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Summary and Findings

The Internet is by all accounts one of the most important innovations of the late twentieth century. As yet the Internet's impact on the economies of developed countries is not obvious, and the economic implications for developing countries are even more unclear. Already much has been written about a supposed "digital divide" within nations and between nations, but no one has a clear understanding of the exact dimensions or implications of this divide. This paper does not take any position on whether Mexico is suffering from a digital divide or is likely to do so in the future; rather, it focuses on the recent rise of Internet sites and e-commerce in Mexico.

Internet usage in Mexico is growing rapidly, though the actual number of Internet users is still quite small when compared to large developed nations such as the U.S., Germany, Japan, etc. The current 1.3 million users amount to only 1.34 percent of the current population of 97 million; however, this number is projected to increase to 7.5 million in 2003. In Latin America, Mexico has the second-largest number of top-level domain registrations after Brazil (404,873 for Mexico versus 446,444 for Brazil as of January 2000). Mexico leads Latin America in new top-level domain registrations for the year ending in February 2000 (a 259-percent increase versus 150 percent for the next fastest-growing country, Colombia). Despite the recent rapid growth, Mexico still lags far behind the leading countries in the top-level domain measure. There are, of course, other measures that could be used. For example, the director of the Mexican subsidiary of the Internet firm iBest claimed that in June 2000 "Mexico has only 3,000 Web sites, 0.3% of the number in the U.S. and 15% of that in Brazil " (BNamericas.com 2000b). Though this estimate seems low, it does show that only in 2000 did Mexico enter e-commerce in a serious way.

At the risk of sounding Panglossian, the benefits of the Internet for developing nations will be enormous. The vast amount of information available on the Internet means that Mexicans who currently suffer from the disadvantages of weak and often inaccessible public library systems and a comparative lack of access to information now have the potential to obtain much more information than ever before. This incalculable benefit will only increase over time. The emerging Voice-over-IP (VoIP) technologies will dramatically decrease the costs of making phone calls, both nationally and internationally – a distinct benefit to lower-income Mexicans seeking to stay in contact with relatives overseas. A recent Telegeography report (2001) found that calls between the U.S. and Mexico accounted for one-third of all U.S. international VoIP traffic for 1999 and 2000, and this was expected to increase rapidly. The opportunities for individuals living in developing nations to benefit from the Internet are vast.

In the developing nations, much of the interest in the Internet has shifted from its myriad non-commercial benefits to interest in a narrower topic, namely the development of e-commerce. The seriousness with which Mexican business and government treat the potential for e-commerce is shown by the decision of 27 firms to form the Asociación Mexicana de Estándares para el Comercio Electrónico (AMECE). In 1999, more than 15,000 firms were associated with AMECE (2000).

This study examines several dimensions of the development of e-commerce in Mexico. The following are our main conclusions and observations:

1) E-commerce in Mexico must overcome some serious obstacles, and only some of these are open to government policy manipulation. They include the following:

a) Inadequate and limited infrastructure, including antiquated phone systems, limited bandwidth, and large sections of the country (particularly rural areas) that are either not served or underserved by telecommunications systems.
b) Access costs are high, particularly call-based or time-based charges for local phone service.
c) A relatively low rate of credit card penetration makes payment for online orders difficult.

d) An unreliable postal system makes courier delivery of items purchased over the Internet necessary, thereby increasing costs.

2) In order to secure adequate markets, many firms are pursuing a pan-Latin American or pan-Hispanic strategy. Services such as Web portals, search engines, retail sales, financial data, news, and other information are targeted at all parts of America (including the United States) and the world that speak Spanish, by sites based either in Mexico or outside of Mexico.

3) Contrary to what many once believed, pan-Latin American sites are not so easy to create. For example, in the financial sectors (such as banking), the laws and institutions vary from country to country. For portals, not only are the local media different, i.e., there is no pan-Latin American newspaper, but the languages vary from country to country. For example, Mexican Spanish is quite different from Argentinean Spanish, so editing is required, thereby raising costs and curtailing the advantages to be drawn from a "single" market.

4) Many of the more important nationally targeted Mexican e-commerce ventures (particularly several portals) are adjuncts to existing dominant media and consumer retail businesses. Only a few firms may ultimately control the Mexican market.

   a) The former Spanish government telephone monopoly, Telefonica, which has already become an important player in Latin America, is now moving aggressively into Mexico. Its portal Terra/Lycos will likely become one of the largest in Latin America and is strengthening its foothold in the Mexican market.
   b) The other major firm in the Mexican market will be the former government telephone monopoly Telmex owned by Carlos Slim of Grupo Carso, which also owns Sanborns. Telmex has an alliance with Microsoft, T1msn.com.

5) Many U.S. and Spanish firms are creating alliances with non-Mexican firms, e.g., Microsoft and Telmex with T1msn.com.

6) Many of the more important nationally targeted Mexican e-commerce ventures (particularly several of the portals) are adjuncts to existing dominant media and consumer retail businesses.

7) There are considerable barriers to establishing e-commerce startups in Mexico. In addition to the already mentioned access-related barriers, there are more business-related problems, including high capital costs, lack of a developed entrepreneurial venture culture, and a complicated and convoluted legal process to establish new firms. Despite this, there have been numerous e-commerce startups in Mexico (as many as 150 as of last summer, according to one report).

   a) The Mexican venture capital industry continues to be quite weak. In Mexico, most of the venture investing is done through family operations, and few of them are truly professionally managed. Much of the venture investment capital in Latin America and Mexico is provided by U.S. funds, particularly Chase Capital Partners and Flatiron Ventures in New York City.

8) The most important development of e-commerce in Mexico could easily be in the business-to-business (B-to-B) area rather than business-to-consumer. Already, leading Mexican companies such as CEMEX have invested aggressively in B-to-B e-commerce. They are implementing Web-based electronic data interchange (EDI) systems in their supplier changes.

9) Nearly 40 percent of the major Mexican or other Latin American e-commerce Web sites that we studied (31 out of 78) are run from servers in the United States.

Introduction

The Internet will be the defining technology of the first decade of the twenty-first century. It is redefining boundaries of all sorts in new and unforeseen ways. As with previous technologies, the Internet presents opportunities and dangers for developing countries such as Mexico. For example, the Internet dramatically lowers barriers to cross-border trade. This will permit international retailers to penetrate the Mexican market, while providing opportunities for Mexican firms to enter the global market, particularly markets in Spanish-speaking Latin America and the huge U.S. Hispanic market. But this is only the tip of the iceberg of change. For example, in a country such as Mexico, in which information has not been readily available and public libraries are relatively few in number and poorly stocked, the free and low-cost information available on the Internet provides a powerful new distribution medium – it provides inexpensive access to global information sources. For consumers, it offers an opportunity to circumvent an inefficient, overpriced distribution system. Mexican firms can use the Internet to find new customers and/or new suppliers. Conversely, while making a far larger market available to Mexican firms, it exposes them too much greater international competition.

Flores and Gaspar (1997) argue that the Internet offers an opportunity for countries such as Mexico to increase already growing relations and strong existing linkages with the more developed economies. Mexico is part of what they term "the intermediate countries in terms of communications infrastructure." For them, the Internet opens new connections for information to flow more quickly than ever. This is true, but the Internet may also exhibit winner-take-all characteristics on a global-level. If this is correct, it might be that the Internet will open up the Mexican economy to competition from Web sites in more advanced nations, while there would be far fewer reciprocal opportunities for Mexican Web-based firms to expand outside of Mexico. This would suggest that the Mexican economy will simply lose. The most likely result is a complicated series of shifts and surprises that lead to entirely unforeseen results.

There can be little doubt that Mexican usage of the Internet is growing rapidly. Most significant firms now have Web sites, and Internet Service Providers (ISPs) have proliferated. Credit Suisse First Boston recently estimated that there are 1.7 million Internet subscribers in Mexico (CNET News.com 2000a).[1] Internet research firm eMarketer estimates that there are currently about 8 million Internet users in Latin America and projects nearly 20 million by 2003, about 5 percent of the worldwide total (Business 2.0 2000). Cable modem service is being established in many Mexican cities: in Mexico City, Cablevision is starting its roll out of cable modem service in January 2001. Per-call, rather than per-minute, phone charges are being instituted in some Mexican cities (BCG 1999). Most large institutions are connected to the Internet, and "cyber cafes" can be found in the more affluent parts of many Mexican cities. For example, Ensenada, a small coastal city in Baja California, has as many as 10 Internet cafes, some with direct, relatively high-speed connections. Tulancingo, a small city in the poor agricultural state of Hidalgo, has at least four cyber cafes, and young people exhibit a sophistication about the Internet that rivals their counterparts in more urbanized parts of North America.[2] Competition has lowered the connection costs in these cyber cafes to just under two dollars per hour. A great deal of interest in personal computing and the Internet exists on the part of young people, particularly those who attend schools or universities where they can obtain access without having to invest their own funds. While computer equipment is still priced too high for the majority of Mexican consumers, the recent decline in computer and component prices has created a flourishing trade in "white box" systems assembled locally (Guadarrama 1998). The most popular computers as a percentage of the market are in the white box category. A PC adequate for Internet use costs only $400-600 in many parts of Mexico. A thriving retail market for unauthorized copies of software programs has developed in Mexico City and other Mexican cities.

[1] Other estimates put the number as low as 1.2 million.

[2] The most recent census reports that the population of the municipio of Tulancingo is about 122,000. A municipio is similar to an U.S. county. The actual urban area of Tulancingo probably has about half that population (INEGI 2001).

There is a great deal of interest and investment in e-commerce in Mexico and other Latin American countries (Petersen 2000). According to a recent report by Credit Suisse First Boston, online advertising spending in Mexico alone should reach $28 million, about a 155-percent increase over last year (CNET News.com 2000b). Numerous Web portal services have been created in the last two years, both by domestic and international startups, and by existing foreign portals such as Yahoo! (see Table 1). These sites utilize a number of strategies depending on the interests of the investor. Companies like Yahoo! and MSN are branching out both to Spanish-speaking Hispanics in the U.S. and Spanish and Portuguese language markets in Latin America. Large Mexican media firms like Televisa and Grupo Azteca are seeking to extend their reach into new markets, often by partnering with a U.S. company, as in the case of Telmex and Microsoft's T1msn.com. Numerous other portal sites have been developed either by Mexican investors with a domestic focus or, as in the case of Starmedia, by international investors whose goal is to develop the entire Latin American market.

Generally speaking, the borderless nature of the Internet, and the drive on the part of many e-commerce sites to develop an international market, means that it is probably more accurate to think of a pan-Latin American or pan-Hispanic Internet than an Internet bounded by national borders. Though, as we shall discuss, it could be that the concept of a "Hispanic" or pan-Latin American market may be questioned because of the need to customize sites by country. And yet, to achieve the necessary market size, most important e-commerce startups such as portals, e-retailers, finance sites, etc., must have an international focus. Argentina, Brazil, Mexico, Spain, and the United States are emerging as the business centers of the Latin American/Hispanic Internet. Several sites studied are focused on those five countries; many others are attempting to serve unique content too most, if not all, Spanish-speaking countries.

The Internet has had less impact in Mexico, simply because access is limited to approximately 2 million users. Its expansion, despite being spectacular during the last five years, is severely limited by high service costs, low phone line density, and poor telephone service quality, to say nothing of computer equipment costs, which are prohibitive for most of the population. Only 12 percent of households has a telephone, and about 2 percent of the population currently has Internet access; users are primarily from

entrepreneurial, academic, and professional circles. There is some research focusing on the Internet's expansion in Mexico (Loyo 1997; Gutiérrez and a 2000), although the authors themselves recognize that the data and conclusions from these explorations are merely initial approximations of a phenomenon that is advancing at breakneck speed and whose consequences are still very uncertain. In addition, Internet expansion analysis leads inevitably to issues of telecommunication infrastructure availability, telephone service quality and cost, and the population's access capabilities (Gutiérrez and Islas 2000b; Landa 1997; Trejo 2000).

There is a direct relationship between the level of Internet development and potential e-commerce development. As stated earlier, only 2 percent of the Mexican population uses the Internet; of these users, only one-fifth carry out any type of economic transaction online. Nonetheless, it is estimated that commercial Internet transactions during 1999 totaled $200 million. Thus, although this is still an emerging phenomenon in Mexico, numerous companies throughout all sectors have begun to develop strategies aimed at penetrating Internet commerce. First of all, there are the large transnational corporations that use internal networks – through an Intranet connection or various network technology products such as SAP, Cisco, or others – in order to synchronize their activities, optimize information flow, and coordinate exchanges with clients and suppliers. Second, there are national and local corporations that have delved into product and service commercialization through the Internet. Finally, there are the self-same companies that offer services related to the Internet such as hookup, consulting, technical support, design, and advertising.

All forecasts predict an accelerated increase in Internet use within the next few years, particularly in commercial transactions (Expansión, 2000). In addition, the medium's current and potential users are among the nation's most dynamic social and economic groups (professionals, university students, corporations, and government institutions). It is estimated that by 2003, the number of Internet users in Mexico could reach 7 million, on top of the 50 million total in Latin America. Among the topics related to the Internet, e-commerce is the one that has lately generated the most interest in Mexico, resulting in several research projects and exploratory essays (Loyo 1997; Ramírez 1999; Miranda 1999; Jímenez

2000). Other topics that have been explored in nascent studies on Internet development are education, journalism, and cultural consumption.

This report pays particular attention to the question of borders. As many have observed, as far as the transmission of data is concerned, the Internet is borderless. With adequate bandwidth and an increase in desirable products available by direct download, there is no reason why e-products and Web sites aimed at one national market cannot be located in another national economy far away. However, it is also true that for most services each country has its own idiosyncrasies, which can make certain types of cross-border marketing difficult if no attempt is made to conform to the local environment.

We provide an overview of the issues involved in the development of the Internet and e-commerce in Mexico. First, the report discusses the current state of the Internet and e-commerce in Mexico. This is followed by a description of the main obstacles confronting the development of Internet usage and Internet business in Mexico and Latin America. The final sections provide an overview of the various approaches towards Internet and e-commerce development currently being undertaken in the Mexican/Latin American context, including a case study of the impact of the Internet in Hermosillo, Mexico and the State of Sonora.

Methodology

Three research methodologies were used in the preparation of this report: The first methodology was a review of the literature in English and Spanish on the evolution of the Internet in Mexico. The second methodology was a study of the most-used Mexican Web sites. The final methodology consisted of personal interviews with representatives of prominent sites. All three of these methodologies presented difficulties. For example, the literature on Mexican sites is sketchy and the news reports seldom provide much detail. The examination of the Web sites provided some information; however, many sites gave little or no information on their management team or financial backers. It was difficult to arrange interviews with Internet executives because of their extremely tight schedules, but we were able to

conduct some interviews. These interviews were particularly useful because they provided a glimpse into the issues Mexican Internet firms face.

The Internet in Mexico

The Early History of the Internet in Mexico

In 1969, the Internet was first launched in the U.S. by the Department of Defense's Advanced Research Project Agency (DARPA) as the ARPANet (Abbate 1999). The first countries to connect to the Internet tended to be the U.S.'s closest Cold War allies. The first Mexican institutions to connect to the Internet were the universities. The first connections were Instituto Tecnológico y de Estudios Superiores of Monterrey (ITESM) and Universidad Nacional Autónoma de México (UNAM), which connected to BITNET in 1987. The first actual connections to the Internet using Internet protocols were made in 1989, once again by ITESM. Then in 1990 a number of other Mexican universities and educational institutions, including the Ministry of Public Education, were connected. Gradually other Mexican educational institutions joined, and by 1994 most were connected (Gutierrez Cortes and Islas 2000b). However, given their limited budgets, even a connection did not mean that the entire institution was wired with high-speed connections. Moreover, the service was routed through servers in Mexico City, which meant that service was slow or sometimes interrupted.

After 1995, the adoption of the Internet by universities and government agencies accelerated. As in the U.S., early adoption occurred in the engineering departments, followed by the sciences. The social sciences would be much slower, because of a lack of funds for computers and local area networks and also a generally conservative bias in these faculties. By 2000, however, Internet use was generalized, and most university students had an email address. Government agencies were slower to adopt the Internet; however, by 2000 every Mexican state government except Quintana Roo had a Web site (Gutierrez Cortes and Islas 2000a).

Mexico was relatively slow in introducing the Internet into its higher education system, and thus Mexican industry took even longer to become aware of the Internet's potential. Certainly, awareness of

the Internet trailed that of the developed countries and even Brazil. However, leading educational organizations, such as CONACYT, did recognize the opportunity and, indeed, the necessity of connecting to the Internet. Measuring the speed with which the Internet was accepted is difficult; however, the intense interest seen in other developing countries, particularly those in Asia, seems to have been slower to develop in Mexico.

Growth in Internet Usage

The increasing penetration of PCs in the home, and PCs and local area networks (LANs) in the office, means that a significant installed base now exists in Mexico. Estimates of how many Internet users there are in Mexico vary widely, but clearly the number is growing fast. In 1998, the consulting firm IDC-Select (1999b), estimated that there were 2,453,000 Internet users in Mexico, and projected an increase to 4.2 million by 2002. A recent study by Internet ratings firm NetValue estimates that there are about 571,000 people "online" in Mexico (Jones 2000). Of these 41 percent are women, and 37 percent are between the ages of 15 and 24. Overall the majority of Internet users are in businesses, followed by home users and school users (see Figure 1). More recent estimates put the number at 1.7 million, increasing to around 5 million by 2005 (CNETNews.com 2000a).

Data on Internet hosts and domain names provide a more empirical perspective -on developments in Mexico. NIC-Mexico (2000a) reports that in the first half of 2000 there were 495,747 Internet hosts in Mexico (an increase of 121.6 percent over the previous year).[3] Figure 2 shows the geographic distribution of Internet hosts in Mexico. Domain name registration in Mexico (.mx) grew 167.0 percent for the year ending in August 2000, outstripping the average of 107 percent for ten Latin American countries, an average that includes countries such as Costa Rica, which have seen recent explosive growth from a very small base (see Table 2 and Figure 3). Despite its rapid growth, Mexico still lags far behind the leading countries like Japan and the United States (see Figure 4). The largest growing domain-name

[3] "Host" refers to any computer that has full two-way access to other computers on the Internet. Internet hosts have unique numerical identifiers (IP addresses).

category is .com.mx. According to the most recent data, there are currently 49,947 unique registered top-level domain names (i.e., names under the top-level designation .mx) in Mexico, of which 91.2 percent (45,560) are commercial (.com.mx).[4] In all dimensions, business usage (.com or .com.mx) continued to experience the most rapid growth (160 percent for the year ending in July 2000), with all other categories growing almost as quickly (139.0 percent) but from a much smaller base – 4,387 as of July 2000 (see Figure 5). The fastest-growing non-commercial domain type is .org.mx.

The availability of data posted by Mexicans is also growing rapidly. Here again, little published information exists. A cursory survey of the Web itself indicates a growing number of Mexico-based postings. A large number of sites can be found on many topical areas, including colleges and universities, national government agencies and local governments, tourist-related businesses such as hotels and restaurants and general travel guides for various cities and regions. There are also general firm information/advertising sites, financial information sites, and economic or export promotion sites. Many of these sites are locally based, while many others, multinational hotel chains for example, are located on U.S. servers, or have dual local and U.S.-based components. The "channel bar" for Mexico that ships with Windows 98 contains 10 channels, of which all but one are addressed under the ".mx" domain. These are Televisa, Grupo Radio Centro, Cinemex, CNI, Compuserve, Infosel, MVS, Sayrols Net, Wall Street Journal Americas, and TV Azteca. With regard to the governmental sector, on the basis of CyPRG (1999) ratings, a global rating system for governmental access, the Mexican government has similar scores to other developing countries on transparency, interactivity, and openness; however, on all scores it ranked lower than Brazil. However, in 2000 the Mexican government committed itself to becoming more Web-based, a policy that over time might have a significant effect on making he operation of the Mexican government more transparent.

[4] A domain name locates an organization or other entity on the Internet, such as www.yahoo.com. While Internet hosts have IP addresses, not all host computers have domain names, i.e., are Web site servers. The domain name system organizes domain names in a hierarchical fashion based on type, geography, etc. For example: top-level

Internet Access and Service Providers

Internet access in Mexico will take many forms. In Mexico, as in other countries, the dominant household technology for Internet access in 2000 was a PC with a dial-up modem to a local Internet service provider (ISP). This paper does not examine the cyber cafe as a type of access, and there are no estimates of how important this service is to Mexican Internet users.

The most important competitor with dial-up access is the cable television system, but cable television penetration in Mexico, at 16 percent, remains relatively low. There are over 220 operators covering 1.7 million subscribers. Eight groups, however, have dominated more than 70 percent of the market. The largest operator is Cablevision, owned by Televisa and Telmex, with 400,000 subscribers. Only four cable television providers in 14 cities are currently providing high-speed Internet access (U.S. Department of Commerce 2000). Other cable companies offer services in the following cities: Cablemas in Cuidad Juarez, Chihuahua, Mexicali, and Tijuana; Television International in Monterrey; Megacable in Guadalajara, Tepic, Veracruz, Jalapa, and others. In some cities, cable modems are often the connection method of choice, because of their speed and the flat rate.

The phenomenon of free Internet access came much later to the Mexican market than it did in the U.S. The first free access was Terra Libre launched by Terra Networks Mexico, a subsidiary of the Spanish firm Telefonica, in November 1999. Two other free access services were Gratis1.com, Inc. a joint venture of Chase Capital Partners, New York-based Starmedia Network, Inc. and others and Tutopia.com, a subsidiary of Miami's IFX Corp (Rodriguez. 2000a; 2000c). The uptake of free Internet was slow in Mexico: by July 2000 only about 420,000 people of the 2 million total users were availing themselves of free access (Garibian 2000).

The Mexican market has not been easy for non-Mexican ISPs to penetrate, in large measure because Telmex, the former monopoly phone provider, is under no pressure to provide access for other firms. The situation is particularly beneficial for Telmex. Since the firm receives the local phone charges

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geographical domain names include .us for the United States and .mx for Mexico. Top-level types refer to the group or individual running the Web site and include .com for commercial Web site and .gov for government Web sites.

by the minute and can charge for Internet access, it always has the option of providing "free" access, because it can still secure profits from the local call. Thus, Terra, AOL, and other competitors have had difficulty making headway in Mexico (Reuters 2000).5

E-commerce in Mexico

Focused commercial sites in Mexico and Latin America are growing rapidly. Mexico's move to e-commerce mirrors that of the United States, but lagged by about three years and developed on a much smaller scale. In 2000, the government enacted legislation recognizing Internet purchase orders as binding contracts (Greenberg 2000b). Most of Mexico's major media and consumer marketing groups, such as Televisa and TV Azteca, have established portal presences on the Web either independently or in partnership with U.S. firms. Like their counterparts in the U.S. such as Yahoo!, these sites include a variety of offerings including news content, free email and other services, and various types of online mall and auction services. In addition, a growing number of existing local retail business, such as book stores, computer retailers, and music CD retailers, have established a presence on the Internet. According to a recent study by the Boston Consulting Group and Visa, in 2000 there were in excess of 1,300 e-commerce merchants in Latin America (Hallford 2000).

E-commerce in Latin America and Mexico grew quickly. According to a study released by Forrester Research (Greenberg 2000a), e-commerce in Latin America (excluding Mexico) was expected to reach $83 billion by 2004. Brazil and Argentina were expected to account for most of the value – $64 billion and $10 billion, respectively (see Table 3 that lists the data for 2000). Mexican e-commerce, partly due to the effects of NAFTA, could reach $107 billion by 2004. While this a significant amount for Mexico, this would be only about 3.3 percent of the projected total of $3.2 trillion the United States.

[5] AOL has had limited success in gaining market share in overseas markets. This limited success is curiously the inverse of the explanation of their success in the U.S. and is path dependent. In the U.S., AOL was an important player in the dial-up access market **prior** to the emergence of the Internet. This meant that it began with large market share and was able to parlay that into a dominant position in the dial-up market for Internet services, despite their lack of any technological or pricing advantage. When AOL offered their service overseas, they had no special

The Boston Consulting Group and Visa recently predicted that retail e-commerce in all of Latin America would reach about $580 million in 2000, an increase of 432 percent over 1999 (Hallford 2000). Mexico occupied the second position in retail e-commerce ($91 million) after Brazil ($300 million) and before Argentina ($82 million). They also estimated that only about 7 percent of retail e-commerce sales would come from the U.S., down from about a third in 1999. In contrast to the U.S., where business-to-consumer (B-to-C) e-commerce emerged first, there was substantial evidence that the business-to-business (B-to-B) e-commerce area was expected to grow most quickly in Mexico. (B-to-B is discussed in more detail in a later section.) For example, in 2000 the Mexican government estimated that 70 percent of e-commerce was B-to-B and that it reached several hundreds of millions (Greenberg 2000b). In contrast, B-to-C e-commerce was estimated to be only $50 million.

Despite the barriers to Internet usage and e-commerce, Mexico has witnessed a remarkable explosion of e-commerce startups. According to Quinones (2000), approximately 150 "dot-coms" were launched since summer of 1999. A study by Bain & Company found that venture capitalists had invested at least $1.5 billion in Latin American Internet and e-commerce startups (Greenberg 2000c). While small by U.S. standards, this was a remarkable sum, given the notorious reluctance of investors to bankroll new ventures, particularly in the closed world of Mexican business. A number of young entrepreneurs, many having recently completed MBAs in the United States, shocked family and friends by choosing to participate in a startup, rather than take jobs in established firms or family businesses (Quinones 2000). Many of the Latin Americans finishing their MBAs at Stanford University, while interested in starting or working for Internet business, were reluctant to return to their home countries to do so. Miami, considered by some as the "hub of the Latin American Internet," has been a magnet for many Latin Americans interested in e-commerce (Epstein 2000).

The Mexican sites generating the greatest amount of traffic are the portals, even more so than in the U.S. There are stand-alone e-commerce sites such as Fiera and DeCompras, but are was not yet an

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advantages and thus met consumer indifference. When this was combined with a premium price package, customer response was usually negative.

abundance of such companies. Some companies such as Sanborn's, which operates a chain of restaurant/pharmacies throughout Mexico, were developing their e-tail operations to build upon their existing brand popularity. The portals offered e-commerce offerings either vertically through their own Web site or by providing links to another online shopping site. This leverage to route network traffic suggests that the dominant portal sites would have considerable influence over which e-commerce sites would become the dominant Web e-tailers in Mexico.

Three main groups of Web sites are currently contesting for dominant market share and attempting to establish themselves as the premier portal-sites. The first and most numerous set of competitors are based in the United States and are exemplified by AOL, Starmedia, Yahoo!, Yupi, and QuePasa. These firms were funded by U.S. venture capitalists and thus had large reservoirs of capital initially. They were extremely aggressive and created much hype. Another set of competitors were based in countries other than the United States and Mexico; these competitors are represented by Terra Networks out of Spain and El Sitio from Argentina. For the most part, existing Mexican companies were early movers onto the Internet; however, Sanborns is an important exception. There were also some Mexican startups such as DeCompras that might become competitive. The final and possibly the most well-balanced types of competitors might be joint ventures such as the alliance between Microsoft and Telmex, which combined very knowledgeable Internet companies with well-established Mexican brand names. The strategies of these companies are examined below.

All of the above-mentioned companies, with the exception of Sanborns and DeCompras, are not e-commerce-only sites. They are also search engines or portal sites. The connection between the portals and e-commerce is one of convenience. The portals are able to direct traffic to the e-commerce sites that they are sponsored by, and thus help affect which sites succeed and fail. Surprisingly, several of the portals have chosen to launch their own e-commerce offerings in addition to that of their sponsors.

The relationship between e-commerce and these portals is important because they will be able to funnel their users to whichever purchasing sites they wish, and in effect, help to determine the winners in the market. The Spanish-language portals vary in degree of sophistication, since many of the search

engines themselves are less than a year old and are still in the process of signing up companies that wish to advertise and sell products on their Web sites. For example, Yupi.com hoped to integrate the e-commerce and portal functions, so they not only operated the portal but also operated all of their online sales and marketing. The following section reviews some of the different Mexican e-commerce businesses. The subsequent section outlines several key requirements that appear to be necessary for success in the Mexican electronic marketplace.

Barriers to the Growth of E-Commerce

There still exist considerable barriers to the development of e-commerce in Mexico. In addition to the relatively high cost of computer equipment, low-quality phone connections at the local level make high-speed connections difficult. Despite their decreasing cost, PCs are still a expensive consumer item, and combined with Internet access and phone costs, accessing the Internet privately is still out of reach for most families in a country with a GDP per-capita of $8,500 and with 27 percent of the population below the official poverty line. High local phone rates present another serious obstacle. Moreover, a the majority of Mexicans do not have bank accounts or credit cards, so most are unable to pay for Internet-based services or retail products online. The parcel delivery system is unreliable, or if reliable, expensive, making electronic retail sales of physical goods less feasible. Given all this, it is unlikely that in the near term Mexico will reach the same critical mass that fed the explosive growth of e-commerce in the U.S. However, both commercial and non-commercial Internet usage has been growing in Mexico. Further growth could occur along lines similar to the U.S., and there is the possibility that the Internet's ability to transcend borders will lead to some Mexican e-commerce being implemented by, or even dominated by, U.S. firms. Mexico will find ways to overcome the barriers to Internet development by adapting to the Internet, and by adapting the Internet to Mexico.

Before the Mexican population can purchase goods online, computers and Internet access must be affordable and reliable. Old, outdated phone technology exists throughout Mexico and Latin America; in many parts of Mexico the best possible connection speeds over phone lines are between 14.4 and 28.8

kbps (Alvarado 2000). Moreover, there is only about one installed phone for every ten people in the population (see Figure 6). Residents of many smaller towns, even if they have phones, are not able to access Internet service locally (Belejack 1998). Recent investment by Telmex and American companies such as PSINet and Qwest Communications should alleviate some of the bandwidth problems, but high levels of regulation and the monopolistic structure of the Mexican telecommunications industry, particularly the now-privatized Telmex, operate to retard change and discourage competition (Gonzalez et al. 1998). Greater bandwidth will not be sufficient to cure the high-cost, low-value situation that hinders the present state of Mexican Internet access.

Internet access from the home using the telephone system is expensive. The home user will be required to pay the ISP roughly 200–300 Pesos per month (roughly 20–30 dollars). In addition, there is also a per-minute charge after a set number of minutes, usually averaging about 7 minutes per day. Finally, as in most other countries, local phone calls are charged on a per-minute basis. Thus the home Internet user pays heavily for Internet usage. Even the recent arrival of free ISPs such as Gratis1 and Terra help only a little; any user spending more than a few minutes per day using the Internet will pay a large phone bill. It does appear that this problem is being ameliorated. Recent informal interviews by the authors indicate that the telephone service cost problem is being solved at least in some cities.

Payment and encryption issues are also problematic in Mexico. Credit card usage is still confined to about 22 percent of the Mexican population (Business 2.0 2000).[6] Bank accounts (particularly checking accounts and ATM access), while increasingly widespread, are still not as ubiquitous as in the U.S. Many employers still pay their employees in cash. Since one of the most convenient aspects of Web shopping is the ability to make immediate payment for goods with a credit card, this serves as a barrier to the development of the type of retail e-commerce becoming common in the U.S. Infrastructure problems make it difficult for those with credit cards as well. Many sites lack both secure links and automated payment systems; often even when payment is made online, the credit card numbers are read off a screen

[6] According to U.S. Government estimates, about 20 percent of the population receives 55 percent of national income.

and then punched into a credit-card terminal. Jan Smith, the managing director of InfoAmericas, states that even if the consumer-side problems were solved and "you had this massive surge in consumer purchasing, the infrastructure of consumer sites is not ready" (Weisman 2000). Lack of credit cards could be overcome with the development of ATM-based debit cards, which could be used over the Internet. However, ATM use in Mexico has only recently grown, since many companies have begun using ATM networks to circumvent security problems associated with distributing large cash payrolls at the work site.

Consumer perceptions of security presents a formidable barrier to the kind of retail e-commerce growth seen in the United States. Whether these concerns were justifiable was not ascertainable. One of the greatest difficulties for e-commerce in Mexico is the lack of confidence in the reliability and honesty of unknown vendors. There is an understandable reticence to disclose credit card numbers to such vendors. The fact that the U.S. Government has allowed the export of 128 bit (high security) encryption embedded in the most popular browsers might allay part of these fears. But most consumers are probably unaware of the strength of such security, and the larger issue is probably what the vendor could do with the credit card information. Here, general concerns with the effectiveness of the legal system in protecting consumers creates a general feeling of distrust, not allayed by promises of better technical security (InfoAmericas 2000). This is evidenced by studies indicating that Mexican consumers feel more confident purchasing online from a company based in the U.S. versus a company indigenous to Mexico. The possible perverse outcome could be the willingness to provide credit card numbers to an U.S.-based firm such as Amazon or Dell and not to a Mexican firm.

Mexicans interviewed on a casual basis by the researchers expressed a preference for U.S.-based news, information, and portal sites. The oft-cited reason is a higher level of trust of the reliability, security, and quality of the information and services offered by U.S. sites. Additionally, there is a corresponding lack of confidence in the public postal system. One of the major factors that has pushed the rapid growth of Internet retail sales in the U.S. is the existence of a very highly developed and reliable package delivery system including both the U.S. Postal Service and private carriers such as Federal Express and United Parcel Service (UPS) (Kenney and Curry 1999). Indeed, the Mexican postal system

cannot be used to deliver retail purchases, particularly easily resalable items such as electronic goods or music CDs. Alternative private services such as UPS and DHL are generally very reliable, but are also more expensive. There are now alternative Mexican-operated sites. The first is Estefeta, which is less expensive than the foreign services, though not quite as fast. Not quite as efficient is Mexpost, a fast delivery company operated by the Mexican postal service, though it does not suffer the bad reputation of the regular Mexican postal service.

It is clear that e-commerce in Mexico, in its incipient stages, will take off most strongly among a minority of the population in the upper middle and upper classes. The Boston Consulting Group estimates that given the conditions prevailing in 1999, about 11 percent of Mexican households can afford Internet access. They estimate that given ideal conditions, including American-level ISP rates, flat telephone rates, and PC leasing, about 18 percent of households could afford Internet access (BCG 1999). While numerous lower-income primary and secondary school students have relatively high-quality Internet access available at their schools, they, like their counterparts in the U.S., use the Internet for entertainment, information, email, chat, file transfer, and other non-purchase activities. This group leads the country in Internet usage.

Business-to-Consumer E-commerce

Mexico and the U.S. Hispanic and pan-Latin American/Hispanic Markets

The Internet version of cyberspace does not occupy space in the conventional sense. Taken collectively, the Internet is not about the actual physical hosts, nodes, routers, switches, cables, and backbones that make up a physical entity; it is a borderless, homogenous space structured by protocols and domains expressed in code (Lessig 1999). Any computer connected to the Internet can potentially access any other computer connected to the Internet. This is already having profound implications for the way people live and work, and with the advent of wireless access, people will be able to carry cyberspace with them wherever they go in physical space. It will also likely have profound effects on the structure

and function of markets, increasingly throwing into question some nationalist notions of economic exchange.

The most salient variables affecting the developing structure of e-commerce and Internet space on the international level are path-dependent evolutions from previous features. Insofar as the Internet is used to facilitate the exchange of tangible goods (take Internet merchants such as Amazon.com, for example), e-commerce is at least partially subject to the limitations inherent in the physical transfer of matter, such as transport distance, security problems, the effects of weather, national boundaries, etc. The "transport" of intangible, information-based goods, be they music, software video, text, or anything else reducible to bits, is virtually frictionless. Communication over the Internet is limited more than anything else by language and cultural barriers.[7]

Thus, while the actual physical nodes (i.e., the servers) of a given Web site or e-commerce firm are place-based, potential audiences exist in a world without boundaries. If one takes a global markets view, then the United States is at least partially a Latin American country; ranked by population, the United States is currently the fifth-largest Latin American country, with a Latino population of 32.0 million. In 2050 the U.S. is projected to be ranked third, with a Latino population of about 96.5 million, nearly the current population of Mexico (Davis 2000). Latin American e-commerce firms have a compelling interest to include this population in their marketing plans.

A certain ambiguity exists with respect to a firm's physical location and its market "location." U.S.-based firms routinely target Mexican audiences, while Mexican (or other Latin American) Internet startups are also trying to develop markets in other Latin American countries. According to Grant Smith, an analyst with the Yankee Group, "a typical path involves establishing operations in Miami, getting funding from U.S. venture capital firms, and positioning themselves as a pan-regional Latin American

[7] It is interesting to speculate how much of a problem language will be in the future. Already there are Web sites which will perform rudimentary translations. It is entirely possible that in the future very sophisticated translation programs could run on very powerful servers, providing real-time translation of Web pages, email, and most interestingly, chat and instant messaging. Another possibility is that the Web could lead to the evolution of a pan-Hispanic style, which is acceptable across regions. However, in the near term, language and cultural affinity will be powerful forces shaping Internet communities and e-commerce.

player" (Welte 2000). Perhaps the most well-known example of this is Starmedia, which is funded primarily by U.S. investors and has its headquarters in Miami. According to published information and interviews conducted for this report, many pan-Latin America-focused e-commerce businesses include U.S. Hispanics as part of their marketing strategy. Moreover, many U.S. e-commerce firms, either intentionally or unintentionally, have customers located somewhere in Latin America. Interviews and discussions with Mexican Internet users indicate a preference for U.S.-based portals, news and information sites, and Internet retailers. Reasons given include security concerns, site quality, trust, and the overall appeal of U.S.-based sites and brand-names.

According to a recent study by the consulting firm eMarketer, almost 75 percent of Latin American online shoppers use U.S.-based sites (Business 2.0 2000). ZonaFinanciera.com claims that 25 percent of its 500,000 unique monthly visitors are from the U.S.. Along with ZonaFinanciera, Patagon and LatinStocks have also made efforts to attract U.S. Hispanics (Schibsted 2000). All three of the major finance sites above are headquartered in the U.S.. U.S. Internet and e-commerce firms, such as AOL and Yahoo!, have made efforts to cater to Spanish speakers in the U.S. and to those in other Latin American countries through target operations and sites such as Yahoo! Mexico.

Customization

While there is a great deal of linguistic homogeneity in Latin America, the news, entertainment, and other information differs from country to country. Put differently, Mexicans are little interested in Argentinean national news and vice versa. Sites that address the Latin American market at an aggregate level instead of customizing content to each individual country will meet with only limited success. Two alternative strategies are possible: The first consists of portal and e-commerce sites indigenously created and focused on the home market. Such sites usually attempt to seek the advantages provided by existing brand names through tie-ins with, or spin-offs from, existing media properties. This is the case with the portal Todito.com that is 50 percent owned by TV Azteca and esmas.com, which is a subsidiary of Televisa. Another approach is to leverage economies of integration by creating an integrated system of

nationally or regionally-based content that is then delivered selectively to groups of users based on their location, or on whatever particular customization they select.

There is a tremendous amount of competition already present, and although sites such as Starmedia have received the most attention, their cross-national attractiveness is dubious. Many of them offer only a mix of news from all over the continent. This superficial customization is unlikely to be sufficient to capture users. Starmedia's strategy has been to establish branches that create local content, with the assumption that local managers and site developers are best able to respond to the needs of regional or national audiences. There is also significant linguistic heterogeneity to require that content be edited to local standards (Marcos 2000). Terra and Microsoft have developed the most advanced portal sites with respect to such customization. When users browse Microsoft's site (www.msn.com.mx), they are able to choose the Mexican city in which they live to obtain updated weather every day, along with news specific to Mexico. Similarly, Terra's Mexican site (www.terra.com.mx aka. www.infosel.com) includes customized Mexican news, as well as surveys that ask questions of Web site viewers ranging from their opinions on politics to their preferences for gift giving.

It is important to consider the limitations of customization as a necessary or basic strategy. Many of the services accessed through portals, e.g., search, chat, email, news and information, weather, etc., need only minimal customization, if any. Generally speaking, people use portals as starting-points, searching out specific localized content when desired. Portals wishing to target particular nations or regions can aggregate content from other providers (news for example), as is the case with several portals which aggregate content from Notimex, a Mexican news service.

Brief Descriptions and Discussion of Major Sites

This section contains summaries of selected Mexican and pan-Latin American Internet businesses and sites. The sites fall into three categories: portals; general e-retailers; and financial, travel, and employment services.

Portals

Starmedia: Starmedia was established in 1996 and was funded by U.S. venture capitalists Chase Venture Capital Associates, Flatiron Fund and various Warburg Pincus funds. It is headquartered in New York and its stock was publicly listed on the NASDAQ in June 1999. Starmedia's objective is to be the leading portal site not only in Mexico but in all of Latin America. Their initial strength was based on their ability to create much "buzz" in the American press.

Starmedia definitely appears to be the most developed as far as its e-commerce positioning and site design is concerned, but it seems to be faltering in its content offering. When users first enter Starmedia's site they are required to select what country they are coming from. This is an excellent tool for Starmedia to not only gather data, but also to customize its content to individual countries. Although this might be Starmedia's goal, they have not yet succeeded, and the same generic site offers widespread news from all of Latin America regardless of the country the user selects (with the notable exception of the Brazil connection – which is in Portuguese instead of Spanish). Starmedia currently has been able to sign up several e-commerce sites, including Submarino, The DisneyStore, and DeCompras, along with auction sites, such as DeRemate and MercadoLibre (Excelsior 2000).

Yupi: Yupi is a major Spanish-language portal. Sony Corporation has invested in Yupi. Yupi appears to have spent more time customizing content by country than Starmedia, but they have only a small audience in Mexico. Yupi has chosen to go the retailing route alone and offers a variety of products ranging from shoes to books online. This decision to go into the online retail business could prove costly. Its e-commerce site, Yupi Compras, distinguishes itself from other shopping sites because before ordering anything, the user is required to register with Yupi if he or she is from Latin America; users from the United States do not have to register. Users that are already signed up for Yupi email and chat are able to use their previous login name and password, but must provide their address and telephone number. New users are subjected to additional marketing questions and registered with Yupi for email and other services. After registering, the consumer then has a key number that stores their information in the Yupi

database so that they can always return to shop. The strange thing is that for Latin American surfers this option is mandatory. Many U.S. sites offer one-click shopping as a convenience rather than as a requirement.

In April 2000, Yupi had to cancel its initial public offering and then in December 2000, Yupi.com laid off 90 persons, i.e., 50 percent of its workforce (Helft 2000). It will be difficult for Yupi.com to survive 2001. The question is likely to be whether some larger firm will decide that the assets Yupi created, such as its user base, are sufficiently valuable to purchase at some highly discounted price. If not, its survival is open to doubt.

Terra Networks: Terra Networks is publicly listed, but majority-owned by Telefonica, the Spanish telephone company that owns telecommunications firms throughout Latin America. Unlike Starmedia, Terra not only has its own e-commerce site, but also links to the important e-commerce sites such as DeCompras. Terra's own shopping site is titled TiendaTerra. Since its purchase of Lycos, it has begun emphasizing its search engine.

The decision to provide free Internet access in Mexico, TerraLibre, should assist in generating more traffic to the site, since Web access has traditionally been so expensive in Mexico. When users signup, Terra will make their site the default homepage and email location, so that Terra has the potential to gain millions of new users through this strategy. However, there are several other sites that offer free Internet access, so gaining a dominant market presence will require strong marketing. Seen more comprehensively, Terra's strategy has been to develop a comprehensive Internet portal for Spanish speakers generally (see Figure 7).

El Sitio: El Sitio, based in Argentina, reproduced the strategy of Terra and Starmedia by creating an entire chain of Web portals throughout the Americas, including a Mexican site. El Sitio recently acquired e-commerce site DeCompras for $7 million in cash and 1.75 million shares of El Sitio common stock. This valued DeCompras at $30 million, and indicates the relatively low valuation of Internet firms in Mexico as compared to the U.S. This purchase was expected to accelerate El Sitio's e-commerce offering

and provide them with Mexican connections and know-how. However, as a pure-play Internet firm whose stock on the NASDAQ is close to delisting, it is not sure that the firm has the financial wherewithal to support its operations through 2002.

T1msn: Microsoft and Telmex recently launched their joint-venture portal site – www.t1msn.com. "T1" has tremendous potential to succeed, not because it is a superior offering, but because of its parents, particularly the monopoly, Telmex. Every time Mexican subscribers log on to Prodigy, the online service of Telmex, they will automatically be channeled to the new portal. This leverage gave "T1" 6 million Spanish-speaking users located throughout Latin America on its very first day of operation. In fact, T1 has the potential to become the AOL of Mexico, though perhaps without the premium pricing.

Yahoo!: Yahoo! has created sites for various countries. However, Yahoo! strictly clones the look and feel of its U.S. site to the various national markets. So, whatever the language, the categories etc. are unchanged and merely translated. However, in each category are various links to Mexican Web pages and not U.S.-only content. Yahoo! has been successful in its strategy of cloning and translating its site into various languages. On October 6, 1999, Yahoo! launched Yahoo! Mexico. As in other countries, Yahoo! places in the top five sites in Mexico on metrics such as unique visitors or page views.

E-retailers

Sanborns: Sanborns is one of the few Mexican companies already in an excellent position to profit from e-commerce. Its controlling owner, Carlos Slim, also owns Prodigy and Telmex (T1), and under the previous political regime he was very influential in Mexico. Sanborns aims to leverage its existing warehouses throughout Mexico that supply its regular stores to undertake deliveries to online customers. This would allow Sanborns to avoid the supply and delivery problems many other firms, particularly U.S. firms, face when undertaking order fulfillment.

Eshop: Based in Mexico, Eshop is a division of Audio Mundo de Mexico, a chain of seven consumer electronics retailers in the Mexico City area. Customers are able to order products from the site and either pick them up at a central warehouse or have them shipped via Estafeta, a private parcel post company with service throughout most of Mexico. Payment can be made through major credit cards (secure ordering) or through deposit in Eshop's bank account (a common practice for many types of transactions in Mexico).

Submarino: Submarino, a large-scale Web retailer headquartered in Brazil, has developed an Amazon-like strategy for the Spanish- and Portuguese-language markets. Whereas portals and many other sites were multinational, many e-tailers were nationally oriented because of the nationally-unique fulfillment issues. Submarino is an example of a pan-Hispanic e-commerce strategy. In each country, it has an independent organizational structure encompassing site content, marketing, and fulfillment. Submarino has a 20-percent market share in Mexico, and claims a product line of 600,000 books, CDs, videos, DVDs, video games and toys. Submarino has received funding from Goldman Sachs, Chase Capital Partners, T.H. Lee, and Warburg Pincus, among others.

Financial, Travel, and Employment Services

As in the U.S., each of these e-commerce sites experiences difficult competition from other "me-too" sites. None of these sites are Mexico-only sites, in fact all of them serve four or five other Latin American nations and often the U.S., also. Despite this multinational perspective, these sites are the leaders in their market segment in Mexico. Interestingly, thus far these sites have not yet experienced the shakeouts and downsizings that are under way in the U.S. and Europe. Finally, for each of these sites it appears that their Mexican online operations remain small, in keeping with the size of the market.

ZonaFinanciera (ZF): This personal financial portal is based in the U.S. and provides relatively customized information to users in various Latin American nations. It raised over $40 million from

financiers including Acorn Investments, Capital Investors, Citicorp Strategic Technology Corporation, Columbia Capital, Hartford Life Insurance, Marsh and McLennan Capital, Steve Walker and Associates, T. Rowe Price, and *The Washington Post.*

Patagon: This is a general financial portal which was first launched in March 1997 in Argentina. It received an angel investment in July 1998, and in April 1999 received a first round of funding from Chase Capital Partners and Flatiron Partners. In December 1999, it received $53 million from JP Morgan, Goldman Sachs, General Electric Capital, Reuters, Telmex, Intel, and a Spanish bank, Banco Santander Central Hispano. In March 2000, 75 percent of Patagon.com was sold to Banco Santander Central Hispano at a value of $705 million. In 2001, Patagon had financial sites serving Mexico, Brazil, Chile, Argentina, Spain, Venezuela, and the United States.

Viajo: This is the premier Latin American travel site. The owner of the second-largest Mexican travel agency founded it. Viajo.com raised more than $36 million in venture capital funds from U.S. venture capitalists such as Chase Capital Partners, Flatiron Partners, Walden Media, and the Information Technology Fund, and from a variety of other U.S. investors. In 1999, it purchased the offline travel agency owned by its founder so that it could provide services such as a help line and complex products. It uses Galileo International, a reservation and travel information system, as its technology partner to manage the site's booking engine. Viajo.com's operations have been expanded to Brazil, Argentina, Chile, Venezuela, Uruguay, and the U.S. It also developed alliances with various local and regional portals such as StarMedia, EsMas.com, To2.com, and El Sitio to provide them with travel content and reservation capabilities (Graves 2000).

Laborum: Seminarium International, a prominent Latin American executive training and search firm based in Chile, founded Laborum.com. The site serves all of Latin America with offices in the U.S., Mexico, Argentina, Peru, and Columbia. It also has an English-language site for people seeking work in

Latin America. In September 2000, it claimed to have the tenth-largest database of resumes in the world and the largest one in the Spanish- and Portuguese-speaking world, with 166,000 from Mexico alone. Laborum.com has received over $26 million in funding from its Chilean parent and the Silicon Valley venture capital firms Explorador.net and Newbridge Venture Capital (Laborum.com 2000; Rodriguez 2000b).

The Future of Business-to-Business e-commerce in Mexico

B-to-B e-commerce is expected to grow much more quickly in Mexico than B-to-C commerce for several reasons . First, established firms have sufficient funds to invest in infrastructure, equipment, and personnel. Second, many of these firms can reduce costs by moving online. Third, Mexican firms are integrating into the global market in which access to supply chains requires conversion to HTML and XML-based software. Having Internet connectivity and the ability to conform your business processes to such standards are becoming a requirement for doing business. A strategic decision to not invest in these capabilities will perforce be a decision not to participate in global markets, but it will also reduce business available in the Mexican market, as national customers and suppliers adopt the global standards. The result is that Mexican firms are being compelled to adopt these business processes, and established firms are rapidly being integrated into the e-commerce revolution.

Among Mexican national firms, the undoubted leader in the adoption of information technology (IT) is CEMEX. Before the emergence of the Internet, CEMEX was already using sophisticated computer-based dispatching for its cement trucks to maximize utilization and quality. So, it was quite natural for it to integrate the Internet into its operations. In October 2000, CEMEX (CEMEX 2000a) announced that it was moving its entire supply chain to a Web-based system. In September 2000, Mexican cement maker CEMEX joined with Cisco Systems to establish a subsidiary for online buying and selling of products. The joint venture would initially focus on three business areas: "the development of online construction marketplaces, the creation of an Internet-based marketplace for the purchase of indirect goods and services, and the expansion of Cemtec – CEMEX's information technology and

Internet consulting services company – into new markets" (CEMEX 2000b). This was in addition to its joint venture with Mexican industrial conglomerate Alfa, a unit of Brazilian bank Bradesco and Brazil's industrial giant Votarantim, announced in July 2000 (www.latinexus.com). Also, in April 2000 CEMEX announced that it had invested $50 million in a Miami-based "incubator" of Latin American Internet projects named PuntoCom Holdings (www.punto.com). For CEMEX, the integration of the Web-based applications into its corporate strategy is logical evolutionary step, because of its earlier commitment to the use of information technologies. Moreover, it is attempting to leverage its capabilities to create B-to-B marketplaces that other Mexican and Latin American firms would use. Finally, it is moving its supply chain to a Web-based platform.

The potential for B-to-B e-commerce in Mexico is undoubtedly great, but given the current turmoil in the market it is difficult to predict exactly how it will develop. For small and medium-sized Mexican firms, the various B-to-B vertical market platforms being created in the U.S. offer possible new customers. For example, smaller Mexican suppliers could use these platforms to bid on requests for proposals posted by U.S. firms. Though the registration and bidding on RFPs seems the most obvious methodology, there is much experimentation under way. For example, in October 2000 a United States-based trade portal for the Americas, 1hemisphere, signed an agreement to provide services to the 33,000 member companies of Mexico's industrial chamber, Canacintra. The site will allow Canacintra's members to post sales leads, create online stores, and access logistics via U.S.-based logistics provider (BNamericas.com 2000a).

Funding for Mexican Internet Startups

The massive Internet bubble began in the U.S. and then spread globally. Latin America and Mexico experienced its effects as did many other countries, although those effects have not been as pervasive because Mexico has not seen the kind of proliferation of pure online startups witnessed in the U.S. (Scheeres 2001). Mexico and most of Latin America have little or no history of venture investing. The largest sources for venture capital were U.S. and European firms that began investing in Latin

America in the late 1990s. The most important of these were Advent (Boston), Chase Capital (New York), Flatiron Partners (New York), Hicks Muse (New York), Softbank (Japan), Intel Ventures (Silicon Valley), T.H. Lee Putnam (New York), Newbridge (New York), Santander (Spain), Europe@Web (London), and Explorador (Silicon Valley). Also, at the end of 1999 some of the Latin American economic groups, such as Claro in Chile, CEMEX and Carlos Slim in Mexico, Liberman in Argentina, and Latintech and GP Investimentos in Brazil, began investing in Internet startups.

The importance of the U.S. venture capitalists in the creation of the Latin American Internet industry is remarkable. All of the firms profiled above, with the exception of those that are arms of large Mexican firms, were funded by U.S. venture capital funds; Chase Capital and Flatiron Partners were especially significant. Interestingly, a fund formed in 1999, Explorador, specializes in funding only Latin American startups. After successful initial public offerings for Latin market-based Internet firms such as Starmedia and El Sitio, U.S. venture capitalists believed that investors would purchase even more Latin American Internet stocks. However, most of their investments were unable to complete IPOs before the market crash that began in March 2000. This left the venture capitalists with unprofitable startups that began running out of money in late 2000. Starmedia and El Sitio proved to be disastrous investments for the public and by January 2001 were close to being relegated to penny stocks. Starmedia had fallen from a high of $61 per share to $1.90 and El Sitio had collapsed from its high of $40 per share to $0.625 per share, and neither had much prospect of recovering.

Hermosillo: A Case Study of Internet Usage[8]

This section discusses the impact of the Internet in Hermosillo, Mexico and the State of Sonora. First we present estimates of Internet and e-commerce expansion, pondering its implications for Mexico's northern region, particularly the state of Sonora. The characteristics of the main ISPs in Sonora, as well as an estimate of the number of Internet users, are outlined. we describe the emergence of local Internet design and advertising agencies, and present data on the region's budding electronic commerce. Finally,

the human resource characteristics of local Internet companies are described. The final section summarizes the project's main findings and the likely future development of e-commerce in Mexico.

Internet Providers

In June 2000 there were nominally 66 providers offering Internet access in Sonora (NIC-Mexico, 2000c). Of these, 49 are national corporations that include Sonora as part of their coverage; the majority are corporations based in the Distrito Federal (D.F.), although almost a third (15 of 49) are located outside D.F. (especially in Guadalajara and Monterrey). Six others are regional companies located in one of the states neighboring Sonora (Baja California, Sinaloa, and Chihuahua), whose market includes Sonora. Finally, there are 11 companies based in Sonora offering Internet access to a primarily or altogether in-state market (see Table 4).

In a series of interviews between March and June 2000, we found that the main commercial Internet providers are 14 of the 66 companies capable of offering access in Sonora. Three of these companies have national coverage and constitute approximately 50 percent of all connections (Prodigy, Megared and Terra), and the remaining 11 local companies offer in-state coverage.

The first provider to enter the market was Indices, established in 1992 by *El Imparcial* (the daily newspaper with the highest circulation in the state) and acquired in 1999 by Terra. During its first three years, Indices was practically the only commercial ISP in the region, despite the fact that the University of Sonora began to develop its services around the same time. It was only in 1995 that another local provider began operations; Cybernet was a small company founded by local business people that began offering access in Hermosillo and gradually extended coverage to the main cities in the state. The number of ISPs saw its highest increase between 1997 and 1999, when Prodigy, Omnired and Megared entered the local market. Currently, these companies manage about 60 percent of the total Internet connections in the state (M. Contreras 2000).

[8] Oscar Contreras Montellanos wrote this section.

An interesting fact is that these three companies have clearly different strategies in terms of where their capital originates. It is well known that Prodigy is the Internet company created by Teléfonos de México (TelMex), one of the largest private enterprises in the country and the owner of the entire nation's basic telephone network, a situation that assures strategic advantage over other ISPs. Apart from cable Internet providers, all ISPs must pay Telmex to use the phone lines, which means that an important slice of their fees is subject to TelMex tariffs. Megared, on the other hand, is an affiliate of Megacable, a cable television company started by local business people in Los Mochis, Sinaloa in the early 1990s. Megared, the affiliate dedicated to Internet service, was created in 1999, when Megacable had already penetrated a large part of Northeast Mexico and other regions (Puebla, Jalisco, and Veracruz, among other states); moreover, it had already sold 40 percent of its capital stock to investors in the U.S., through which the company intended to assure access to cutting-edge cable Internet technology. Finally, Omnired is the result of a merger between two small firms in Hermosillo and Ciudad Obregón. Its coverage is in-state and includes four of the major cities in Sonora.

As for the pioneer of Internet providers, Indices, it began as part of the parent company of the newspaper *El Imparcial*. Despite having been the first commercial provider and having entered into Sonora's professional and business circles early on, the appearance of new and stronger competitors in 1997 determined the sale of the Sonoran company to the Infosel group of Monterrey, which is associated with Terra, the Internet company within Grupo Telefónica of Spain. Terra was meant to service the residential, small business, and independent professional market. Currently, Terra provides Internet access in Spain, Brazil, Chile, Guatemala, Mexico, Peru, and the U.S. The sale of Indices to Infosel was finalized in late 1999, and the powerful group from Monterrey hopes to occupy a prominent place in the local market.

Two other important providers are Cybernet and the University of Sonora (Internet Unison). The former was launched in 1995 by a small local company specializing in computer equipment sales and maintenance. It has grown consistently since then, and although it's not the largest of the Internet companies, it has the most penetration into the Sonoran market, with subscribers in the state's nine most

important cities. Internet Unison, on the other hand, is the Internet service for the University of Sonora, which has encouraged the formation of an active group of experts in order to develop an efficient and profitable commercial service, giving it broad operative and financial independence. Through Internet Unison, the Computer Center seems to be one of the departments that currently generates the most income for the University. The other eight providers with a relatively important presence in the state are small local companies, whose coverage is frequently limited to a single city, but which represent an important share of the market in their respective localities.

There are four types of primary services offered by Internet providers: Internet access, Web page hosting, Web page design and advertising, and technical support and advising.

An ISP's basic service consists of allowing a workstation or personal computer access to an Internet server. From home this is done through a telephone cable and a modem or from work through a local area network (LAN) that is connected to the telephone networks, usually through a router or a switch. In addition to Internet access, the ISP often offers an email account and the ability to post a personal Web page.

Web page design, hosting, and advertising services are closely related. The companies best suited for these services appear to be those that specialize in this kind of work and don't offer Internet access services. Web-hosting services are different from those offered as accessories to Internet connection. The difference is that free hosting services are limited to personal Web homepages, while hosting services for commercial and corporate Web pages (including e-commerce pages) imply payment of a determined fee to the company hosting the page, usually the same one functioning as ISP. In addition, the user has the option of using an advertising service, which places messages and images on the designer's page or other pages. In some cases, the published advertisement has a link to the advertiser's page, which usually allows direct interaction between the advertiser and the audience; in other cases, the ads are simply messages similar to the ads in traditional media. Web page hosting tends to be more costly than placing an ad on another page.

In the design area, one of the more specialized services is the creation of e-commerce pages. The more straightforward pages may contain a simple product catalogue that is periodically updated, though more sophisticated and useful versions are capable of processing online orders, modifying company inventory, charging the corresponding fees, handling client credit card numbers securely, placing the order, and making sure the bill isn't charged until the merchandise is delivered.

These services are often very similar from one company to another, although there is some differentiation on the basis of the importance attached to support. In terms of support, sometimes local providers are better able to attract users that require nearby or personal support from their ISP. This is why providers such as Unison, Omnired, Cybernet and Onyx, which generally have higher access costs, maintain almost half the corporate connections in the state of Sonora. Prodigy is the opposite, because even though it has the second-highest number of contracted connections, its advising and technical support services are handled by its Mexico City operations center. Thus, users receive remote service that can be slow, complicated, and inefficient.

Users and Connections

The number of connections provided by the 14 most important ISPs in Sonora was nearing 26,700 in June 2000. The majority of these connections were concentrated in 5 of these 14 companies, viz., Prodigy, Megared, Internet Unison, Omnired and Cybernet, which provide more than 90 percent of total subscriptions. An estimate of total Internet users, based on the number of connections, is 68,170 for the entire state.[9] The total number of users is important in itself, since various national estimates have calculated that the total number of Internet users in Mexico represents between 1.5 and 2 percent of the population. In Sonora, our statistic of estimated users is 3.3 percent of the state's total population, which in relative terms means that it is performing better than the Mexican average.

[9] This is a base calculation. There are two factors that indicate that this is an underestimate. First, there is no way to measure the number of Internet users in large corporations. Second, there are many small fringe ISPs that are not included in various estimates.

On the other hand, the different types of users and their distribution among providers must be considered, since, as mentioned earlier, an important criterion for subscribers when choosing an ISP is the technical support offered by the company in conjunction with the connection. In this respect, the fact that corporate connections are concentrated predominantly among local providers is significant. As Table 5 indicates, local ISPs provide over 60 percent of corporate connections. If Terra (which maintains a local office and a technical support team in Hermosillo for its clients in Sonora) is included in this group, the percentage of corporate clients serviced by local companies climbs to 75 percent. This is primarily due to the fact that local ISPs can offer their clients more personalized advising and technical support; for many companies, the remote service offered by the larger ISPs is inefficient at resolving urgent problems with the connection, network software, or computer equipment used to access the Internet. In addition, corporate accounts usually require the installation of an internal network, as well as constant support for maintenance, expansion, updating, etc., areas in which personal service is indispensable.

There is also another reason that corporations prefer local ISPs: they have been in the local market longer, or were recently created by local business people who have a strong presence in the area. In other words, they have developed relationships with their clients and are able to understand the particular needs of regional and local merchants. The firm Cybernet illustrates this phenomenon. Cybernet began as a consulting firm and computer equipment dealer, developing a client portfolio composed mainly of small to medium-sized businesses in Sonora, to which it sold computer equipment and provided training, maintenance, and software updates. When its ISP capabilities were introduced, many of the clients with whom it had a previous relationship subscribed to the new service. Currently, Cybernet maintains more than a third of all corporate connections in Sonora.

On the other hand, large providers such as Prodigy and Megared service the majority of residential clients. This is due to the fact that the connection costs offered by national providers are generally lower. Also, residential users don't usually require immediate advising and technical support services.

Internet Advertising and Design

ISPs tend to offer advertising and design services. However, the market includes companies which specialize in advertising and design and are not ISPs. The services offered by these companies are Web hosting, design, advertising, e-commerce pages, advising, and technical support. The companies devoted to Internet advertising and design are small local firms usually founded by engineers and designers, some of which started as computer equipment distributors. They began to surface in 1998, the period that registered the highest growth in the region's users and providers. Viveweb and Hermosillo Virtual, both launched in 1998 and still in business, are the pioneers in this area; however, the majority of companies currently in operation were created between 1999 and 2000. In Hermosillo alone, there are 10 companies specializing in Internet advertising and design, each with a client portfolio of anywhere between 10 and 50 clients, primarily small and medium-sized commercial, service, and industrial firms. In this context, a particularly successful strategy has been developed by Viveweb, which partnered with Omnired – one of the most important local ISPs – to provide advertising and design services to the ISP's subscribers.

These companies, which have been encouraged by the rapid increase in users who wish to advertise on the Internet, are beginning to encounter stiff competition from providers such as Internet Unison, which offers free Web page design upon subscription. To a certain extent, design companies face the same challenge as local ISPs, who must deal with the imminent "invasion" of free Internet connection services, which have begun to appear in Mexico's largest cities and will soon be available throughout the country.

Electronic Commerce in Hermosillo

There are two kinds of companies offering advice on how to begin using the Internet for commercial purposes. The first kind includes Internet providers that have been in the market for some time and have evolved technically until reaching the capacity to develop e-commerce applications. This is the case with Indices (now Terra), whose early technical capabilities were limited to Internet service

installation and advising. During the mid-1990s, Indices' engineers took technical courses online and in the U.S., thereby acquiring the skills necessary to design Web pages and e-commerce sites. One of the sites Indices designed was for Lanix, a regional firm based in Hermosillo that assembles personal computers. The Lanix page provides online ordering, with options allowing customers to tailor their purchase to their needs.

The second category is composed of new firms established by former employees of the large ISPs or young information technology professionals. For example, Vive Web, which is devoted solely to Web design, employs young designers and engineers (ages ranging between 23 and 30) who used to work at ISPs. Another example is Hermosillo Virtual, which was established by an engineer who worked at developing systems as a state government employee and took advantage of this experience to found his own company. Hermosillo Virtual's main clients are small and medium-sized local businesses such as photography studios, flower shops, and electronic component stores.

Not all companies offering Web page design and hosting services have the capacity to develop e-commerce pages. Currently, the demand for this type of page development is still nascent, but there is a tendency towards greater demand in the immediate future. Up to now, it is more common for regional and local businesses to seek a presence on the Internet through an informative Web page, but very few have any online business. Of course, consumers in Sonora can already carry out an increasing number of commercial transactions through Web pages for national and U.S. companies that offer their goods and services online. Examples of typical purchases are plane tickets (Aeroméxico), books (Gandhi), and gifts (Sanborn's); however, local Web pages have only recently begun to appear.

In terms of informative pages, an example is Mazón, a regional department store chain whose Web page is an online catalogue, which is visually attractive but does not allow online purchases. There is also Fatuvisa, an Hermosillo company which manufactures molds, prototypes, and ornamental

products. This is an especially interesting case because their advertising is explicitly directed at an external market of original equipment manufacturing.[10]

In terms of online commerce, apart from the large corporations mentioned earlier, a few local businesses are beginning to enter the electronic market with originality and success. One example is a small company based in Hermosillo which distributes radiators for all types of automobiles and whose market focus is the northwest region of Mexico (Baja California, Baja California Sur, Sonora, Sinaloa, and Chihuahua); according to the company's owner, after one year operating as an online vendor, half his sales are conducted through the Internet. Another example is a flower shop based in the city of Navojoa, whose online service offers remote ordering and delivery of flower arrangements, and is directed specifically at Mexican migrants originally from this city and currently residing in the United States who are unable to return to their city of origin to attend celebrations or funerals.

Human Resources at Local Internet Companies

In the firms we studied, the number of employees ranges from 1 and 30, with an average of 9.6. employees per company. This means that Internet companies in Sonora directly employ about 150 experts in the field, without considering those (undoubtedly more numerous) employed by companies which use Internet applications. In general terms, the background necessary to carry out these jobs requires technical specialization or, more commonly, a professional degree.

It is worth mentioning that among the companies visited, we were able to observe a clear difference between the pioneering firms and the startups. Employees of the former have degrees that are not necessarily related to information technology, such as journalism, business administration, accounting and civil engineering, among others, whereas newer companies seem to employ professionals with degrees specifically related to computing. In general, the majority of employees at companies whose primary activity is Internet service provision have technical degrees; companies whose main service is e-

[10] The site's homepage reads: "If you have a business with labor intensive products, which needs a craftsmanship attitude, fast delivery and no manufacturing hassles, Fatuvisa is your answer. We provide manufacturing outsourcing

commerce Web page design and development employ professionals with degrees in design, data processing, and media arts.

There is great interest in the Internet in medium-sized Mexican cities, and there has been some entrepreneurship. Given the fast-changing character of the current situation, any conclusions must admittedly be provisional; however, it is interesting to note that Sonora has more Internet users than the Mexican average. Still, Sonora, in common with other Mexican cities, suffers from an inadequate communication infrastructure. Of the 66 Internet service providers in Sonora, the majority of the subscriptions are concentrated in 14 firms. Since the end of 1999, even as the number of users has increased quickly, the larger national ISPs are penetrating the Sonoran market.

Sonora has seen the establishment of local providers of services such as Web page design, technical support, and developers of e-commerce sites. The number of persons employed directly in these activities remains small, consisting of approximately 150 professionals by our count (see Table 6). E-commerce itself is in an embryonic phase. There is no doubt that the large national and multinational firms operating in Sonora are probably using their intranets extensively for commercial purposes. The small and medium-sized firms in the region that have adopted the Internet are using it for Web pages containing information.

Conclusion

The past few years have seen a remarkable transformation in e-commerce and the Internet in Mexico. Many of the high-cost barriers to entry that were preventing Mexican users from getting online are being eliminated, albeit gradually, and new prospects, such as very inexpensive PCs a direct migration to broadband cable modem access, suggest that over the next few years the lack of a large online population will no longer be a serious impediment to e-commerce in Mexico. The arrival of low-cost (or free) Internet access is the first-step to successful e-commerce in Mexico. Whether credit cards will become more prevalent is difficult to say. Credit cards are currently a possession of the wealthy elite.

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services." (www.fatuvisa.com).

Companies such as Visa and American Express need to form alliances with the Web portals to make credit cards or debit cards available to the general public, along with banking and checking accounts.

Another challenge confronting e-commerce in Mexico is the delivery of goods ordered online. In contrast to the post office agencies in developed countries, the Mexican postal service has enormous difficulties, including unpredictability, inefficiency, and an overall reputation for problems. This means the postal system will find it difficult to satisfy the needs of a growing e-commerce sector. The U.S. delivery companies such as UPS, FedEx, and DHL have expanded into the Mexican market. However, they charge premium prices, a factor that might retard e-commerce. Today, there are less expensive Mexican-operated package delivery services.

The infrastructure for e-commerce is rapidly coalescing in Mexico. Moreover, younger, more educated Mexicans are showing great interest in the Internet. It seems likely that these young Mexicans who are experiencing the Internet as simply an aspect of their environment will find new ways to create value and utilize the potential inherent in the technology. Their innovations will integrate the Internet increasingly into the current Mexican economy and likely lead to greater efficiency and value creation.

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WEB SITES CONSULTED

www.CEMEX.com
www.BNamericas.com
www.amece.com.mx

Table 1: Portal Sites in the Latin American Market

Name	URL	Users	Most Recent Investment (Dollars)	Principal Location	Notes
Umbral	www.umbral.com	60,000*	1.2 million	Mexico	Startup
El Sitio	www.elsitio.com	250,000*	44 million	Argentina	Startup
StarMedia	www.starmedia.com	7.6 Million**	2.2 billion***	United States	Startup
Mexis	www.mexis.to2.com	200,000	N/A	Mexico	Startup
Yupi	www.yupi.com	2.8 Million**	N/A	United States	Sony a major investor. Recently shifted strategy to business-to-business transactions.
Esmas	www.esmas.com.mx	N/A	N/A	Mexico	Much delayed new portal by Televisa television network.
Infosel	www.infosel.com	1.3 Million**	N/A	Mexico	Long-established ISP and portal based in Monterrey.
Yahoo!	www.yahoo.com	315 million**	104 Billion***	United States	Dominant U.S. portal, has aggressive Latin American/Spanish strategy. Has general Spanish site and targeted country sites.
Adnet	www.adnet.com.mx	N/A	60 million	U.S./Mexico	Startup
Todito	www.todito.com	60,000*	N/A	Mexico	Portal run by TV Azteca subsidiary Grupo Dataflux
AOL Latin America	www.americaonline.com.mx	250,000*	200 Million IPO	U.S./Mexico	U.S. Portal/ISP Latin America joint venture with Cisneros Group (Venezuela). Launched Mexico operations in July 2000. Already has in excess of 250,000 subscribers in Brazil and Argentina.
T1msn	www.t1msn.com.mx	N/A	N/A	U.S./Mexico	Recently announced portal site. Joint venture between Microsoft and Telmex. Telmex also in ISP-related venture with Prodigy.

*Registered users

**Page visits per day

***Publicly traded company, market valuation, March 2000

SOURCES: Expansón 1999 (October), 13-27; San Diego Union-Tribune 2000 (March 16); CNET News.com 2000 (May 15); Borland 1999.

Table 2: Percentage Growth in Latin American Top-level Domains (NIC and ISC registrations, year ending July 2000)

	6 months	12 months
Country	**Growth (%)**	
Brazil (.br)	48.5	113.7
Mexico (.mx)	**22.4**	**121.1**
Argentina (.ar)	24.4	74.0
Columbia (.co)	59.4	99.0
Chile (.cl)	32.3	72.2
Uruguay (.uy)	69.1	238.1
Venezuela (.ve)	16.9	77.1
Perú (.pe)	27.0	50.2
Costa Rica (.cr)	46.7	193.4
Dominican Republic (.do)	31.5	38.4

Source: NIC-Mexico 2000b

Table 3: Latin American Retail E-Commerce by Country and Type, Year 2000 (in Millions $US)

Country	
Brazil	300
Mexico	91
Argentina	85
Other	104
Type	
C-to-C Auctions	192
Computer Hardware & Software	72
Financial Services	62
Entertainment	59
Other	195

TABLE 4
LEADING INTERNET PROVIDERS IN SONORA

Company	Launch	Capital	Coverage
Prodigy	1997	Mexico City (Telmex)	National Sonora (Hermosillo, Guaymas, Caborca, Nogales, Navojoa, Ciudad Obregon)
Megared	1999	Sonora-Sinaloa (60%) Foreign (40%)	National Sonora (Hermosillo, Ciudad Obregon)
Terra (previously Indices)	1992	Monterrey (owned by Sonoran newspaper *El Imparcial* until 1999)	Sonora (Hermosillo, Ciudad Obregon, Nogales)
Internet Unison	1992	Sonora (Universidad de Sonora)	Sonora (Hermosillo, Navojoa)
Omnired	1999	Hermosillo-Ciudad Obregon	Sonora (Hermosillo, Ciudad Obregon, Navojoa, Alamos)
Cybernet	1995	Hermosillo	Sonora (Hermosillo, Huatabampo, Navojoa, Ciudad Obregon, Guaymas, Caborca, Puerto Peñasco, Magdalena, Nogales)
Onix	1996	Hermosillo	Sonora (Hermosillo)
Asesoría y serv. Gate		Ciudad Obregon, Son.	Sonora (Ciudad Obregon)
Enlace		Guaymas, Son.	Sonora (Guaymas)
Infotec		Puerto Peñasco, Son.	Sonora (Puerto Peñasco)
Internexos		Magdalena, Son.	Sonora (Magdalena)
Micro Sistemas		Agua Prieta, Son.	Sonora (Agua Prieta)
Program. y Sistemas		Navojoa, Son.	Sonora (Navojoa)
Tecnología y Sistemas		Navojoa, Son.	Sonora (Navojoa)

Source: own design, based on interviews and NIC-Mexico (2000b).

TABLE 5
INTERNET PROVIDERS IN SONORA:
SERVICES, CONNECTIONS AND USERS
(June, 2000)

Company	Services	No. of connections		No. of users*
Prodigy	ISP, Hosting, UniNet, E-commerce	Total: 7400	Residential: 7400 Corporate: --	18500
Megared	ISP by cable, Hosting Design, Page blocking, Support	Total: 4500	Residential: 4100 Corporate: 400	11450
Terra	ISP, Hosting, Design, Networks, E-commerce, Advising, Support	Total: 1200	Residential: 960 Corporate: 240	3720
Unison*	ISP, Hosting, Design, Dedicated line, E-commerce, Advising, Support	Total: 7800	Residential: 7400 Corporate: 400	19700
Omnired	ISP, Hosting, Design, Networks, Renting, Advising, Support	Total: 3000	Residential: n.a. Corporate: n.a.	7500
Cybernet	ISP, Hosting, Dedicated line, Consulting, E-commerce, Advising, Support	Total: 2000	Residential: 1400 Corporate: 600	5300
Onyx	ISP, Consulting, Advising, Support	Total: 50	Residential: n.a. Corporate: n.a.	125
Other 7 local ISPs*	ISP, Hosting, Design (primarily)	Total: 750	Residential: n.a. Corporate: n.a.	1875
Total		26,700		68,170

* Estimates.
Sources: personal interviews and NIC-México (2000).

TABLE 6

INTERNET HUMAN RESOURCES IN SONORA

Company	Employees	Profile	Skills
Prodigy	*	*	Remote installation, remote support
Megared	18	Data processing technician Data processor Industrial and systems engineer	Installation, sales, monitoring, advising, support
Terra	25	Systems engineer Graphic designer Business manager Media arts specialist Journalist	Installation, design, marketing, sales, writing, advising, support
Unison	30	Systems engineer Data processor Graphic designer Civil engineer Accountant	Installation, design, monitoring, advising, support
Omnired	17**	Systems engineer Industrial engineer Lic. en commercial Business manager	Installation, management, sales, advising, support
Cybernet	5	Systems engineer Data processor Business manager	Installation, management, advising, support
Onyx	8	Physics students Computer-related degrees	Consulting, installation, advising, support
Viveweb	8	Data processor Graphic designer	Design, software development, advertising, advising
Hermosillo Virtual	1**	Licensed electrician	Design, advertising, advising
Sonora On Line	6	Media arts specialist Data processor Systems engineer Electronics engineer	Design, advertising, advising
Other 7 local ISPs	35***		

* Prodigy's personnel work entirely out of Mexico City.
** They also hire temporary workers.
*** Estimated number.
Sources: personal interviews.

Figure 1: Estimated Mexico Internet Users

(SOURCE: Select IDC 1999)

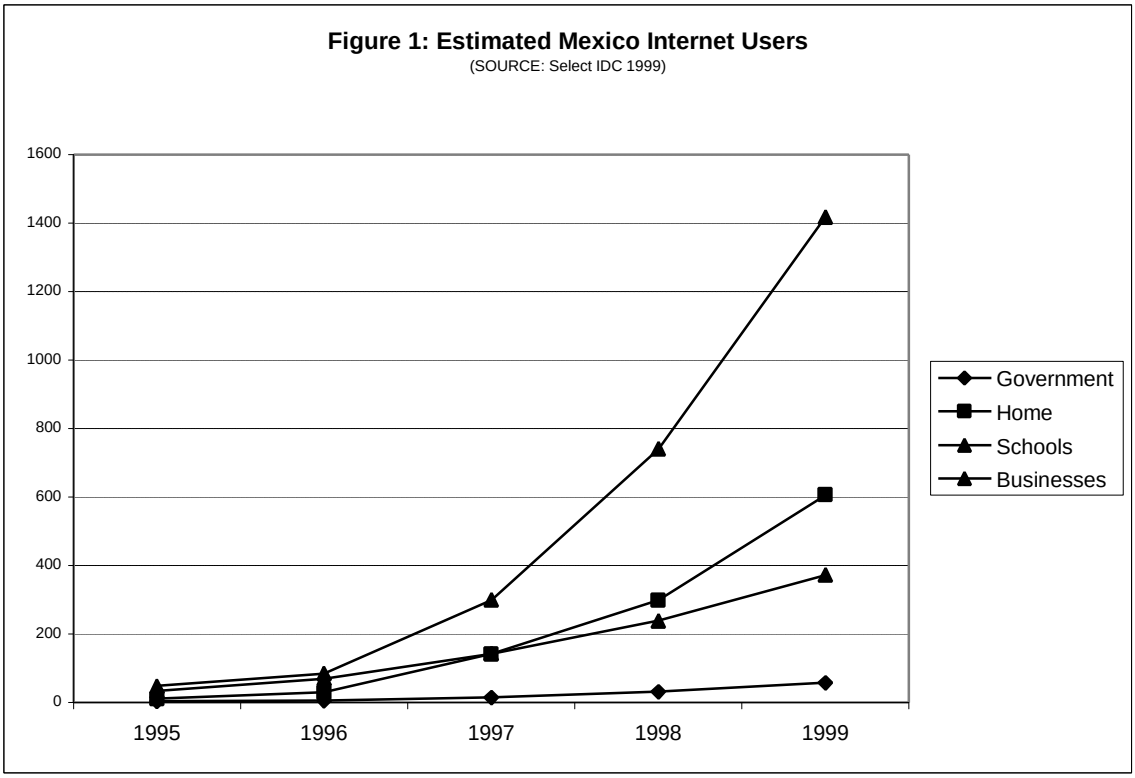


Figure 2: Internet hosts in Mexico

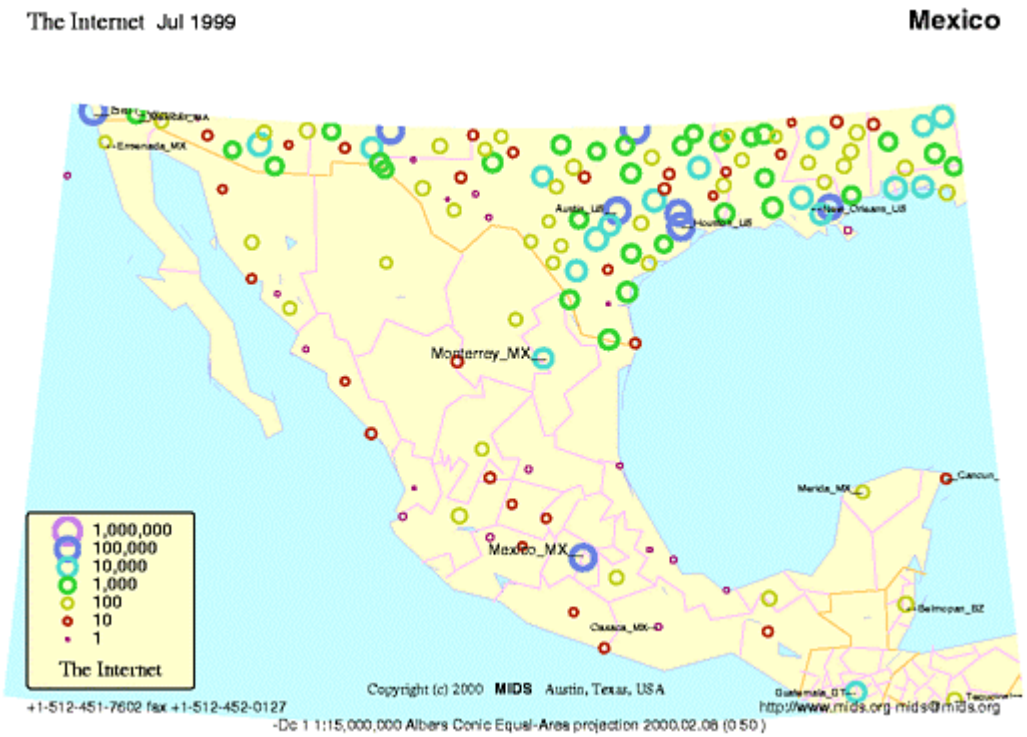


Figure 3: Top-Level Domain Growth in Selected Latin American Countries (000s)
(Source NIC-Mexico 2000)

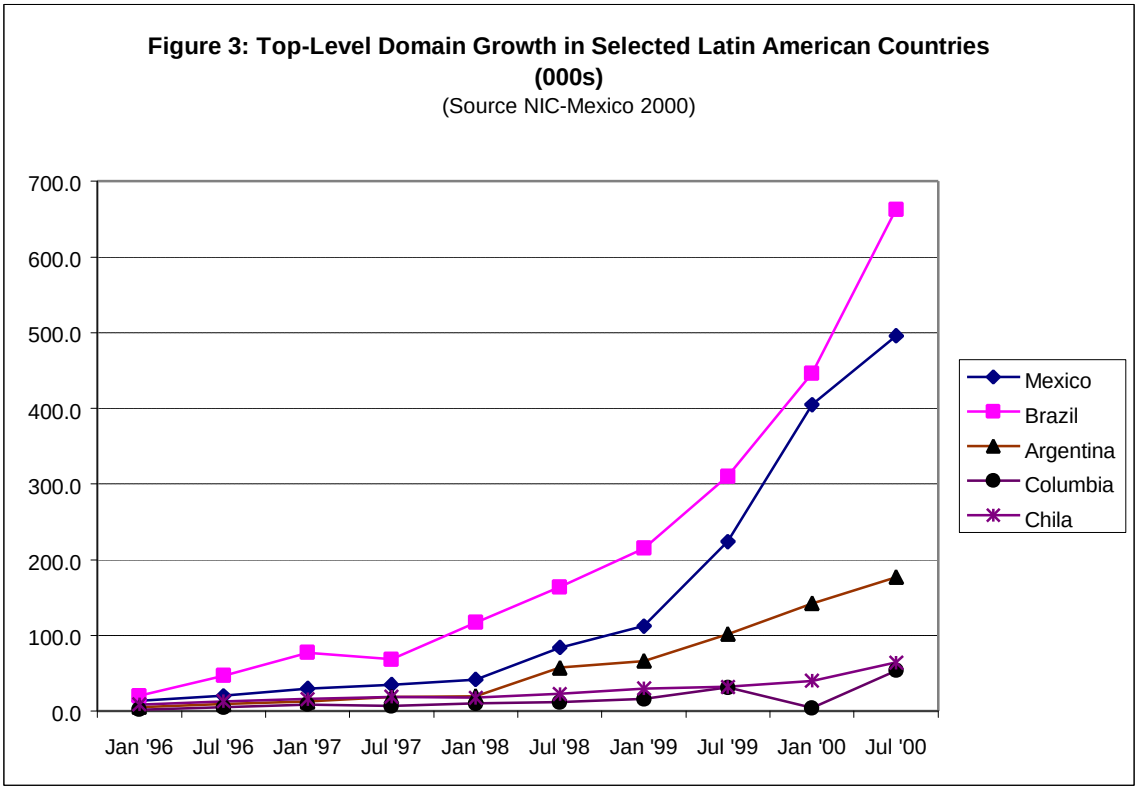


FIGURE 4: Internet Hosts (Top-Level Domains)
Internet Leaders Comparison
SOURCE: NIC Mexico

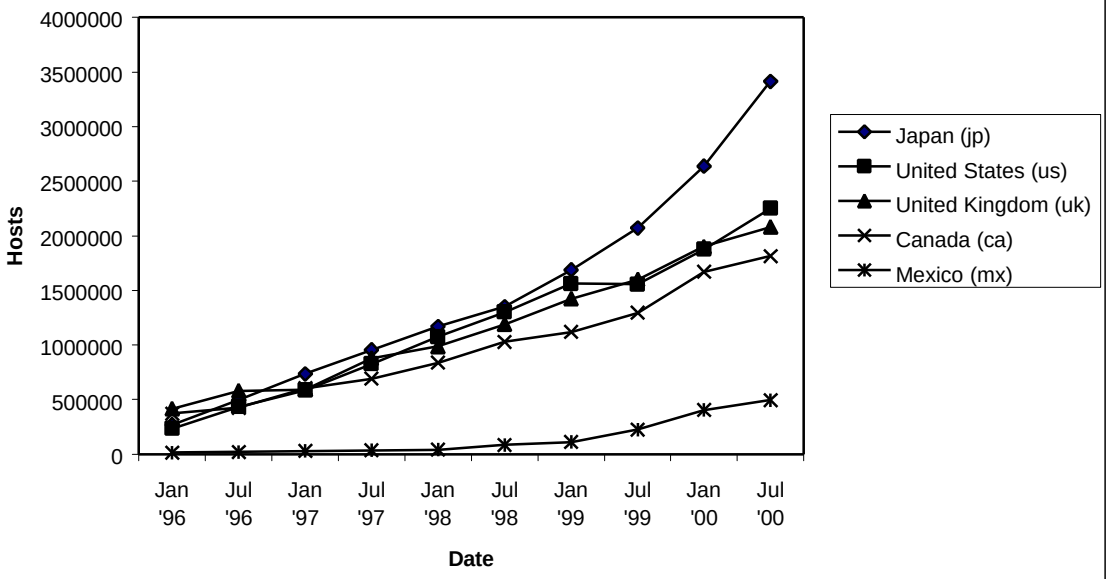


FIGURE 5: Top-Level Domains Under .mx
(Source: NIC-Mexico)

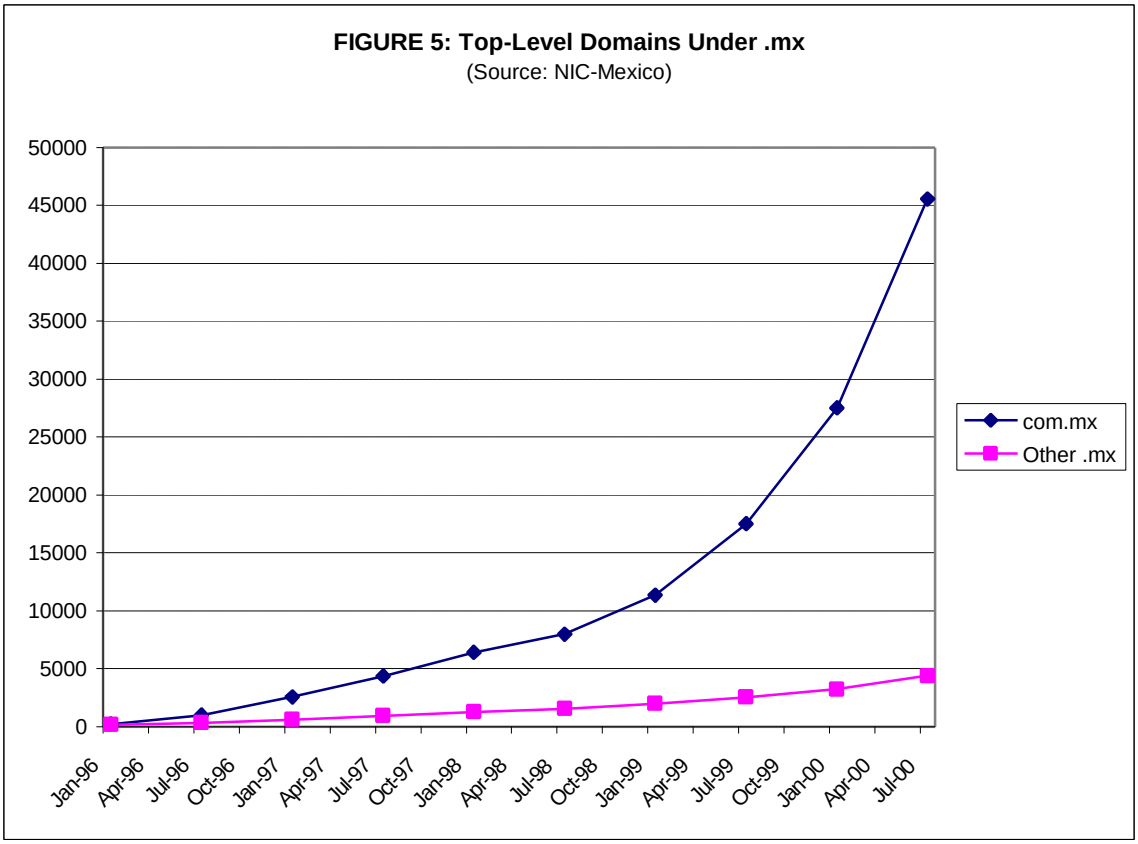


FIGURE 6: Installed Phone Lines in Mexico

Source: INEGI 2000

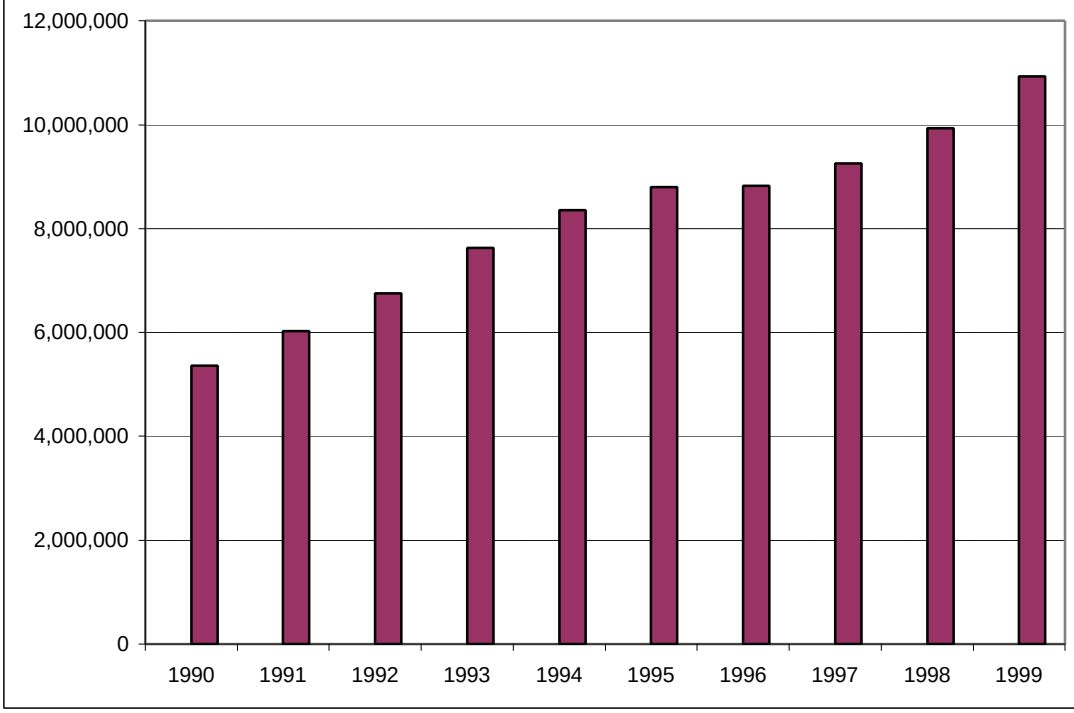
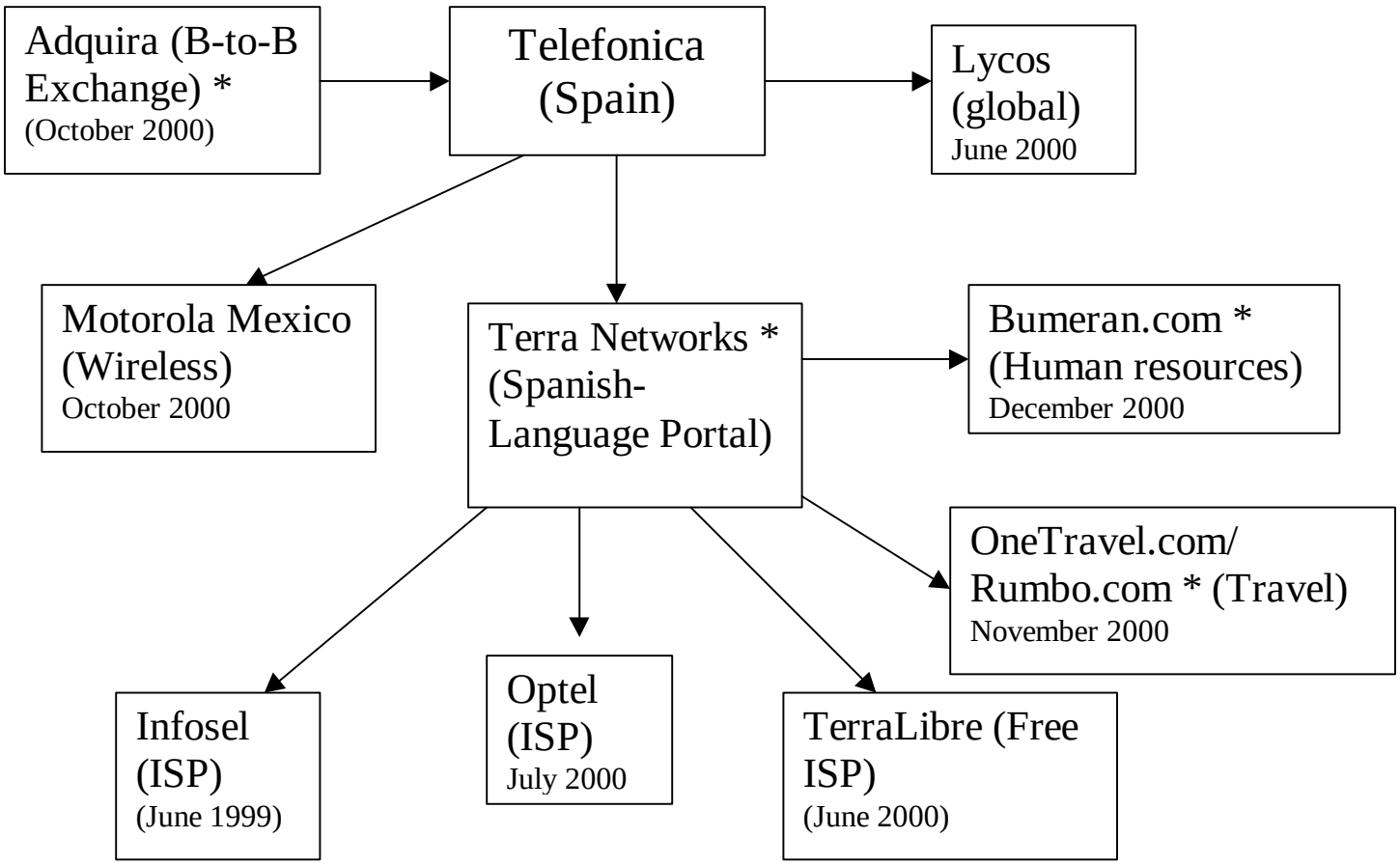


Figure 7: Telefonica/Terra's Growing Network in Mexico



Legend: arrow indicates an ownership stake
* Indicates serves all of Latin America

Source: Author's compilation

APPENDIX A: Selected Mexican E-commerce and Other Commerce-related Sites

Name	URL	Function	Location*	Notes
Adnet	www.adnet.com.mx	Search/portal	Mexico	Search engine specializing in Mexico, owned by Starmedia
AeroMexico Airlines	www.aeromexico.com	Information/Sales	Mexico	Advertising, information, & reservations site
Agencia Aduanal Felgueres	www.felgueres.com.mx	Advertising/information	Mexico	Customs agent
Agrositio.com	www.agrositio.com.mx	Information/Sales	Argentina	B-to-B site providing information and products to agriculture industry
Agugutata.com	www.agugutata.com	Retail Sales	USA	Baby products
Alaska	www.alaska.com.mx	Sales/Advertising	Mexico	PC maker with national distribution network
Alo.com	www.alo.com	Portal	USA	Cell phone web portal
Angelopolis.com	www.angelopolis.com	Regional Portal	USA	Regional portal site for Puebla, Mexico
AOL Latin America	www.americaonline.com.mx	ISP & portal	USA	AOL's Mexican operation
Banamex	boveda.banamex.com.mx	Bank services site	Mexico	Banking and finance site with minimal online services
Bumeran.com	www.bumeran.com	Employment site	USA	Pan Latin American job search site headquartered in Argentina
Cablemás	www.cablemas.com.mx	Advertising/information	Mexico	Cable TV company in Baja California. Advertising and programming schedules.
Canal 12	www.telnor.com/siir/notivisa/canal12.htm	Advertising	Mexico	Tijuana TV station
Celulosa y Corrugados de Sonora	www.cecso.com.mx	Advertising/information	Mexico	tienen un e-mail: cecso@telnor.net
Centro de negocios banca afirme	www.afirme.com.mx	Advertising/information	Mexico	Banking and finance site with minimal online services
Cemex	www.cemex.com	Advertising/Information	USA	Global big-three cement manufacturer based in Mexico--innovative user of Internet and other computerized technologies.
Cemexsuppliers.com	www.cemexsuppliers.com	B2B Supplier Site	USA	Business-to-business ecommerce site for Cemex (above)
CinemaStar	www.cinemastar.com	Advertising/Information	USA	U.S. theater chain with operations in Mexico

Ciudad Futura	www.ciudadfutura.com	Portal	USA	Major portal site aimed at youth market, owned by Yupi Internet
Cocinas Industriales	www.cocinaindustrial.com.mx	Advertising/information	Mexico	Restaurant and industrial food service firm in Tijuana
Comprasdirectas.com	www.compradirectas.com	Retail sales	Mexico	Retailer: electronics, photography, gifts, toys, videos, etc.
Compravirtual.com	www.compravirtual.com.mx	Virtual mall/retail site integrator	Mexico	Retailer: electronics, photography, gifts, toys, videos, etc.
Compuprice.com	www.compuprice.com.mx	Retail sales	Mexico	Computer and accessories retailer
Condumex	www.condumex.com.mx	Information/Advertising	Mexico	Industrial firm
Decompras	www.decompras.com	Retail sales	USA	Retailer: electronics, photography, gifts, toys, videos, etc.
Desde Mexico.com	www.desde-mexico.com	Information/promotion	USA	Market promotion site
Despegar.com	www.despagar.com	Travel Agency	USA	Pan-Latin American travel reservation site
Dfenlinia.com	www.dfenlinia.com	Mexico City Commercial Portal	USA	Local business and entertainment guide for Mexico City
El Foco	www.elfoco.com	Portal	USA	Portal focused on Argentina, Spain, Mexico, & Brazil
El Sitio	www.elsitio.com.mx	Portal	USA	Pan Latin American portal
Eshop.com	ws3.tecnofin.com.mx/eshop	Retail Sales	Mexico	Electronics
Esmas.com	www.esmas.com.mx	Portal	USA	Standard portal site
Estafeta	www.estafeta.com.mx	Parcel Shipping Company	Mexico	Parcel shipping company--offers retail and business-to-business e-commerce shipping and logistics services
Floresflowernet.com	www.floresflowernet.com.mx	Retail sales	Mexico	Flowers & gifts
Grupo televisa	www.televisa.com.mx	Advertising/sales	Mexico	Advertising
Implantes Dentales	www.dental-implants-center.com	Advertising/information	Mexico	Tijuana dentistry center with advertising site for U.S. market. There are numerous other medical-related clinics in border cities advertising on the Internet
Infocity.com	www.infocity.com.mx	Advertising/Local portal	Mexico	Local ISP-based portal and service site in Puebla
Klic-Klic.com	www.tecnofin.com.mx/klicklic	Retail sales	Mexico	Electronics, appliances, musical instruments
Laborum.com	www.laborum.com	Employment site	Chile	Pan Latin American job search site headquartered in Chile

Latinstocks.com	www.latinstocks.com.mx	Finance Portal	Mexico	Focused on Mexico, Argentina, & Brazil
Libreria Ghandi	www.Gandhi.mx	Sales/Advertising	Mexico	Bookstore/Record Store Chain expanding to Internet
Libreria Jovellanos	www.j-libros.com	Sales/Advertising	USA	Bookstore Chain expanding to Internet
Liverpool	www.liverpool.com.mx	Retail sales	Mexico	Department store chain Internet retail site
Loquesea.com	www.loquesea.com	Portal	USA	Pan Latin American portal focused on youth market
Mensajeria Estafeta	www.estafeta.com.mx	Advertising	Mexico	Package delivery company
MercadoLibre.com	www.mercadolibre.com	Auction site	USA	Ebay-like auction site
Mexicana Airlines	www.mexicana.com.mx	Information/Sales	Mexico	Mexican airline
Mexico Florist Network	www.floramex.com	Sales	USA	U.S. flower delivery site specializing in Mexico
Mexico Web	mexico.web.com.mx	Portal/Search	Mexico	Portal based in Mexico
Mexis	www.mexis.to2.com.mx	Portal	Mexico	Portal run by To2 with essentially the same content as To2
Mexmal	www.mexmal.com	Sales/Advertising	Mexico	Computers parts and peripheral distributor
Mujer Siglo 21.com	www.mujersiglo21.com	Information/sales/advertising/entertainment	Mexico	Women's' portal site offering retail sales and other services
Mundo en Linea (MEL)	www.mel.com	Portal	Mexico	Pan-Hispanic portal based in Mexico
Notimex	www.notimex.com.mx	News Agency	Mexico	News Agency
Notivisa	notivisa.com	News Agency	Mexico	News Agency
Palacio de Hierro	www.totalmente.com.mx	Sales	Mexico	Retail site of upscale department store
Paragon.com	www.paragon.com.mx	Auto sales	Mexico	Multiple Brand auto retailer
Patagon.com	www.patagon.com.mx	Finance Portal	Mexico	Argentina-based with Mexico presence
Periodico Zeta	www.zetatijuana.com	Newspaper	USA	Independent Tijuana Weekly Newspaper
Pl@zaBanamex	www.plazabanamex.com.mx	Retail sales	Mexico	Retail sales/integration site run by major bank
Quepasa	www.quepasa.com	Portal	USA	Pan-Latin America Portal
Regalopolis.com	www.regalopolis.com.mx	Retail sales	Mexico	Gifts, flowers, cards, ecards, etc.
Revista proceso	www.proceso.com.mx	Information /Search	Mexico	Mexican weekly newsmagazine site
Roberts.com	www.roberts.com.mx	Retail sales	Mexico	Men's clothing
Rshopping.com	www.rshopping.com.mx	Retail sales	USA	Retailer: tools, pharmaceuticals, kitchenware, automotive accessories, etc.

Sanborn's	www.sanborns.com.mx	Retail sales	Mexico	Department store/restaurant/pharmacy chain Internet retail site
Sección amarilla	www.seccionamarilla.com.mx	Advertising/information	Mexico	Phone Listings
Shoppingpark.com	www.shoppingpark.com	Shopping mall	USA	Shopping aggregation site
StarMedia	www.starmedia.com	Portal	USA	Pan-Latin America Portal
Subasta.com	www.subasta.com	Auction site	USA	Ebay-like auction site
Submarino	www.submarino.com.mx	Retail Sales	Mexico	Books, CDs, videos, toys, etc.
T1msn.com	www.t1msn.com.mx	Portal	USA	Portal joint venture between Telmex and Microsoft
Tequila-Internet	www.tequila-internet.com	Information/promotion	USA	Tequila marketing/information site
Terra	www.terra.com.mx	Portal	Mexico	Pan Hispanic portal
Ticketbus.com	www.ticketbus.com.mx	Sales	Mexico	Bus ticket vendor
Tijuana Net	www.tijuana-net.com	Advertising/Local Portal	USA	Local portal/information/ advertising site in Tijuana
To2	www.to2.com.mx	Portal	USA	Pan Hispanic portal
Todito	www.todito.com	Portal	Mexico	Monterrey-based Mexican portal
TV Azteca	www.tvazteca.com.mx	Advertising/sales	Mexico	Advertising
TyJ Provedora	www.tyj.com.mx	Advertising/information	Mexico	Cleaning Products
Universo Online (UOL)	www.uol.com.mx	Portal	Mexico	Pan-Latin American portal based in Brazil
Viajo.com	www.viajo.com	Travel Agency	USA	Pan Latin American travel service site
VirtualPlaza.com	www.virtualplaza.com.mx	Retail sales/virtual mall	Mexico	Internet mall based in Monterrey
Yahoo!	mx.yahoo.com	Portal	USA	Yahoo's Mexico site, also has Yahoo! in Spanish aimed at Spanish-speaking audience generally
Yupi	www.yupi.com.mx	Portal	USA	Pan Latin American portal, company based in U.S.
ZonaFinanciera	www.zonafinanciera.com	Finance Portal	USA	Bilingual site targeted at both Latin American and U.S./Canada customers

*Apparent location of servers based on Internet scan

APPENDIX B: Selected E-Commerce Sites in Mexico or Marketing to Mexico

Company	URL	Origin	Location *	Business
Decompras	www.decompras.com	Monterrey	Mexico	Retailer: electronics, gifts, etc.
Submarino	www.submarino.com.mx	Mexico	Mexico	Amazon-like retailer: books, CDs, toys, electronics, etc.
Sanborn's	www.sanborns.com.mx	Mexico	Mexico	E-retail site for Sanborn's, a national chain of pharmacies/restaurants: books, toiletries, CDs, etc.
Compras Directas	www.comprasdirectas.com	Mexico	Mexico	Amazon-like retailer: books, CDs, toys, electronics, etc.
Pendulo	www.pendulo.com	Mexico	U.S.	Retailer: books, CDs, videos (with strong community-creating features)
El Palacio de Hierro	www.totalmente.com.mx	Mexico	Mexico	Retail site for upscale Mexican department store El Palacio de Hierro
Feria	www.fiera.com	Miami, Florida	U.S.	Amazon-like retailer: books, CDs, toys, electronics, etc., with multi-country Latin America strategy.
Librarias Gandhi	www.ghandi.com.mx	Mexico	Mexico	Retailer: books, videos, CDs
Jovellanos	www.j-libros.com	Mexico	U.S.	Retailer: books, videos, CDs
Vans Latinoamericana de Mexico	tienda.vans.com.mx	U.S.	Mexico	U.S. Shoe retailer's Mexican retail site
Sony	www.sonystyle.com.mx	Japan	Mexico	Japanese electronics manufacturer's Mexican retail site
Virtual Plaza	www.virtualplaza.com.mx	Monterrey, Mexico	Mexico	Amazon-like retailer: books, CDs, toys, electronics, computers, home appliances, software, etc. Self-described virtual plaza (mall) offering placement for other retailers
Dell Computer	www.dell.com	U.S.	U.S.	U.S. PC direct marketer's Spanish pages for shipment to Mexico and other Latin American countries (requires phone call to arrange shipping)
OfficeMax	www.officemax.com.mx	Cleveland, U.S.	Mexico	U.S. office supply retailer with stores and online retail site in Mexico
Lokau	www.lokau.com.mx	Brazil	U.S.	Ebay-like auction site with other separate sites in other Latin American countries
De Remate	mexico.deremate.com	Delaware, U.S.	U.S.	Ebay-like auction site
Mercado Libre	www.mercadolibre.com.mx	Mexico	U.S.	Ebay-like auction site

Latinstocks	www.latinstocks.com.mx	Mexico	Mexico	Full-service financial site with offices in Mexico, Brazil, and Argentina. Argentinean founders with backing from AOL among others
Patagon	www.patagon.com.mx	Maimi	Mexico	Full service financial site with offices in Mexico, Chile, Brazil, Argentina, and Venezuela (Argentinean founders) with backing from Chase Capital Partners, Flatiron Partners, among others
Zona Financiera	www.zonafinanciera.com	U.S. (Virginia)	U.S.	Full service financial site aimed at Latin America and U.S. Hispanics, founded by Americans

*Apparent location of servers based on Internet scan