linkages with the formal sector.

The most remarkable theoretical discussions of scavenging have been those of Chris Birkbeck and Daniel Sicular. Birkbeck (1978 and 1979) found that Cali scavengers were poor but by no means marginal, showing strong linkages with the Colombian paper industry. He argued that scavengers actually worked for the paper mills but that scavengers were not employed by the factories. Scavengers are, according to Birkbeck, part of the mainstream economy but exploited and poor. He characterized scavengers as 'self-employed proletarians'. Sicular (1992), on the other hand, criticizes Birkbeck and argues that there exist internal contradictions in Birkbeck's characterization: self-employed individuals can not be considered proletarians, because proletarians work for capitalists. Sicular conducted research in Indonesia in the mid-1980s and argues that scavenging is not part of capitalism, but is dependent on capitalism. According to Sicular, scavenging is pre-capitalist form of production and scavengers should be characterized as 'pockets of peasants engaged in hunting and gathering'. Thus, one side of the debate considers scavengers as being both poor and marginal, while the other side views scavengers as part of the mainstream economy but exploited and poor.

The following critique of Birkbeck's and Sicular's methods and analyses can be made. First, the two of them used qualitative methodologies in their field research. In general, qualitative methods are strong in validity but weak in reliability (Babbie, 1990). They may not have drawn their conclusions from a representative sample of their respective scavenger populations. Thus, their findings are hard to generalize to an entire scavenger population. Whenever possible, studies of scavenging population should use qualitative and quantitative methods, so that the data gathered can be considered valid, reliable and generalizable to the rest of the population. A combined quantitative / qualitative methodology enables the researcher to understand in depth the dynamics of scavenging as well as to generate statistically valid and reliable data. The statistics presented by Birkbeck and Sicular show weaknesses. Birkbeck (1978) for instance, based his analysis on only 13 interviews and used the sample mean (average) to describe scavengers' income. The median provides a better measurement of income of a sample than the mean, because the former is less susceptible to extreme values than the latter.

Both Sicular and Birkbeck's characterizations contain internal contradictions. Sicular (1992) correctly pointed out Birkbeck's contradictions. Sicular himself, however, brought in contradictions into his own argument of considering scavengers as 'peasants engaged in hunting and gathering'. Social theorists generally agree that hunting and gathering societies are fundamentally different from agrarian societies (Lenski and Nolan, 1991; Burch and Ellana, 1994). While Sicular made use of a Marxist analytical framework in his study, he did not follow Marxist social theory in his characterization of scavengers as hunter-gatherers: most Marxist social theorists would argue that

foraging and agrarian societies are fundamentally different, and they distinguish between foraging and agrarian modes of production (Ingold, 1988; Lee, 1990; Keenan, 1977).

My field research in Los Dos Laredos as well as studies conducted elsewhere demonstrate that scavenging populations do not exhibit the attributes that typify hunting and gathering societies: nomadism, lack of territoriality, small number of individuals, egalitarianism and lack of division of labor (Medina, 1997).

My research in the U. S.-Mexico border supports Birkbeck's view that scavenging has strong linkages with the formal sector. My results show that scavenging has strong backward and forward linkages, not only with the domestic formal sector, but with the international economy as well. The *cartoneros* of Nuevo Laredo can not be considered as poor. Consequently, this contradicts Birkbeck's finding in Colombia.

The results of my research do not support Sicular's proposed categorization of scavengers as a pre-capitalist form of production. Even though most scavengers in Los Dos Laredos migrated from rural areas, and may retain some traditions typical of the countryside, their scavenging activities are fundamentally different from peasant production. Even if some of them were once subsistence farmers, and operated on the margins of economy and society, scavengers now form part of the market economy. Also, the fact that scavengers sometimes collect materials for their own consumption without involving a monetary transaction –an activity outside the market economy– does not lead to the conclusion that scavengers function in a pre-capitalist form of production. Scavengers in Los Dos Laredos do occasionally operate outside the market, but they satisfy most of their needs by selling materials to industry for recycling. Scavengers have been a structural component of the Mexican paper industry since the sixteenth century, and today the industry relies on them for inexpensive supply of raw materials. Thus, the informal recycling sector reduces production costs to the Mexican paper industry.

Conclusions and Policy Implications

Despite appearances and arguments to the contrary, the *cartoneros* of Los Dos Laredos are an important component in the operation of the recycling system. Scavenging also plays an important role in improving the competitiveness of the Mexican paper industry because of the cost savings realized. Consequently, cardboard collecting in Los Dos Laredos can hardly be considered a marginal occupation, since it shows direct, strong backward and forward linkages with the formal sector of both Mexico and the U. S. Scavenging has direct linkages with, and is affected by, the international economy. Cardboard collecting is influenced by the interplay of factors that affect global supply and demand for paper products. Cardboard collecting provides the *cartoneros* a relatively stable occupation, has enabled them to raise a family, and provides them with a modest income, an activity they like, and living conditions they

rate as 'fair'. Cardboard collecting in Los Dos Laredos constitutes one example of the increasing economic integration between Mexico and the United States. It represents a mutually-beneficial activity: it provides a steady income to poor Mexican migrants while reduces the amount of wastes that Laredo needs to collect and dispose of as well as the tax burden on the *maquiladoras*. Recycling of cardboard also renders environmental benefits compared to the use of virgin resources.

My research shows that scavengers in Los Dos Laredos are neither poor nor marginal, contradicting the prevailing view among scholars. Scavenging constitutes, on the one hand, an adaptive response to scarcity, particularly for poor and migrant individuals. On the other hand, scavenging reduces production costs to industry. My research supports theorists who argue that the informal sector is a structural component of the type of development experienced by developing societies, and therefore is closely linked to the formal sector.³

Public policy towards scavengers should be based on this kind of research, and considering the environmental, social, and economic impact of their work. Public policy towards scavengers is often based on incomplete or superficial information. The relationship between scavenging and variables such as unemployment, economic globalization and privatization of waste management services should be investigated and considered in the design of public policy on scavenging.

NOTES

- ¹ Informal economic activities have been defined as characterized by ease of entry, reliance of indigenous resources, family ownership, small scale of operation, labor-intensive methods of production and adapted technology, skills acquired outside the formal school system, and unregulated and competitive markets (Thomas, J. J., *Informal Economic Activity*, Ann Arbor: The University of Michigan Press, 1992, p. 53).
- ² Figure used in a previous study (CEPAL, 1992).
- ³ Authors such as Portes, Castells and Benton (1989); Arizpe (1989); Beneria and Roldan (1987); De Soto (1990); Fernandez-Kelly (1989) and Sassen-Koob (1989) maintain that view.

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Table 1

Comparison of Alternative Costs of Raw Materials for the Mexican Paper Mills

(Mexican Pesos)

Raw Material	Cost	Index
Cardboard collected in Los Dos Laredos	300 Mex. P. / ton.	100 %
Imported cardboard (from the U. S.)	360 Mex. P. / ton.*	120 %
Market wood pulp (U. S.)	2,205 Mex. P. / ton.*	735 %

Cost provided per metric ton

* It includes Mexico's 10 % import tariff, but it does not include transportation costs

Sources: Medina, M. Survey Research. June 1994; Jaffe, M. 1995. Paper Industry's Amazing Resurgence. *Standard & Poor's Industry Surveys*. Building and Forest Products. August 10. Vol. 163. No. 32. Sec. 32. pp. B76, B91

Table 2
Socioeconomic Characteristics of Cartoneros

Variable or Attribute	Statistic
Males	97 %
Age	$x = 40.6$ years
Education	$x = 4.6$ years
Literacy	83 %
Married	83 %
Time collecting	$x = 12.95$ years
Collect materials in Laredo, TX	95 %
Have a fixed route	70 %
Number of scavenger relatives	$x = 0.35$
Migrants	70 %
Previous work experience	87 %
Have other sources of income	17 %
Have U.S. visa / crossing card	95 %
Amount collected	$x = 375$ Kg/day
Weekly median income	270 Mexican pesos

Source: Medina, M., 1994, Survey Research

Table 3
Comparison of Socioeconomic Characteristics of Cartoneros
and the General Population of Nuevo Laredo

Variable	Cartoneros	General Population
Migrants	69.6 %	41.0 %
Illiterate	16.6 %	7.4 %
Completed at least Elementary School	39.1 %	73.5 %
Home Connected to Sewer System	96.6 %	81.8 %
Home Connected to Water System	100 %	92.5 %
Home Connected to Electric Grid	96.6 %	95.1 %
Workers not Covered by Social Security	92.9 %	27.9 %*
Hours Worked per Week	48	40.8*
Household Size	4.1	4.6
Median Weekly Income (Mexican pesos)	270	173

* These figures refer to Nuevo Laredo's labor force and not to the general population

Sources: Medina, M. Survey Research; INEGI. 1993. *La Frontera Norte un Panorama de la Población y las Viviendas. Resultados Definitivos. XI Censo General de Población y Vivienda*; Alegría, T. 1990. *Ciudad y Transmigración en la Frontera con Estados Unidos. Frontera Norte. No. 4, Vol. 2.* ; González R., R. 1990. *Evaluación de la Encuesta Socioeconómica Anual de la Frontera. Frontera Norte. No. 4, Vol. 2*

Table 4
Environmental Benefits of Recycling Paper
Instead of Using Wood Pulp

Environmental Benefit	Percentage
Reduction of Energy Use	23 - 74 %
Reduction of Air Pollution	74 %
Reduction of Water Pollution	35 %
Reduction of Water Use	58 %

Source: Adapted from Cowles, R. 1986. Source Separation and Citizen Recycling, in Robinson, W. D. (ed.) The Solid Waste Handbook. New York: John Wiley & Sons