Insight to Mexican E-Commerce and its interaction with future Industrial Real Estate Demand

by

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Submitted to the Program in Real Estate Development in Conjunction with the Center for Real Estate in Partial Fulfillment of the Requirements for the Degree of Master of Science in Real Estate Development at the Massachusetts Institute of Technology

September, 2016

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ABSTRACT

This study conducted some interviews to professionals related to the Retail Logistics Industry, and gained understanding for Mexican E-commerce. After interviewing these professionals, six reasons for the delay of Mexican E-retail were identified. The reasons are: Lack of Confidence from the User, Increasing Unbanked Population, Undeveloped Infrastructure, Captive Retail Shoppers, Lag in General Development, and Shopping as a Form of Cheap Entertainment.

Reliable information helps support the fact that general lack of development for internet retail in Mexico will soon take a shift. However, in order to avoid risks related to internet retail, Mexico must develop: Better Fiscal and Credit Regulations, Improved Implementations for Telecommunication Reforms, Increased Security Issues for Package Delivery, Superior E-retail Platforms, Enhanced Mitigation of Identity Theft, Cheaper Mobile Internet, Higher Relative Value of Time, Effective Taxation of Remittances, Upgraded Infrastructure, and Less Unbanked Population.

Relying on some forecasts, the expected increase in demand for Mexican Logistic Real Estate Class A between 2015 and 2018, due to e-commerce, might range between 0.98 million to 1.65 million square feet (153,290 to 91,045 square meters).

Top industry executives expect that 60% of future E-Retail operations could be hosted in the Northern part of Mexico City. A rough guess regarding the rest of the E-Retail logistic potential could be: 15% Monterrey, 15% Villahermosa, and 10% Guadalajara. Nevertheless, Industrial Real Estate requirements related to E-Commerce are not written on stone.

The Last Mile problem could be addressed in the next ten years with large fulfillment centers located in strategic positions on the outskirts, and fully linked to a huge network of small or medium warehouses located in central strategic locations in the cities.

Intensive logistic operations could leverage the expensive rents in CBDs, so that industrial sorting facilities can be located there. The computed costs for this idea could range between 122 and 74 US cents. If the idea exposed on subchapter 4.6 is feasible, Suburban warehouses could be less required, increasing the demand for warehouses in the outskirts.

Thesis Supervisor: Dr. Albert Saiz
Title: Daniel Rose Associate Professor of Urban Economics and Real Estate
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Acknowledgements

Four Institutions, with the greatest humanitarian spirit, have made my dream experience of studying at MIT come true. I will thank them the rest of my life from the bottom of my heart. Many thanks to: Prologis Inc., Fundación Magdalena Obregón Viuda de Brockmann A.C., Consejo Nacional de la Ciencia y Tecnología, and Empresas ICA S.A.B. de C.V.. For sure, even my great grandsons will hear always edifying comments for these Institutions on my side.

My underlying strength, vision, guidance, values, discipline, opportunities, and mental skills are the result of thirty one years of unhesitant care and unconditional love, from behalf of my two rounded parents. It has been a tremendous sacrifice to stay away from home all these months. May God’s will be to extend our lives in order to replace this period I could not share with them.

The knowledge basis of this experience was granted by the National Autonomous University of Mexico. It has been a privilege to be part of the most important cultural effort of my Country.

I would like to thank the help and guidance of Dr. Albert Saiz, Mr. John Vitou and Mr. Chris Caton, during the process of working with Prologis and doing the Thesis. Thanks a lot for all the Prologis officers that helped with information and interviews. Their names are specifically mentioned throughout the text. Special thanks to Mrs. Paloma Gomez for kindly setting up the interviews.

All errors and omissions are solely the responsibility of the author.
1. Introduction and antecedents

The E-commerce revolution has reconfigured retail, not only in terms of customer experience, but also in terms of required Real Estate facilities. According to Prologis (2014), one billion USD of conventional retail sales require on average a Real Estate footprint of one square measure of warehousing and logistics, for each thirteen square measures of commercial retail space necessary for exhibit and transaction. On the other side, one billion USD of E-commerce sales reduce the footprint of commercial retail space to zero, and require 266 % more warehousing and logistic space when compared to traditional retail. This phenomenon is depicted in Exhibit 1.1.

Exhibit 1.1. Ratio of Retail Space vs Logistic Space for a one billion USD retailer. Conventional retailing shown in the left, e-commerce retail shown in the right side. Source: Prologis (2014).

With these estimations, it is simple to conclude that Industrial Real Estate Developers and investors are already receiving the benefits from this new wave of shopping experiences. Prologis (2015) estimates for Europe that “growth in E-fulfilment over the last three years translated into five million square meters (53.82 million square foot) of new leases during that time. Specifically, for every €1 billion in new e-commerce sales, 77,000 square meters (828,828 square foot) of new facility space was needed to fulfil those orders.”
E-commerce is still reporting growth and increasing all around the world. This trend started in late 1990’s. According to market research firm eMarketer\(^1\), consumers worldwide spent US$ 1,672 trillion online during 2015. That figure represents 7.3% of overall global retail sales, which are expected to be US$ 22,822 trillion during 2015.

By 2019, eMarketer Inc. projects online purchases will more than double to US$ 3.51 trillion (or 12.4% of total retail sales of US$ 28,550 trillion), as more people come online around the world. The Asia-Pacific region is growing faster than any other at a rate of 35.2% year over year, with eMarketer projecting US$ 875 billion in online sales there in 2015.

The fastest growing countries for Internet commerce according to eMarketer Inc. are shown in Exhibit 1.2. These ten countries are also expecting two-digit growth rates in E-commerce during 2016. The countries mentioned in Exhibit 1.2 are also the biggest economies worldwide in terms of Gross Domestic Product. Exhibit 1.2 might be stating that the size of the economy is one of the factors that predict the size of internet retail operations within its borders.

\[\text{Exhibit 1.2. Expected sales and growth rate for 2015. Source: eMarketer}\]

\[
\begin{array}{|c|c|c|}
\hline
\text{Country} & \text{Expected sales 2015 (B USD)} & \text{Percent increase} \\
\hline
\text{China} & $672.01 & 42.1\% \\
\text{United States of America} & $349.06 & 14.2\% \\
\text{United Kingdom} & $99.39 & 14.5\% \\
\text{Japan} & $89.55 & 14.0\% \\
\text{Germany} & $61.54 & 12.0\% \\
\text{France} & $42.60 & 11.1\% \\
\text{South Korea} & $38.86 & 11.0\% \\
\text{Canada} & $26.83 & 16.8\% \\
\text{Brazil} & $19.79 & 17.3\% \\
\text{Australia} & $19.02 & 9.3\% \\
\hline
\end{array}
\]

However, there are concerns regarding Mexico. For Prologis Inc., Mexico was the first international market that AMB Capital reached according to Mr. Hamid Moghadam. Right now the Prologis office of Mexico controls over 31.6 million square feet (4.65 % of the total Gross Leasable Area of Prologis). Mr. Moghadam also states that the office in Mexico City grabs the attention of various officers from Prologis, and has a specific investment committee. This fact regards the importance that Mexico has

as an emerging market. One of the concerns for this particular market is that E-commerce activity has not reported the same satisfaction in terms of growth when compared to other economies.

In order to assess this observation, we can combine the GDP Ranking 2014 as reported by the World Bank, with the E-commerce ranking 2014 as reported by ATKertney in Exhibit 1.3. In fact Mexico is one of first thirty economies in the world (number fifteen to be exact), but it does not appear on the leading thirty E-commerce countries list. Even Venezuela and Argentina have better internet retail indexes.

Another finding from Exhibit 1.3 is that the first ten economies are quite consistent in their internet commerce ranking level. This is explained by the fact that the first ten economies tend also to appear as the leading 15 online shopping indexes. But the next twenty economies are not consistent with this. Those countries that are not consistent are part of the emerging markets and developing countries (the only exception to this statement might be Austria). Then, we might expect that E-commerce should be somehow related to the general development of the country. May be internet infrastructure and percentage of unbanked population are the main reasons for the lack of internet development.

Exhibit 1.3. World’s leading economies in GDP and in E-commerce retail sales (2014).

<table>
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<tbody>
<tr>
<td>United States</td>
<td>1</td>
<td>3</td>
<td>Sweden</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>China</td>
<td>2</td>
<td>1</td>
<td>Mexico</td>
<td>17</td>
<td>Not ranked</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3</td>
<td>4</td>
<td>Spain</td>
<td>18</td>
<td>Not ranked</td>
</tr>
<tr>
<td>Japan</td>
<td>4</td>
<td>2</td>
<td>Chile</td>
<td>19</td>
<td>20</td>
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<tr>
<td>Germany</td>
<td>5</td>
<td>6</td>
<td>Norway</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>France</td>
<td>6</td>
<td>7</td>
<td>Brazil</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>South Korea</td>
<td>7</td>
<td>5</td>
<td>Italy</td>
<td>22</td>
<td>15</td>
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<tr>
<td>Russian Federation</td>
<td>8</td>
<td>13</td>
<td>Switzerland</td>
<td>23</td>
<td>29</td>
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<tr>
<td>Belgium</td>
<td>9</td>
<td>24</td>
<td>Venezuela</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>Australia</td>
<td>10</td>
<td>9</td>
<td>Finland</td>
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<tr>
<td>Canada</td>
<td>11</td>
<td>10</td>
<td>New Zealand</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>12</td>
<td>14</td>
<td>Austria</td>
<td>27</td>
<td>Not ranked</td>
</tr>
<tr>
<td>Netherlands</td>
<td>13</td>
<td>19</td>
<td>Saudi Arabia</td>
<td>28</td>
<td>Not ranked</td>
</tr>
<tr>
<td>Singapore</td>
<td>14</td>
<td>11</td>
<td>Argentina</td>
<td>29</td>
<td>12</td>
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<tr>
<td>Denmark</td>
<td>15</td>
<td>28</td>
<td>Ireland</td>
<td>30</td>
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</tbody>
</table>

What are the underlying mechanisms that trigger this phenomenon? What cultural, technological and trading issues support the fact that the 17th economy of the world does not figure as one of the top thirty E-commerce nations in 2014? Maybe some of the findings in this Thesis could help also explain the same singularities in other countries such as India and Spain.

The methodology followed by this study consists of the following aspects:

Chapter 2, presents the main findings regarding this phenomenon. Those findings come from direct interviews with people who are directly acquainted to me. Due to professional and academic proposes their names will not be revealed. However, I can provide some clues in that chapter that can help me validate the veracity of the information obtained through them. These people have given me specific comprehension on some reasons, as well as main paths for the investigation. All through Chapter 2 I will clarify in more depth each of the elements that help explain this particular situation in Mexico.

In chapter 3, predictions regarding the e-commerce market for Mexico and the world are provided. In this chapter we can see that a major strength of Mexico relies on its vicinity to the United States of America in terms of internet trade growth. Other major factor for expecting tremendous internet commerce growth is the young population that expects income increases during their future lifetime. Electronic retail will be increased worldwide, and it is a great bet to make investments around it.

Chapter 4 presents the answers given by some Logistics professionals to the following questions. Why do you think Mexican E-commerce has lagged? How might this situation change in the short and in the long run? What are the main consequences in Industrial Real Estate requirements

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3 During the XIX Conference on Mexican International Trade, some successful Mexican businessmen that spoke as panelists, commented on the huge cultural similarities that Mexico shared with Spain and India. The similarities with Spain rely on obvious factors, while the common traits with India are amazingly surprising. Executives from the Mexican international firms of Homex and Cinepolis made great comments regarding the fact that learning how to do business in India was very familiar for Mexican people. It is important to mention that this research is not aimed to prove cultural business affinities between countries. The last paragraph is only written as a note to support the possible use of the conclusions as hypothesis for further similar studies regarding other low E-commerce profile countries.
regarding E-retail? What might the solution to the Last mile problem look like in the next ten years? What locations and types of logistics assets will benefit the most in Mexico regarding E-commerce? The interviewing methodology results in a compilation of professional perspectives on how to manage the growth expectations of Mexican Industrial Real Estate.

In chapter 5, I will present some conclusions and recommendations. The recommendations and comments could help identify the main players that can support with the process of unhampering internet commerce in Mexico. Nevertheless, this study is not intended to make a specific plan for incentivizing e-commerce in Mexico, nor to identify the complete stakeholders for a Public Policy.
2. The underlying reasons for the delay

Three contacts helped me find specific explanations, one from the private equity industry, and another from a Mexican E-Retailer and the last one from a major logistic supplier. It is not surprising that a great number of people in retail industry have certain insights into the delay in Mexican E-retail, regarding the fact that internet commerce has come to rebuild all the basic assumptions of market studies everywhere. My three contacts have had access to some private studies and forecasts which have been done by specialized consultants. Also several seminars, conferences and press articles have been written regarding this phenomenon.

My first contact is a private equity associate who refused to be identified in this study due to the fact that confidentiality issues are very important for Private Equity firms. She claims that one year ago she was involved in a due diligence process aimed at buying a very famous retail chain store in Mexico City. The transaction was estimated at 50 million USD. Part of the due diligence included a market analysis that covered the impact of E-commerce on the retail stores. The consulting firm hired for that specific purpose made in the market analysis some relevant observations for the study addressed in this paper.

My second contact worked for three years as commercial manager at one of the fastest growing internet retailers in Mexico, according to Credit Suisse (2015). This company, Linio, delivers three thousand articles every day, and the average ticket approximates 100 dollars. Linio’s sales in Latin America have grown more than 82 % when compared to 2013. Linio has already been financed by JP Morgan. This company is also gaining a great reputation in Central and South America. My contact, as a Global manager, addressed different issues in major Latin American markets. He also prefers not to reveal his name.

The third contact works in Mexico for one of the major logistic companies of the world. He has been manager in charge of huge accounts related to internet retailers that contract delivery services directly with them. More than five years of experience in the sector support his insights. He prefers to keep confidential the name of the company, as well as his name. However, in order to validate his advice, I might say that the company he works for registered 10+ billion USD revenue during 2014 for its global operations.
The three interviews were consistent in terms of the reasons provided for the delay, and each of the contacts validated the viewpoints of the rest of the participants. The main reasons gained though these interviews appear condensed and classified in Exhibit 2.1. Regarding the interviewing methodology, the first part of the process was kind of a brainstorm between the interviewers and me. Next, in the second interview, each of the professionals validated a concise, structured and clear set of reasons, which are expressed on this document with confidence.

### Exhibit 2.1 Main reasons for the delay of internet retail in Mexico

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Explanation for delay in Mexican E-commerce</th>
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<tbody>
<tr>
<td>2.1</td>
<td>Lack of Confidence from the User</td>
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<tr>
<td>2.2</td>
<td>Unbanked Population</td>
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<td>2.3</td>
<td>Undeveloped Infrastructure</td>
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<td>2.4</td>
<td>Captive Retail Shoppers</td>
</tr>
<tr>
<td>2.5</td>
<td>Lag in General Development</td>
</tr>
<tr>
<td>2.6</td>
<td>Shopping as a Form of “Cheap” Entertainment</td>
</tr>
</tbody>
</table>

Due to the professionalism of the three people I interviewed, I could not have access to the documents that supported their points of view. They mentioned documents and sources that are property of their respective firms, and are part of their structural market research. However, I have done further exploration of each of the reasons shown in Exhibit 2.1 in order to justify their existence and gain better knowledge. Indeed these reasons are also supported by other industry experts in various press interviews and forums found on reliable webpages. The main findings for each reason are shown in each subchapter.

The last subchapter 2.7 presents a quantitative and qualitative estimation aimed at determining the specific weight of each reason that keeps Mexico behind the rest of the 15 greatest economies in terms of electronic commerce. Also in this subchapter 2.7, the main insights and conclusions for the findings of chapter 2 are presented.

It is necessary to state that the last subchapter is only intended to provide the first hypothesis of a new study aimed at fostering the development of electronic commerce in Mexico. This chapter is focused on statistics for the whole Mexican Republic. Segregated figures for Mexico City, Monterrey, Guadalajara, are not yet computed.
2.1 Lack of Confidence from the User

According to the persons I interviewed, the most important limitation for the electronic commerce in Mexico is a general lack of trust from the user. This feeling from the user was revealed as the most important hurdle in the surveys that the market consultants presented to the Private Equity Manager I interviewed. This fact was also validated in major trustworthy news sources. Mauricio Braverman, executive director of VISA in Mexico, highlights how strongly that issue is affecting the Small and Medium Enterprises. He recommends the Mexican Secretary of Economy to provide specific public policies, as well as the coordination of a good media campaign aimed at convincing people of the benefits that e-commerce offers.

The “lack of confidence from the user” also includes skeptical opinions about E-retail. If people do not trust the internet as a commercial tool, or think it is expensive, then lack of information might be the underlying reason for the lag. This lack of confidence might regard no concrete evidences from the consumer, only bad intuitions towards the shopping experience. Mistrust of internet accounts for more than 75% of the reasons that Exhibit 2.2 provides. In Exhibit 2.2, a survey of 510 Mexican internet users who are not internet buyers, explained in 2013 their reasons to avoid buying on internet. The ignorance of evidence can be corrected if trustworthy information about E-retail is developed and becomes available. For instance, we can expect that acquainted people start sharing positive experiences that will increase general confidence for e-retail.

Exhibit 2.2 Why buyers in Mexico do not use internet? Source DHL (2015)

My interviewers provided further detail on this issue that regards the Mexican consumer. The mature consumer (age 50+), regularly has the best income source when compared to the younger population, and also is expected to have access to credit cards. This kind of people do not feel confident when they provide the card details to anyone. Past bad experiences with banks and credit cards have regularly occurred to them when their credit cards were cloned. They still remain reluctant to engage in new risks regarding e-commerce. It is important to state that we should focus on credit card payments because 78 % of the payments for e-commerce are done online according to AMIPCI (2015), so cash payment options are not regarded as an alternative explanation for this argument. When Mexican E-shoppers decide to buy, they are most likely to buy services, not products, as shown at Exhibit 2.3.

Exhibit 2.3 Typical products bought by the Mexican consumer online Source AMIPCI (2015)

<table>
<thead>
<tr>
<th>Product</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airplane tickets</td>
<td>48 %</td>
</tr>
<tr>
<td>Clothing, accessories and shoes</td>
<td>46 %</td>
</tr>
<tr>
<td>Tours and hotel reservations</td>
<td>44 %</td>
</tr>
<tr>
<td>Tickets for venues and events</td>
<td>42 %</td>
</tr>
<tr>
<td>Books</td>
<td>39 %</td>
</tr>
</tbody>
</table>

The well-known Mexican newspaper “Excelsior”, states that the lack of confidence from the consumer is evidenced if we study the fraud incidence at online stores for credit card holders during 2014. While Brazil faced 1.2 %, United States and Canada 0.6 %, Mexico reported 1.8 % of Fraud during E-commerce operations. The response to these situation from the consumer is that they use internet retail for limited purposes only. Another main piece of evidence stating the lack of trust from the user is the average ticket sales reported in Mexico, when compared to the rest of the world. In 2014, Mexico averaged 306 USD, while Brazil computed 508 USD on average, and even Argentina resulted in 348 USD.

However, this trend is reversing for two reasons. First, the consumer satisfaction for online shopping in Mexico is almost as good or even better when compared to traditional retail on physical stores, as shown in Exhibit 2.4. If this trend continues, then the confidence of potential new clients, as well as current clients, can be expected to increase. The advantages of online shopping should continue to drive people into the new wave of retail experiences. Also for 50 + people, the possibility to buy foodstuffs without going to the market will be a strong incentive.

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5 Such as Amazon's prepaid cards
In Exhibit 2.5, the advantages and reasons for evaluating an online shopping experience as satisfactory in Mexico are detailed by type of device. We can see that online Mexican retail also faces confidence limitations when the device is not a computer.

Exhibit 2.4 Online shopping satisfaction survey vs traditional shopping Source: AMPICI (2015)

Exhibit 2.5 Internet shopping experience by type of device. Source: AMPICI (2015)

The second reason to expect a reversal in this trend is linked with the fact that younger people are the current population that shops the most online, as shown in Exhibit 2.6. Electronic commerce in Mexico should expect greater increases in demand while millennials increase their economic power, and trust more in internet retail than their elders.
Exhibit 2.6 Online retail users in Mexico by age, as of June 2014. Source: Statista (2015)

2.2 Unbanked Population

In an interview with Octavio Camarena, CEO of MásNegocio, done by the trustworthy newspaper “Excelsior”\(^7\), Camarena states that an unbanked population is the second most important factor that hinders E-retail in Mexico. Exhibit 2.7 shows the total percent of the population that used a Credit card for any type of transaction during 2014. Other comparable statistics are found in Exhibit 2.8, where we can find the percentage of credit card rejections during an electronic transaction for the same countries of interest.

Exhibit 2.7 Total credit card usage for any type of transaction for 2014 Source: Excelsior.

<table>
<thead>
<tr>
<th>Country</th>
<th>Percent of population using actively a credit card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>11 %</td>
</tr>
<tr>
<td>Brazil</td>
<td>28 %</td>
</tr>
<tr>
<td>Argentina</td>
<td>24 %</td>
</tr>
</tbody>
</table>

Exhibit 2.8 Total credit card rejections for internet shopping in 2014 Source: Excelsior.

<table>
<thead>
<tr>
<th>Country</th>
<th>Percent of rejections while executing an internet deal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>13.9 %</td>
</tr>
<tr>
<td>Brazil</td>
<td>3.8 %</td>
</tr>
<tr>
<td>Argentina</td>
<td>2.3 %</td>
</tr>
</tbody>
</table>

According to the World Bank, Mexico is one of the most lagged countries in Latin America in terms of banked population. Colombia, Chile, Brazil and Argentina have lower percentage of unbanked population when compared to Mexico. Regarding this fact, Mauricio Baldi Almaraz, Director of Financial education of BBVA Bancomer, states that “Mexican people lack a general financial literacy”\(^8\). He also comments that this fact affects the advance of the Mexican economic system, as well as the general economy.

Mr. Baldi defends the Mexican banks by saying that the efforts to foster financial knowledge among Mexicans have been constant and strong. In 2002 only 4.3% of the households had access to a credit card. In 2012, this same number was up to 23.4%. Exhibit 2.8 shows the advance in banked population in Mexico from 2011 to 2014, according to the World Bank.


However, he accepts that savings, investment and credit instruments still exhibit a big delay. Baldi continues his statistics by saying that in Mexico less than 28% of the population of 15 years or elder

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have registered a bank account. Two shocking statistics are that currently 29% of the population store their savings at home, and 25% of the population deposit their investments in informal rotating savings and credit associations (named “Tandas” in Spanish). Mexicans rely on “Tandas” without any kind of binding contracts for the savers, nor for the debtors. The most typical forms of financing in Mexican cities are friends and family (67.5%), and selling personal items (36.4%).

Baldi agrees that it is a huge challenge for the Mexican government and for the Mexican banks to overcome this situation. It requires a huge effort with public campaigns and programs aimed at proving the virtues of relying on a bank system. He continues giving more alarming statistics that come from the most recent National Survey of Financial Inclusion, done by the Mexican Bureau of Statistics (INEGI) in 2012. For instance:

- 68% of the banked population ignores the fact that their savings in Mexico are guaranteed by the Governmental Institution for Savings Protection named “IPAB”.
- 16% of the total population surveyed declared that they were not interested in having a bank account.
- 73% of the unbanked population declared that they had no bank accounts because they lacked any kind of savings.
- The unbanked population responded that they had no credit card because:
  - They were not interested (48.9%)
  - They perceived hard underwriting criteria (23.2%)
  - They do not like to have any kind of institutional debts (19.3%)
- 35% of the banked population ignore the mechanisms that govern interest rates.

With these figures, it might be correct to assume that lack of trust accounts as an explanation for unbanked population. The unbanked population is a phenomenon that impacts the whole Latin America. Exhibit 2.9 shows the account penetration in Latin America when compared to the rest of the world. Also the internet access and use for payments are shown in 2.9. Exhibit 2.10 shows the relative usage of Debit Cards, Credit Cards and Internet for Payments. With these Exhibits it is easy to identify a big lag in terms of development for Mexico, Panamá, India and South Africa. The rest of the countries are performing consistently better, with the exception of Russia. Exhibit 2.11 shows a picture on the percentage of banked population worldwide.
Exhibit 2.9 Account penetration and internet access for payments in 2014
Exhibit 2.10 Usage of credit cards, debit cards and internet payments as percentage of population.


Exhibit 2.11 Percentage of banked population worldwide. Source World Bank (2015)
2.3 Undeveloped Infrastructure

The e market consultants AT Kearney\(^9\) show in Exhibit 2.12 a general evaluation of the internet infrastructure quality for the top 30 internet countries. In this case, Mexico appears in place 25 out of 30. The top seven countries performed at least 30\% better in terms of internet infrastructure when compared to Mexico. This same computation reveals for the top 15 internet economies at least 14\% better performance when compared to Mexico. AT Kearney computes a special fact for this comparison regarding Russia. While Russia has a worse infrastructure index when compared to Mexico, its E-market size is three times bigger than the Mexican. But we should remember Exhibit 2.10, where we can find that a more developed Banked Population in Russia might be the best explanation for this finding. These findings are important clues that must be taken into consideration when pondering each of the reasons that are explained in this chapter.

Exhibit 2.12 Internet infrastructure evaluation (2014) Source AT Kearney

<table>
<thead>
<tr>
<th>Country</th>
<th>Points</th>
<th>Country</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>100.0</td>
<td>Finland</td>
<td>77.3</td>
</tr>
<tr>
<td>Singapore</td>
<td>100.0</td>
<td>Norway</td>
<td>76.3</td>
</tr>
<tr>
<td>Japan</td>
<td>97.7</td>
<td>Denmark</td>
<td>75.5</td>
</tr>
<tr>
<td>South Korea</td>
<td>95.0</td>
<td>New Zealand</td>
<td>75.4</td>
</tr>
<tr>
<td>United States</td>
<td>91.5</td>
<td>Austria</td>
<td>74.8</td>
</tr>
<tr>
<td>Canada</td>
<td>88.9</td>
<td>Saudi Arabia</td>
<td>74.6</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>86.4</td>
<td>Ireland</td>
<td>74.1</td>
</tr>
<tr>
<td>Australia</td>
<td>84.8</td>
<td>Chile</td>
<td>73.2</td>
</tr>
<tr>
<td>Netherlands</td>
<td>84.6</td>
<td>Brazil</td>
<td>72.4</td>
</tr>
<tr>
<td>Germany</td>
<td>83.1</td>
<td>Italy</td>
<td>70.7</td>
</tr>
<tr>
<td>Switzerland</td>
<td>82.5</td>
<td>Mexico</td>
<td>68.0</td>
</tr>
<tr>
<td>France</td>
<td>82.1</td>
<td>Russian Federation</td>
<td>66.2</td>
</tr>
<tr>
<td>Belgium</td>
<td>81.1</td>
<td>Argentina</td>
<td>64.3</td>
</tr>
<tr>
<td>Spain</td>
<td>80.1</td>
<td>Venezuela</td>
<td>55.7</td>
</tr>
<tr>
<td>Sweden</td>
<td>77.7</td>
<td>China</td>
<td>43.6</td>
</tr>
</tbody>
</table>

The lack of general infrastructure is also regarded by the World Economic Forum. On the World Competitiveness Index 2015 – 2016, Mexico scored the 57\(^{th}\) position out of 140 in general competitiveness. This position represents 4.3 points out of a maximum of 5.76 points, awarded to

the most competitive country in the world. In Exhibit 2.13 we can find the total averages that Mexico scored regarding infrastructure and internet infrastructure. Mexican telecommunications are low scored, as well as mobile communications.

An additional finding of Exhibit 2.13 is the fact that the general transport infrastructure evaluation is located in the second quartile of all Countries. The general transport infrastructure evaluation is the best Mexican index related to infrastructure. The best country in terms of transportation has systems that perform only 47% better than the Mexican ones. This is important because transport activities are correlated directly to the physical logistics. Hence, this disadvantage impacts the direct cost of delivery that internet retail offers to the customers. One of my interviewers works at a major logistics company. He states that one of biggest issues that his company has to deal with, concerns with the low quality of infrastructure in Mexico. Many towns in Mexico are still impossible to reach for a private logistics company. Only the Mexican Post Service has full coverage of the Country, but it is not reliable in terms of time and scheduling.


<table>
<thead>
<tr>
<th>Concept</th>
<th>Place</th>
<th>Points</th>
<th>Maximum Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Infrastructure</td>
<td>59/140</td>
<td>4.2</td>
<td>6.69</td>
</tr>
<tr>
<td>Transport Infrastructure</td>
<td>36/140</td>
<td>4.5</td>
<td>6.64</td>
</tr>
<tr>
<td>Telecommunications Infrastructure</td>
<td>86/140</td>
<td>3.9</td>
<td>6.90</td>
</tr>
<tr>
<td>Cellphone Availability</td>
<td>112/140</td>
<td>82.5</td>
<td>230</td>
</tr>
<tr>
<td>Telephone Availability</td>
<td>66/140</td>
<td>17</td>
<td>61</td>
</tr>
</tbody>
</table>

2.4 Captive Retail Shoppers

Another phenomenon that appears to obstruct Mexican internet retail regards the behavior of some Mexican consumers. This behavior has been exploited by large traditional retail firms in Mexico. Paradoxically these same retail firms (Elektra and Coppel specifically) have developed good internet retail platforms, the state of the art in Mexican shopping habits might be fostered by the principal scheme operated by these retailers.
In order to explain concretely the captivity, we first need to be conscious of a major concern of the Mexican economy. For the whole country, the remittances made by Mexicans living abroad – mainly from the United States, and particularly Texas and California – to their families in Mexico, represent the largest currency revenue for the Country, since the prices of oil have dropped\(^\text{10}\). The most recent figures as reported by the Mexican Central Bank reveal that the total revenue generated by remittances for the Country averages two billion United States Dollars each month, or 24 billion each year. Originally, the first currency source for Mexico was oil exports. During 2015, oil products accounted for 12.5 % less than remittances. It is important to note that Mexico City is the 5\(^{th}\) greatest remittance receiver of Mexico, and the State of Mexico is the 6\(^{th}\). Both political entities make up the Greater Mexico City Area.

As a huge percentage of the population remains unbanked, the best way to receive money from the United States is via direct money transfer. In this kind of transfers the companies Western Union and MoneyGram are huge players. Some main locations in Mexico where direct money transfers can be received are located at the rear of retail stores like Elektra and Coppel. Once the money is cashed, the captive Mexican consumer becomes more likely to shop at those same stores. This fact decreases the shopping potential that could be reached in other commercial platforms such as Internet Retail.

Elektra is a publicly traded company. The market strategy here mentioned, aimed at capturing remittances, is one of the explanations that some stock analysts have argued for Elektra’s share growth from 88 pesos to an average of 491 pesos in 15 years (557 % growth in nominal pesos). Elektra’s marketing strategy in mass media places direct emphasis on the remittance services offered at the stores when appearing on TV or on Radio. It is also necessary to state that Elektra is owned by the major shareholders of “Television Azteca”. “Television Azteca” is one of the two television firms that have been accused of Duopoly for the Mexican television market. The frequency of Elektra’s advertising on “Television Azteca” can very likely explain the market dominance of Elektra during the last years.

This same growth phenomenon accounts for Coppel stores. Coppel is one of the two retailer firms that have grown the most in the world since 2008, and currently is the fifth largest retailer in Latin

\(^{10}\) http://www.jornada.unam.mx/2015/05/05/economia/019n1eco, November 12, 2015
America\textsuperscript{11}. These two huge retailers have recently started in the banking business. Exhibit 2.14 shows a picture inside of the typical Elektra store, where the Western Union cashiers (here located at the sign of “Banco Azteca”) are situated at the rear, and the merchandise is everywhere surrounding the consumer. Same kind of schemes are also found in Coppel stores.

\begin{center}
Exhibit 2.14 Typical Elektra store with the cashier at the rear part
\end{center}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{typical_elektra_store}
\end{figure}

2.5 Lag in general development

All the indicators that appear in the World Competitiveness Report 2015, reveal structural issues for each country thwarting their development. It is expected in the report that developing countries will score generally score lower than developed countries. It is a good hypothesis to claim that these structural issues play a very important part when it comes to implement technological advances in developing countries. Some examples in Mexico that can support this statement can be found when

\footnote{\url{http://www.cnnexpansion.com/negocios/2015/01/12/coppel-y-oxxo-de-los-retailers-que-mas-crecen-en-el-mundo}, November 11, 2015.}
analyzing the lack of development on projects like smart cities, subway construction, electronic administration of public institutions, environmental remediation, etc.

Nevertheless, mass media produced in developed countries and social media have the power to communicate technological advances and standards of living that the huge population in Mexico eagerly desires and pushes towards. It might be the huge population combined with the knowledge of existing industrial advances in developed countries that helps trigger in Mexico some significant advances in technology implementations. These advances are done despite the fact that main structural issues in the economy impede its applications.

A good example related to this argument is found in Exhibit 2.15, where we can discover that finally in 2015, Mexico reached the 17th place on the Global Retail E-commerce Index computed by AT Kearney12. In a nutshell, my assumption is that we need to expect lags in technological advances for developing countries; however, there is a great hope that the size and relevance of Mexico’s population breaks through the obstacles that block their implementation. Finally, the 15th global economy ranks as the 17th e-commerce user.

Exhibit 2.15 Global Retail E-commerce Index Rankings 2015

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP Rank 2015</th>
<th>Top 30 E commerce Index 2014</th>
<th>Country</th>
<th>GDP Rank 2015</th>
<th>Top 30 E commerce Index 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>1</td>
<td>1</td>
<td>Indonesia</td>
<td>16</td>
<td>Not listed</td>
</tr>
<tr>
<td>China</td>
<td>2</td>
<td>2</td>
<td>Netherlands</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Japan</td>
<td>3</td>
<td>4</td>
<td>Turkey</td>
<td>18</td>
<td>Not listed</td>
</tr>
<tr>
<td>Germany</td>
<td>4</td>
<td>5</td>
<td>Saudi Arabia</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>5</td>
<td>3</td>
<td>Sweden</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>France</td>
<td>6</td>
<td>6</td>
<td>Nigeria</td>
<td>21</td>
<td>Not listed</td>
</tr>
<tr>
<td>Brazil</td>
<td>7</td>
<td>21</td>
<td>Poland</td>
<td>22</td>
<td>Not listed</td>
</tr>
<tr>
<td>Italy</td>
<td>8</td>
<td>22</td>
<td>Argentina</td>
<td>23</td>
<td>29</td>
</tr>
<tr>
<td>India</td>
<td>9</td>
<td>Not listed</td>
<td>Belgium</td>
<td>24</td>
<td>9</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>10</td>
<td>8</td>
<td>Venezuela, RB</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Canada</td>
<td>11</td>
<td>11</td>
<td>Norway</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Australia</td>
<td>12</td>
<td>10</td>
<td>Austria</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Korea, Rep.</td>
<td>13</td>
<td>7</td>
<td>Iran, Islamic Rep.</td>
<td>28</td>
<td>Not listed</td>
</tr>
<tr>
<td>Spain</td>
<td>14</td>
<td>18</td>
<td>United Arab Emirates</td>
<td>29</td>
<td>Not listed</td>
</tr>
<tr>
<td>Mexico</td>
<td>15</td>
<td>17</td>
<td>Colombia</td>
<td>30</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

Another interesting finding regarding general development is the Business Sophistication evaluation of the World Competitiveness Report 2015. On that index Mexico scores 4.2 points to reach the 50th place out of 140 countries. If we consider E-commerce a sophistication of retail, then this index again might be reflecting some important issues that we need to take into account when studying electronic commerce. Other factors that can be classified as “Lag in General Development” can include secure conditions for delivery, high shipping costs, undeveloped culture of effective time value, and lack of a legal framework that hampers doing business in that country.

There is another discovery related to the development and sophistication of the retail industry. We must note that the proximity to the US border, and the low development of local internet retailers fosters the Mexican consumer to buy more frequently on international sites. Again, an article form Excelsior\textsuperscript{13} states that 57\% of internet retail customers in Mexico buy merchandise from a foreign site.

Caution is very important when estimating the elasticity of demand for warehousing due to internet commerce. It is important to consider the fact that if the most merchandise comes from the United States, then the internet retailers might be not using Mexican warehouses for short term storage, but instead only using Mexican logistic infrastructure for freight redistribution. However, Wheaton and Dipascuale (1996) agrees that we must expect greater inventories for managing imports when comparing to exports.

\textbf{2.6 Shopping as a Form of Cheap Entertainment}

Last but not least, there is another insight that arose during the interviews with the people involved in retail industry. It is important to remember that although Mexico is the 15th global economy, in terms of the GDP per capita (purchase power), Mexico occupies position number 60 in the 2015 computations of the World Bank. This position implies three times less acquisition power when

\footnote{http://www.dineroenimagen.com/2015-09-15/61598, November 8, 2015.}
compared to United Kingdom (place 17th of the GDP per capita list). Hence, Mexico should be studied as a country where the general low income population seeks cheap forms of entertainment.

Going to the shopping mall or to retail facilities is a very attractive and cheap way to hang out with the family and friends. During the time expended shopping, they take advantage of social interaction and use their limited income to buy things directly in stores. The outcome is that families are left with little money to expend on internet sites.

This explanation correlates with the findings of a market study done for cinemas in Mexico City. One of my interviewers had access to that document, which states that Movie Theatre chains in Mexico have grown more than 10% in the past decade, due to the fact that it is one of the cheapest forms of entertainment in Mexico. According to that market study, cinemas are the perfect complement for the cheapest form of entertainment that is just wandering around a plaza with your friends and family with nothing more than an ice cream. This experience helps maintain strong traditional retail in Mexico.

2.7 Pondering the six explanations

ATKearney measures the size of each of the 30 most relevant internet commerce markets on a point basis, as shown in Exhibit 2.16. When analyzing the size of E-commerce by country, it is important to stick to one same reliable consultant. In this case it will be ATKearney. No official computations nor methodologies of measurement have been developed by the World Bank or by any other notable Institution. All around the web, many different figures for each country can be found. This fact raises uncertainty.

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By correlating the e-market size found in Exhibit 2.16 with the GDP 2014 (as reported by World Bank) using the approach of Wheaton and DiPascale (1996), we can find an adjusted $R^2$ that is capable of explaining 76% of the internet retail market size in terms of the economic size of the country, as shown in Exhibit 2.17. The correlation between the size of the economy and the size of internet retail for each country is clear. A special note regarding Exhibit 2.17 is that both the USA and China have to be treated as outliers in order to obtain a more accurate computation for the countries of interest. Clearly the explanations for the recent growth in China and in the United States might not be applicable for the rest of the world, and a specific analysis for each country is required.

E-commerce could be reaching a different dimension when more than 300 million people reach the middle class threshold in one country. Using the data for credit card usage and internet transaction usage from Exhibit 2.16, we can compute the adjusted $R^2$ between the two variables as shown in Exhibit 2.18. In this case $R^2$ tells that the percent of population holding a credit card is able to explain the percentage of population using internet for payments up to 50%.

Exhibit 2.16 Size of the most relevant e-commerce markets 2014, infrastructure and credit cards

<table>
<thead>
<tr>
<th>Country</th>
<th>Online market size (Bn USD)</th>
<th>Infrastructure (Points)</th>
<th>Credit Card Usage (Percent of Population)</th>
<th>Internet payments (Percent of Population)</th>
<th>GDP 2014 (Billion USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>100.0</td>
<td>91.5</td>
<td>0.57</td>
<td>0.65</td>
<td>$ 17,419.00</td>
</tr>
<tr>
<td>China</td>
<td>100.0</td>
<td>43.6</td>
<td>0.14</td>
<td>0.19</td>
<td>$ 10,360.11</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>87.9</td>
<td>86.4</td>
<td>0.35</td>
<td>0.73</td>
<td>$ 2,941.89</td>
</tr>
<tr>
<td>Japan</td>
<td>77.6</td>
<td>97.7</td>
<td>0.52</td>
<td>0.36</td>
<td>$ 4,601.46</td>
</tr>
<tr>
<td>Germany</td>
<td>63.9</td>
<td>83.1</td>
<td>0.36</td>
<td>0.56</td>
<td>$ 3,852.56</td>
</tr>
<tr>
<td>France</td>
<td>51.9</td>
<td>82.1</td>
<td>0.36</td>
<td>0.44</td>
<td>$ 2,829.19</td>
</tr>
<tr>
<td>South Korea</td>
<td>45</td>
<td>95.0</td>
<td>0.54</td>
<td>0.52</td>
<td>$ 1,410.38</td>
</tr>
<tr>
<td>Russian Fed.</td>
<td>29.6</td>
<td>66.2</td>
<td>0.17</td>
<td>0.18</td>
<td>$ 1,860.60</td>
</tr>
<tr>
<td>Belgium</td>
<td>8.3</td>
<td>81.1</td>
<td>0.37</td>
<td>0.52</td>
<td>$ 533.38</td>
</tr>
<tr>
<td>Australia</td>
<td>11.9</td>
<td>84.8</td>
<td>0.56</td>
<td>0.68</td>
<td>$ 1,453.77</td>
</tr>
<tr>
<td>Canada</td>
<td>10.6</td>
<td>88.9</td>
<td>0.73</td>
<td>0.66</td>
<td>$ 1,786.66</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>2</td>
<td>100.0</td>
<td>0.59</td>
<td>0.36</td>
<td>$ 290.90</td>
</tr>
<tr>
<td>Netherlands</td>
<td>8.9</td>
<td>84.6</td>
<td>0.26</td>
<td>0.68</td>
<td>$ 869.91</td>
</tr>
<tr>
<td>Singapore</td>
<td>1</td>
<td>100.0</td>
<td>0.31</td>
<td>0.28</td>
<td>$ 307.87</td>
</tr>
<tr>
<td>Denmark</td>
<td>8.1</td>
<td>75.5</td>
<td>0.29</td>
<td>0.74</td>
<td>$ 341.95</td>
</tr>
<tr>
<td>Sweden</td>
<td>8.8</td>
<td>77.7</td>
<td>0.36</td>
<td>0.75</td>
<td>$ 570.59</td>
</tr>
<tr>
<td>Mexico</td>
<td>10.0</td>
<td>56.0</td>
<td>0.11</td>
<td>0.06</td>
<td>$ 1,282.72</td>
</tr>
<tr>
<td>Spain</td>
<td>13.2</td>
<td>80.1</td>
<td>0.45</td>
<td>0.57</td>
<td>$ 1,404.31</td>
</tr>
<tr>
<td>Chile</td>
<td>2.7</td>
<td>73.2</td>
<td>0.23</td>
<td>0.15</td>
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</tr>
<tr>
<td>Norway</td>
<td>8</td>
<td>76.3</td>
<td>0.54</td>
<td>0.79</td>
<td>$ 500.10</td>
</tr>
<tr>
<td>Brazil</td>
<td>19.6</td>
<td>72.4</td>
<td>0.28</td>
<td>0.09</td>
<td>$ 2,346.12</td>
</tr>
<tr>
<td>Italy</td>
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<td>0.32</td>
<td>0.39</td>
<td>$ 2,144.34</td>
</tr>
<tr>
<td>Switzerland</td>
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<td>82.5</td>
<td>0.48</td>
<td>0.53</td>
<td>$ 726.56</td>
</tr>
<tr>
<td>Venezuela</td>
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<td>55.7</td>
<td>0.19</td>
<td>0.1</td>
<td>$ 509.96</td>
</tr>
<tr>
<td>Finland</td>
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<td>77.3</td>
<td>0.5</td>
<td>0.75</td>
<td>$ 270.67</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2</td>
<td>75.4</td>
<td>0.72</td>
<td>0.72</td>
<td>$ 188.38</td>
</tr>
<tr>
<td>Austria</td>
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<td>74.8</td>
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<td>0.68</td>
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</tr>
<tr>
<td>Saudi Arabia</td>
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<td>74.6</td>
<td>0.08</td>
<td>0.16</td>
<td>$ 746.25</td>
</tr>
<tr>
<td>Argentina</td>
<td>5.7</td>
<td>64.3</td>
<td>0.24</td>
<td>0.08</td>
<td>$ 540.20</td>
</tr>
<tr>
<td>Ireland</td>
<td>4.9</td>
<td>74.1</td>
<td>0.39</td>
<td>0.54</td>
<td>$ 245.92</td>
</tr>
</tbody>
</table>
Exhibit 2.17 Correlation between size of economy and size of internet retail

\[ y = 0.0179x - 4.109 \]
\[ R^2 = 0.7602 \]

Exhibit 2.18 Correlation between credit card usage and internet usage for payments

\[ y = 0.9566x + 0.0845 \]
\[ R^2 = 0.5028 \]
With the above relationships, we can estimate some quantitative interactions that are the basis for the qualitative pondering shown in Exhibit 2.19. In order to explain this last exhibit, our first hypothesis is that the six reasons here studied explain up to 100% of the phenomenon.

Exhibit 2.19 Weighted reasons explaining the lack of development for the Mexican internet retail

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Explanation for delay in Mexican E-commerce</th>
<th>Qualitative Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Lack of Confidence from the User</td>
<td>25 %</td>
</tr>
<tr>
<td>2.2</td>
<td>Unbanked Population</td>
<td>25 %</td>
</tr>
<tr>
<td>2.3</td>
<td>Undeveloped Infrastructure</td>
<td>5 %</td>
</tr>
<tr>
<td>2.4</td>
<td>Captive Retail Shoppers</td>
<td>4 %</td>
</tr>
<tr>
<td>2.5</td>
<td>Lag in General Development</td>
<td>37 %</td>
</tr>
<tr>
<td>2.6</td>
<td>Shopping as a form of “Cheap” Entertainment</td>
<td>4 %</td>
</tr>
<tr>
<td></td>
<td><strong>Total percentage points</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

The second assumption is that all the market consultants ponder the Lack of confidence from the user as the main component. We also have to remember that a conclusion from subchapter 2.1 is that lack of trust is a reason for a heavily unbanked population in Mexico. Hence we must adjust our findings to both statements in this paragraph insight. Therefore, I propose that the 50% found in Exhibit 2.18 should be split into the first two explanations.

By the same token, assuming that the “Lag in General Development” might be described by the phenomenon shown in Exhibit 2.17, then the 76% of the remaining percentage must be assigned to that reason. The rest of the reasons receive an equal share of the remaining total points, except for an additional point dedicated to undeveloped infrastructure, which displays clear correlation with developed economies (regardless of their E-commerce market share).
Chapter 2 clarified the main basis regarding the future forecasts of the Mexican E-commerce market. The huge potential growth in the next years will be quantified in this chapter. We start with some current facts. Mr. Octavio Camarena, CEO of Más Negocio\textsuperscript{16}, gives some statistics regarding the low development of Latin America in terms of E-Retail. Latin America accounts for 4.3\% of the total world electronic commerce. Africa represents 2.3\%, while Canada and the USA account for 32.9\%. Asia has also a major share accounting 31.2\%, and Europe computes 29.4\%.

However, the growth potential of Latin America, and particularly of Mexico, is enormous. The first subchapter presents the statistics for Mexico as a whole country, and shows various Exhibits aimed at proving the future importance of Mexico's internet market in the short run. The second subchapter presents two of the major risks that the possible growth in e-commerce faces in the short run. Subchapter three summarizes a general overview of the main E-Retailers in Mexico. At the end in subchapter four, a simple projection of Industrial Real Estate demand is done.

### 3.1 General trends of Mexican internet retail

Although Euromonitor shows that general growth trend for world E-commerce has started to slow down, as shown in Exhibit 3.1, Mexico during 2015 – 2018 will be the second country in terms of growth for e-commerce as shown in Exhibit 3.2. According to ATKeartney\textsuperscript{17} “the country's E-commerce market grows rapidly thanks to a young, connected population that is increasingly willing to shop online.” Now more than 40\% of Mexicans are considered to be connected to the World

\textsuperscript{16} http://www.dineroenimagen.com/2015-09-15/61598, November 8, 2015

Wide Web. At least 60% of the connected population has made any kind of purchase using the internet platform.

As shown in Exhibit 3.3, online sales in Mexico have increased more than 38 percent over the last two years, and a similar growth trend is expected for the next five years. Research from AMPICI (2015) has shown that Mexican online shoppers use the web for bargain information and comparison shop 63% of the time. The main portion of online sales in Mexico is dedicated to travel sales, and accounts for 61% of the web transactions. This might be considered a sign of early stages of development. This is due to the fact that many consumers show more confidence paying money on the web for intangible articles instead of buying physical belongings.

We can see that the percentage of online sales to total retail sales in Mexico will more than double between 2015 and 2019 as shown in Exhibit 3.4. The main reasons for this increase are probable rises in the share of expected digital buyers in Mexico, as shown in Exhibit 3.5. It is important to mention that Mexico City will be the 5th greatest city in the world in terms of population in 2025 according to Statista (2015). Only Tokyo, Delhi, Sao Paolo and Mumbai will have larger populations. Not even New York – Newark will host so many people. So, in fact this huge concentration of individuals in Mexico City might be expected to host one of the biggest internet retail markets of the world for the next ten years, as its population becomes more aware of the advantages of E-Commerce.

Exhibit 3.1 General growth trend of e-commerce worldwide
Exhibit 3.2 E-commerce sales CARG in selected markets from 2013 to 2018 Source: Statista (2015)

Exhibit 3.3 The evolution of Mexican e-commerce. Source: AMPICI (2015)
The person working at a major logistics company, whom I interviewed for chapter 2, defends that online shoppers are found to be concerned with the delivery of merchandise. A huge amount of Mexican retailers are found to use independent contractors in order to achieve the Last Mile delivery. This situation is linked to a limited refund policies and product return. These behaviors
might be linked with developing market stages. This percentage is expected to increase in coming years. ATKearney defends that “Higher-income consumers in Mexico’s three largest cities—Mexico City, Guadalajara, and Monterrey—accounted for more than half of all online sales in 2013, so as the rest of the country catches up, there will be an opportunity for online retailers.”.

The relevance of Mexico’s proximity to the United States is obvious, due to the fact that more than 50% of the merchandise comes from foreign sites. Hence, import volumes are also expected to increase in the long run, making Mexico a more relevant potential partner for the United States. ATKearney has already identified the main E-commerce players in Mexico. They are the international American companies Amazon and Walmart, followed by Mercado Libre (Argentina), Linio (Germany), and Dafiti (Brazil), and Netshoes (Brazil). It is necessary to state that Walmart has a variety of brands in Mexico.

Mexico faces a high potential, as its major players are not yet developed. For instance, Scotiabank 2014 states that the one major Mexican player is Liverpool, however only 1% of its sales are done online. Credit Suisse (2015) is consistent with these predictions, and believes that the Mexican internet market is ready to take off, and grow more than the rest of Latin America, as shown in Exhibit 3.6.

Exhibit 3.6 Growth forecasts for Mexican e retail and other countries Source: Credit Suisse 2015
3.2 Main risks in Mexican E-Commerce

In order to make a correct projection regarding the possible growth in warehousing demand, a correct risk assessment must be done. Three main risks are identified here. Every investor interested in the future expansion of Mexican industrial Real Estate should track the three.

First, one of the latest stories regarding credit cards in Mexico is that the total number of credit cards diminished by 3 million during 2015\(^\text{18}\). The total founding of Mexican plastic cards has decreased during the last 16 months, due to new fiscal regulations in 2015. These tax laws stimulate the use of cash because they keep strict track of the specific earnings every person has. Hence, they discourage the use of credit cards. The specialists have also explained this phenomenon with a consistent increase in personal, automotive and payroll credit. These specific financial products have decreased the need for credit cards as they provide better payment options for the clients.

Another reason to explain the recent loses in bank cards relies on a general misuse of credit cards by the bulk of the Mexican population. During the last 5 years, the Mexican credit card debts have increased exponentially\(^\text{19}\). Specialists agree that a general lack of financial culture has driven an alarming financial situation to a huge number of Mexicans. Today, at least 30 % of the current credit card holders have been found to require financial assistance aimed at solving their debt problems. Lack of liquidity, adverse macroeconomic situations and over-confidence are the main reasons why this happens in Mexico. These stressful situations explain why some of the young (24 to 35 years) bachelors have decided to cancel their credit cards.

Recent trends in prepaid cards for internet, as well as credit card random generators\(^\text{20}\) have set the target to reverse the decrease in internet transactions due to the current trends in plastic debt and internet mistrust. However, we need to take into account that the most comfortable way to pay on the internet is using a credit card, mainly because the information is stored. Other payment methods require additional steps in order to fulfill each electronic deal. The alternative methods also limit the number of sale events, because people require cash in order to comply with the first steps.

\(^{20}\) Some web pages offer to buy a temporary credit card number for a single use.
Impulse purchases are also reduced because the buyers require more time to think and realize the operation.

The second risk deals with the possibility of an excessive market supply (overbuilding). According to CBRE, from October 2014 to October 2015, the Greater area of Mexico City registered a 45% growth of Industrial Real Estate stock. The submarkets of Cuautitlán and Tepotzotlán lead this growth. However, a Real Estate investor must be very cautious if this type of expansions rely on speculative investments driven by E-Commerce expectations. In Exhibit 3.7 are the three main Industrial Real Estate market indicators for six major markets in Mexico, and do not show the same upward trend as Mexican E-Commerce in Exhibit 3.3.

Exhibit 3.7 Main market indicators in six major Mexican markets Source: CBRE, NAI, Prologis (2016)
Although there has been in Mexico a tremendous growth in E-commerce transactions during the period of 2006 – 2015, this phenomenon has not echoed in the demand for Industrial Real Estate. The main indicators presented in Exhibit 3.7 show three markets that can be almost considered flat. The three markets have not tightened. Excessive growth in supply must be mitigated by avoiding speculations and achieving the correct tenants before committing to invest. Nevertheless, we must always watch the competitor’s moves, because overbuilding can drive rents down and vacancies up. A conservative and reliable threshold for the future demand for Industrial Real Estate in Mexico due to the growth of e-retail (2015 – 2018) can be found in subchapter 3.4. Any construction above these predictions must be addressed carefully.

According to Professor David Geltner, we are facing a very complex global moment in the Macroeconomic Real Estate environment. All around the world, the Real Estate rents and prices are high, and sometimes they equal those reached in 2007. Geltner’s point of view states that this situation might lead to another crisis in the short run, driving cap rate expansions. The risk of another world crisis such as the one that occurred in 2008 can have the impact of delaying the Mexican E-commerce expansion. The industrial Real Estate in Mexico can suffer losses if the new predicted world crisis occurs during a period when excessive space supply occurs. In order to forecast correctly the correlation between Industrial Real Estate demand and E-commerce growth, the best strategy is to make conservative forecasts.

A third risk deals with the potential increase of identity theft in Mexico as E-retail increases\(^\text{21}\). This situation is likely to happen in a country where the legal framework is not correctly adjusted, as well as internet security is not guaranteed. If this happens, a lack of trust of internet will be incentivized, affecting the E-commerce perspectives.

These three risks might impact the forecasts of Industrial Real Estate, but chapter 2 has brought a solid framework that justifies a true growth perspective for E-retail in Mexico in the short run. Related to risks, it is important to mention that every Real Estate investor must take into consideration that planning to finance bricks and mortar retail in Mexico and worldwide might not be a wise investment in the long run. If the current scenarios in the United States are a good forecast of what will happen to Mexico, then in the long run we can expect retailers to close or downsize. A complete stop in the construction of new indoor malls could also be expected, according to DHL

Mexican e-retail market is considered by DHL (2015) to be a hotter market when contrasted to Brazil because of its greater growth perspectives.

### 3.3 Top ten Mexican E-Retailers

According to Credit Suisse (2015), the top ten E-commerce platforms in Mexico, excluding trips and services, are listed below. It is important to remark that these ten top players only account for 9 % of the total E-commerce in Mexico (1 billion USD of 2014). The rest the Mexican E-retail are players related to travel and services, and do not require logistic services for physical transportation of the final product to the consumer.

1. Walmart Mexico. Accounts for a 2 % of the total e-retail sales in Mexico. That represents according to Exhibit 3.3, 162.1 billion Mexican Pesos * 2 % = 3.24 billion Mexican pesos (244 million USD). Walmart Mexico reported in 2014 a total revenue of 437.66 billion Mexican pesos. Hence, the total web sales from the largest Mexican E-retailer only account for 0.7 % of its total sales. This can be considered absolutely marginal for the retailer. Walmart Mexico works with a "Third Party Logistics" (3PL) on its own main distribution centers. They also lease up some other secondary logistic facilities. It is important to state that the entire E-Commerce business unit only rents warehouses. Prologis Mexico constantly keeps track of Walmart as a current and as a prospective client.

2. Privalia. The Spaniard clothe e-retailer is expected to have a share equal to 1.6 % of the internet sales in Mexico during 2014. This is 2.59 billion pesos or 144 million Euros at an exchange rate of 17.94 Euros per Mexican peso. Privalia’s sales totaled 415 million euros in 2014. Then, the Mexican sales are 35 % of the total sales. We can consider Privalia is a company with a great relevance in the market, and with a big stake of their revenue in Mexico. Some products they sale come from past seasons of other retailers. Their logistic strategy in Mexico is focused in leasing warehouses, however Prologis Mexico has still no contact with them.
3. Linio. The third largest retailer in Mexico is expected to have a share equal to 1.1% of the total e-commerce sales (134 million USD). However, on a recent press interview, Linio’s CEO for Mexico has reported during 2015 that the revenue has tripled compared to 2014. At the time these lines are written, we still not have any declaration from Walmart in order to compare its current e-retail sales, but it is possible that right now Linio is be the largest player in the Mexican internet commerce. Some products they sale come from past seasons of other retailers. According to my contact at Linio, they rely mostly in third party logistic providers that can deliver the packages directly from the producers to the consumers (such as DHL, UPS, and/or FEDEX), and have no investments in warehouses. They rent in Mexico small storage facilities for their complex inventories to the company O’Donnell, and have no relation with Prologis Mexico.

4. Dafiti. The Brazilian based (but German owned) E-retailer, that has raised +300 million USD from JP Morgan, Quadrant Capital Advisors and Teachers’ Pension Plan since its foundation in 2011, ranks fourth with a 1.0% of the total internet sales (122 million USD) in Mexico. The total world sales of Dafiti are somehow blur. The financial reports are still kept in secret. A press release reveals that the estimated total world revenue of Dafiti is 192 million USD, but this number is quite unreliable. The expansion plan for Mexico is a very ambitious one. They have zero investments in Industrial Real Estate in Mexico and currently rent all their logistic facilities. Dafiti is more likely to rely on the same logistic strategy of Linio. They can be subcontracting currier services from Fedex and or DHL. They are not related to Prologis Mexico. Nevertheless, they own large warehousing facilities in Brazil.

5. Liverpool. Stands in the fifth place with 1.0% of the total sales (122 million USD). On a recent press release Liverpool reports that during 2015, the total internet revenue equaled 1.5% of its total sales. However, they plan to increase this number up to a 5% of the total sales by 2020. This huge expansion plan is a very interesting one. Like Walmart, Liverpool has a mixed strategy for the required warehouses. They own their main strategic distribution facilities, but lease the regional warehouses to other companies. Prologis Mexico currently leases space to Liverpool in Toluca.

6. Famsa. The famous Mexican retailer is a group listed in the Mexican Stock Exchange. The corporate office has been located in Monterrey since the foundation of Famsa, forty four years ago. They have recently opened stores in Texas and Illinois. They are the sixth largest
player in Mexican E-retail, and hold 0.7 % of the total sales (85 million USD). The total sales in 2014 reached one thousand million USD. Hence the internet platform stands for 8.5 % of their total sales. Here it is important to note that the share of E-commerce has been recently affected by the devaluation of Mexican peso. They rent all the required warehouses in Monterrey. Prologis has no contact with Famsa.

7. Palacio. The main competitor of Liverpool stands with 0.5 % of the total electronic sales (61 million USD) in Mexico. Grupo Palacio de Hierro is also listed at the Mexican Stock Exchange, and has a huge reputation as the leading high end store since 1891. The total reported revenue in 2014 equaled 1.6 billion USD. Hence the e-retail platform represents 3.8 % of the total sales. The company does not declare to have warehousing ownership in Mexico. Prologis Mexico leases some space to Palacio.

8. Decompras. Has 0.4 % of the total internet sales in Mexico (49 million USD). This computation is absolutely marginal to its holding company. Decompras has been recently acquired by Grupo CARSO. Grupo CARSO is owned by the Mexican billionaire Carlos Slim. Decompras is now named Clarostore, and currently hosts the internet sales portal of the entire holding company. Telcel, Telmex, and Samborns host their web platform there currently. Grupo CARSO is famous for huge investment in Real Estate Assets, including warehouses all around Mexico. Prologis Mexico currently leases some space to Telmex. But it is uncertain what kind of market they are trying to reach with the merchandise they store there. Telmex leases some space to Prologis Mexico.

9. Amazon. The most famous E-retailer player in the world started operations in Mexico in 2014. They only accounts for 0.4 % of the sales (49 million USD). This computation is absolutely marginal when compared to Amazon’s World revenue of 88.89 billion USD. Amazon is just beginning in Mexico. On the last few years they were only selling books. According to Mr. Juan Carlos García CEO of Amazon, the expansion strategy of this company in Mexico involves a large Distribution Center. The distribution center is property of Prologis, and was not leased until 2015. This facility is a top asset of Prologis Mexico in terms of innovation and design. Amazon is one of the top clients of Prologis worldwide. They have a strong expansion program mainly focused on logistic infrastructure around Mexico City. This company has for sure a great potential because of the intangible asset they have with their brand. We have to consider that some customers have found Amazon’s internet platform
in Mexico to be the easiest of all the top E-retailers. This functional issues can grab customers from the competitors. It is important to consider that very few startups achieve +40 million USD during their first years of operation. However, some analysts argue that Amazon is arriving late to the Mexican market, because Linio and Privalia have already reached a certain degree of loyalty with their customers.

10. Elektra. The famous Mexican retailer has only 0.3 % (36 million USD) of the total E-retail sales. This huge retailer is also listed at the Mexican Stock exchange. They reported a revenue equal to 5.1 billion USD in 2014. Hence the internet sales only account for 0.7 % of the total revenue. The business model of Elektra is more focused on capturing the purchasing power of the unbanked Mexican population that still receives remittances from their families in the USA (please read subchapter 2.3 for a better explanation of this). Grupo Elektra rents huge amounts of warehousing space around the country, and own also some strategic assets. They are not currently leasing properties that belong to Prologis Mexico.

3.4 A projection for the demand for warehouses in Mexico due to E-commerce

In order to make a projection for the demand for warehouses in Mexico caused by the future expansion of E-commerce, the following assumptions are taken into consideration.

1. The industrial Class A space for E-retail will be restricted to E-retailers that share the characteristics of those listed in subchapter 3.3. This relies on the fact that only those kind of tenants will satisfy the leasing criteria of the Mexican Fibras. Few smaller E-retailers will qualify for this criteria. So, the following computations must be based on the 9 % of the total e-retail market share.

2. There are more E-retailers that can satisfy the criteria of the Mexican Fibras and are not listed in subchapter 3.3. For instance, Librerías Gandhi, SEARS, Netshoes, Comercial Mexicana, Coppel, and Chedraui are also current E-merchants and possible good tenants not listed. Here it is important to note that the arrival to E-commerce of the big Mexican catalogue retailer “Andrea” is expected soon. Also we have to notice that some E-retailers,
such as Linio and Dafiti, might not be leasing directly the space. Instead, the required logistics might be leased to other carriers such as DHL and/or FEDEX.

3. The other E-retailers mentioned on the last paragraph account for an additional 20% of the total sales reported in subchapter 3.3 for 2015. This assumption is an informed guess based on how the market share of the top 10 e-retailers diminishes from one to ten. No more evidence supports this supposition.

4. The growth of E-commerce in Mexico will equal 126% more between 2015 and 2018, according to Exhibit 3.6. This projection has to be considered a conservative scenario provided by Credit Suisse (2015).

5. The demand elasticity of products will not be affected by the last appreciation of the United States dollar (years 2013, 2014, 2015 and 2016). This hypothesis implies that in the short run, the purchasing power of the Mexicans will not be eroded. Hence, we can consider the initial Mexican e-commerce total sales to equal 12,200 million USD. This quantity will not diminish in USD terms due to the depreciation of Mexican peso. This assumption might be the weakest of the six assumptions here presented. An alternative hypothesis is discussed four paragraphs below.

6. According to Prologis (2014), each billion USD of new e-commerce sales requires one million square foot of warehousing in Europe. We can consider this same projection to be valid in Mexico, although Europe has different perspectives in terms of infrastructure, economies of scale, and local manufacturing facilities. It is also necessary to test this last assumption.

The six assumptions listed above can result on an approximation for the total demand for new Class A warehousing space in Mexico due to E-retail growth. These estimations will be valid for the country as a whole. They represent a projected base scenario if all the assumptions above are considered conservative.

The total E-retail market share for the top ten internet retailers that required Class A space in 2015 invoiced a total of 12.2 bn USD * 9% = 1.098 bn USD. An additional 20% is added in order to take into consideration other e-transactions executed by more e-retailers. This results in 1.098 bn USD * 1.2 = 1.317 bn USD. An increase of 126% (from 2014 to 2018) results in 1.317 bn USD * 1.26 = 1.65 bn USD of additional e-retail commercial operations in Mexico by the end of 2018. According to Prologis (2014), this might produce a demand equal to 1.65 million new square feet of warehousing by the end of 2018 (153,290 square meters). This translates into eight warehousing facilities with
the same size of PROLOGIS Park Tres Ríos in Cuautitlán (Mexico City submarket) only devoted to fulfil E-retail solutions. The market that will benefit the most due to this expansion is expected to be Mexico City.

If we change assumption number five, and take into consideration a negative impact caused by an erosion in the Mexican peso value, we might use the compounded annual growth ratio (CARG) expected by DHL (2015). The expected CARG is 13 – 18 % for a USD based projection. This results in a 74 % increase from 2014 to the end of 2018. An increase of 74 % results in $1.317\text{bn}\text{USD} \times 0.74 = 0.98\text{bn}\text{USD}$ of additional e-retail commercial operations in Mexico by the end of 2018. This produces a demand equal to 0.98 million new square foot of warehousing by 2018 (91,045 square meters), agreeing with Prologis (2014). This translates into four warehousing facilities with the same size of PROLOGIS Park Tres Ríos in Cuautitlán (Mexico City submarket) only devoted to fulfil E-retail solutions.

In conclusion, a reliable threshold for e-commerce warehousing requirements in Mexico is around 0.98 million to 1.65 million square feet (153,290 to 91,045 square meters). Exhibit 3.8 shows the estimate of additional stock in Industrial Real Estate when compared to 2014. The references are shown there. The projections are done in billion dollars, which is equal to one million square foot.

Exhibit 3.8 Estimate of additional demand for Industrial Real Estate in Mexico due to E-commerce

(million square foot)
4. Industrial Real Estate strategies in Mexico due to future E-Commerce growth

The following chapter summarizes the main ideas captured during some interviews with the Prologis team in Mexico City and Brazil. In order to make an unbiased report, I avoid to reveal the specific answers that each person gave me. This methodology results in a compilation of professional perspectives on how to manage the growth expectations of Mexican Industrial Real Estate, regardless of the hierarchy in Prologis. The same questions were applied to everyone. The answers to the questions are analyzed in detail on the following subchapters. The interviews were done to the following Prologis Officers: Luis Gutierrez, Héctor Ibarzabal, Jorge Girault, Rafael Arias, Hardy Milsch, Juan Carlos López, Federico Cantú, and Ben Peterson. Other four professionals answered these questions. They are Dr. Edgar Blanco and Dr. Sergio Caballero from the MIT Lab focused on Last Mile solutions at the Megacity logistics lab, and Yadira Romero and Luisa Alaniz, market specialists from CBRE.

The criteria of all the Prologis officers is similar. It tends to be aligned and consistent with the general investment strategy of Prologis, which can be understood by expending a few days at the office. Some officers have alternative opinions, and tend to justify with more evidences and insights. The vision of an external Real Estate professional such as Yadira helped contrast Prologis’s opinions by providing a fresh new perspective. This was very valuable. The current general strategy of Prologis Mexico aimed at detecting the proper location for a new investment and development project can be summarized on the three following points:

1) Focus on constrained environments and markets. The tollbooths set a clear frontier for the convenient warehousing locations, because it is more convenient to pay tolls for fewer containers instead of tolls for many smaller ones. Rafael Arias mentions that at least during the current Federal Government administration, the position of the tollbooth for the Mexico City – Querétaro Highway will not change. Geographical slopes and natural barriers are great factors for this scarcity that also occur in the Corridor Cualtitlán-Tultitlán-Tepoztlán (CTT) in Mexico City. This same investment strategy is justified scientifically on Saiz (2010). The CTT Corridor can be found in Exhibit 4.1.

2) Give priority to the larger and most densely populated markets, which are most likely to generate the greater demands. Here almost every company can find the best opportunities
for logistics, as neighboring cities can also be served from larger cities. For instance, Mexico City can also serve Toluca, Pachuca, Puebla, Cuernavaca and Querétaro.

3) It is important to understand that investing in logistics platforms outside the tollbooths requires offering lower rents. This might imply higher risks for the projects. Although these locations offer cheaper land, they do not offer the strategic position to distribute finished goods inside a city.

Exhibit 4.1 CTT Corridor, North Mexico City. Source: Prologis.
Logistics platforms outside of the cities can be good import consolidation centers or terminal logistics facilities, where the manufacturer can perform the last finishes of the merchandise. The best world example is according to Watson, Kraiselburd (2009) the logistics platform of Zaragoza, Spain where Inditex hosts its main logistic center. Logistics platforms sometimes require a specific kind of tenants. The assets are not so easy to lease, and hence the Fibra’s requirements might be stricter with this kind of properties.

4.1 Why do you think E-commerce has lagged in Mexico?

The reasons exposed on chapter 2 were validated. Some insight into the possible social mechanisms that trigger those reasons were mentioned during the interviews. Three main factors were consistently mentioned as the main cause of the delay: Low level of Banked Population, Lack of Trust of Internet, and Lack of Internet Infrastructure. However, Mexican E-retail is growing, and the Prologis office has great confidence of a future consistent and continuous growth for that phenomenon. The expansion of Amazon Mexico is a good evidence to expect an increase of internet operations. It is important to state that we have to rely on conservative expectations for Mexican E-retail because the social mechanisms mentioned here are linked to a general culture that affects doing business in Mexico. Maybe the correct consolidation of E-retail in Mexico could occur in ten or fifteen years.

The most outweighed reason for the delay during the interviews is Unbanked Population. The low bank penetration and low number of bank accounts are believed to be caused by the new Federal Reforms aimed at taxing more the consumer. These new Reforms are supposed to hinder formal economy. Cash transactions are preferred by the consumers in order to avoid a complete audit of their resources.

The second most mentioned reason regards a Lack of Trust of Internet. There is a natural mistrust to online issues by the Mexican consumer. Some of the top commercial Mexican web pages are considered dismal by some users. This mistrust plays a great synergy with Internet penetration. Electronic devices are more scarce and expensive in Mexico. This has caused that only 2 % of the
203 billion USD Dollars total retail sales occur in internet in Mexico. It is amazing that Brazil has 120 million internet users, while the population in Mexico is only 115 million. Technology hasn’t reached the complete Mexican population.

An important idiosyncratic difference of Mexico when compared to the United States deals with a lower culture of time value. The need for immediacy and short time results is not valued as much in Mexico. This situation could be the explanation for less reliable distribution networks. In Mexico only the national mail system has full coverage of the country, but it is unreliable in terms of time. The delivery methods to the consumer are not trustworthy in rural areas. Meanwhile in Brazil, the national mailing system works efficiently. In China the mailing system is also very trustworthy according to Chinese Graduate students at MIT. Due to this fact, the retail economy is different when compared to the USA, China, and Brazil.

The delivery process in Mexico encounters three big obstacles. The first hurdle deals with higher shipping costs when compared to the USA. Even currier servicers expect tips when delivering a package. The second difficulty regards the fact that in Mexico the delivery system can not work most of the time if there is not someone to receive the package and sign for it. Due to security reasons, security guards in Brazil are always present at the entrances. So it is easier to deliver packages there. The need to have a receipt signature is because frauds to mail delivery are done frequently by the customer. Palacio de Hierro commented with Prologis that they have registered a rate of claims equal to 15 % when dealing with E-commerce. The third big obstacle is that packages can be stolen easily from mailboxes in Mexico. Security cameras are not so reliable in Mexico. Palacio de Hierro also has told Prologis that certain precautions have to be done for delivering big home appliances in some of the Districts because of robbery. E-retail is working correctly only in the best districts of the big cities, where there are enough surveillance cameras. Only the upper 25 % of the urban population lives in these kinds of districts.

When comparing Mexico and Brazil in terms of E-shopping, 22 % of Prologis leases are devoted to E-retail in Brazil. E-commerce in Brazil staggered impressively. It is important to mention that Amazon is the main client of Prologis Worldwide, and only 10 % of Prologis’s leases are internet retail oriented. The size of traditional logistics is still unbeatable. In Brazil, E-commerce has evolved as a response to the complex national geographical challenge that corporations face. Mexico offers an easier topographical challenge regarding transport when compared to Brazil, hence it is easier in Mexico to have a full commercial and logistic coverage of the country.
Another issue that arises when comparing Mexico to Brazil, United States and China deals with the cost of mobile internet. According to CBRE and AMPICI, people in China, United States and Brazil are more likely to shop using a mobile device than a computer. Exhibit 2.5 shows a very different scenario for Mexico, where the computer plays the leading role of E-retail transactions. In the other three countries, the highest volume of online transactions are done between 15:00 and 17:00 local time. In Mexico, most of the cellular phones are smartphones that do not have a mobile internet contract due to high internet costs. Mexican smartphones and tablets are still Wi-Fi dependent. This shopping pattern will not be similar in Mexico if the telecommunication reforms are not properly implemented.

4.2 How might this situation change in the short and in the long run?

There is a need for Government intervention to improve legal framework and laws. The new fiscal Reforms must provide the suitable context aimed to incentivize greater levels of banked population. A better credit policy, as well as a more flexible credit bureau are efforts that will require the intervention of high Government officials. Only a comprehensive fiscal reform that forces everyone to enter into tax control will really make the difference for the banking system in terms of clients.

To clarify this situation, a comparison to Brazil can be described. In Brazil, a person cannot exist without a Personal Tax Number. This number is required even to buy a cellphone. Brazilian housemaids and construction workers are required to be paid on a bank account. This does not occur in Mexico. Hence in Brazil almost everyone has at least a debit card. Almost every commerce has a bank card terminal, and there is much less need for cash in Brazil than in Mexico. Tax registrations are more advanced in Brazil. The financial culture of Brazil has improved significantly.

Other important Reform required in Mexico deals with telecommunications. This new Reform must facilitate an affordable access to internet and mobile devices by eliminating possible excessive costs that can be linked to monopolistic practices in Mexico. Nevertheless, it is important to mention that recent legal changes in Mexico have suggested that Reforms are easy to approve, but very hard to implement effectively. For instance, the telecommunication group TELMEX has recently been publicly accused of Cartel behavior.

Another fact is that Banks must provide better security systems for transactions in order to improve confidence from the user. Electronic frauds must be mitigated by the banking institutions in Mexico.
The whole Mexican culture has to change around the credit cards. Not only bank cards must depend on better security systems, but also the streets must have a better security system aimed at avoiding the merchandises to be stolen. It is necessary to also mention that interest rates, although low at interbank level, can be considered high to the credit card holder. This issue diminishes the elasticity of demand related to credit card usage.

We have to consider that E-commerce is very recent worldwide. It is just starting. Mexico is always expected to be following the United States, hence E-commerce has a great possibility of expansion. We have to expect that buying habits are changed gradually. E-retail companies are making huge efforts to improve this situation in Latin America. The arrival of new worldwide known players to Mexican E-commerce will help, due to specific marketing efforts done by these organizations. For instance, prepaid gift cards of Amazon that can be bought at OXXO stores in Mexico are a good market innovation for Mexico. OXXO convenience stores offer the possibility to retrieve Amazon packages there. However, a main risk for OXXO regards their low storage capacity. The biggest players worldwide are interested in developing economies in order to keep expanding at the same rate that the United States offered in recent years for them. Specific efforts for triggering E-commerce are likely to appear on their business plans.

AMIPCI and CBRE share the idea that the most effective efforts aimed at gaining confidence from the Mexican customer should be done by very well-known traditional stores such as Walmart, Palacio de Hierro and Liverpool. Amazon, Linio and Dafiti by themselves have not achieved the same degree of confidence when trying to convince the grown up Mexican customer (who is supposed to have the best purchasing power) to buy online. Marketing efforts from seasoned retailers in Mexico are expected to happen shortly. These three retailers have already expressed interest to CBRE in expanding warehousing capacity in order to address E-retail transactions.

There have been some good advances in Mexico that are expected to stimulate E-retail. Cellular phone costs have already diminished and there is a continuous growth regarding the availability of electronic devices. Yet, costs must still be diminished. In the long run we can expect Mexico to adopt the best practices of developed countries. E-retail will grow enormously in Mexico because of the demographic bonus that Mexico has. Younger people are already internet buyers that will increase their purchasing power, as well as the number of E-buyers. There is no other choice.
4.3 When we think of the required logistics for E-retail, what are the main consequences in Warehousing Requirements?

The facilities will not be so different. The specific needs will depend on the vision and objectives of the specific E-retailer renting the warehouses. Ordinary warehouses can also work for the standard type of E-retail tenant. However, it is very important to work on a Built-To-Suit basis with larger E-retail logistic clients, in order to address the specific demands of reliable tenants. Most requirements have a range of possible sizes that would fit, but the specifications of some clients are simple “guidelines” and are not set in stone. CBRE thinks that the most important requirements will be connectivity and location.

However, based on the recent experiences with Amazon in Mexico and Brazil, the first generation of huge logistic facilities for E-commerce are likely to require: vast regular lands, warehouses with more landing docks than usual, cross docks will be preferred and no front docks are expected, heights will equal more than 10 m in order to fulfill automation requirements, floors will require flatter specifications regarding the finishes, and wider spaces will be a continuous demand for maneuvers. The height of warehouses is a major concern for the rack system. Peiser and Hamilton (2012) consider that a clear height at the center of the Building must be at least 12 meters, hence more than 10 meters could be considered already a standard in the United States.

More office space needs are expected. Maybe distribution center buildings will be larger, with more than 100,000 square feet of roofed space. We can foresee more installations, and HVAC ducts than usual. Global companies might require specific insulation components in order to provide the same working conditions for their labor forces all around the world. Maybe extensive robots (known as “Kiva Systems” for Amazon) will be a future requirement. Civil works must anticipate special needs for those machines.

A typical Amazon market will have at least two, but frequently more than two full-sized fulfillment centers located in the outer ring of town, within two hours of the majority of population centers. Amazon pairs these into “sort” and “non-sort” varieties that are designed with the same 570’ deep footprint. The sort facilities handle the smaller and more easily conveyable products, contain multiple levels of mezzanine and use extensive robotics. The non-sort variety handle larger, bulkier
products, have smaller mezzanines, and contain far less robotics and automation that the sort facilities.

Amazon prefers to build new “ground-up” construction for its most advanced fulfillment centers. These buildings are very complex facilities built inside a very generic shell, using a prototype shape and design. Preferred clear height is 40’, but exceptions can be made for lower clear height on existing buildings down to 30’ clear. Preferred building depth is 570’ in a cross-dock format. Amazon will often only use one side of the building for loading, so it can utilize the other side of the building truck court for auto parking. These buildings usually contain specifications for multiple levels of mezzanine and automation, and will require parking for 1,000 to 2,500 cars. Amazon tends to plan for these facilities as much as two or three years before they need to be placed into operation.

When developable land sites are not available, Amazon will look at other creative approaches where existing buildings can be expanded or retrofitted to meet their specifications. Amazon will sometimes tie up property themselves via negotiations with local and State Economic Development organizations, then will ask developers to construct and fund the projects in an open bid. According to Ben Peterson, Vice President Sr. for the Amazon account at Prologis, the fulfillment centers of a huge Logistics titan like Amazon can be classified as:

1. BIG SORTABLE FC’S – They house larger items that can all fit into one shipping box (e.g. books, DVDs, Watches, etc.). Sizes typically 800k square foot to 1.2 million square foot.
2. SMALL SORTABLE FC’S – House smaller items that can all fit in one box/shipment. Sizes typically 800k square foot to 1.2 million square foot.
3. NON-SORTABLE FC’S – Generally house items that cannot be sorted into a box with other items, and cannot be placed onto a conveyor belt for automated sortation. Sizes typically 800k square foot to 1.2 million square foot.
4. REPLENISHMENT CENTERS – Generally receive product from vendors and then move these products to and between other fulfillment centers.
5. CUSTOMER RETURNS CENTERS – They process all Amazon customer returns. Sizes typically 300k to 600ksf.
6. SPECIALTY SITES – Fulfill specialty items sold by Amazon such as jewelry and clothing. Sizes typically 100k square foot to 800k square foot.
7. GROCERY SITES – Service home delivery of dry grocery and perishable merchandise (Amazon Fresh) currently in Seattle, Los Angeles, San Francisco, and expected to roll out to
over 20 large metropolitan cities globally. Dry groceries size can be 300k sf or more. Perishable (refrigerated) groceries size typically 40k sf to 100k sf.

8. SORTATION CENTERS – Generally used to sort packages out by zip code whereby the packages have originated from a fulfillment center elsewhere in the Amazon network. Sizes typically from 100k square foot to 500k square foot (exceptions for largest U.S. markets such as Southern California and NY/NJ where these can be upwards of 800k square foot).

9. AMAZON LOGISTICS (AMZL) – These facilities are designed to be last mile cross-docks, taking bulk truck deliveries from fulfillment centers and sortation centers, and consolidating them into small delivery sizes to go to customers’ homes and businesses. Large trucks/trailers unload at docks, while smaller vans (owned by Amazon) drive into the buildings and back up to a conveyor belt where packages are loaded into the van. Vans then drive out of the buildings and wait in the truck court until they get onto the road for delivery. Low automation and smaller offices. No HVAC necessary except for exhaust systems. Trailer storage preferred but not absolutely necessary. Prefer to be located in close-in urban locations and suburbs. Sizes typically 100k square foot to 250k square foot.

10. AMAZON PRIME NOW- Amazon is rolling numerous one-hour delivery stations in every large U.S. market for its new Prime Now service (same day and one-hour delivery capabilities). Prime now stations will be smaller, lower clear height light industrial buildings with minimal dock loading, and will store the most actively purchased inventory for same day delivery. Amazon will utilize some of its own vans, and also a new service called “Amazon Flex” to deliver packages to customers from these locations. Amazon Flex is the Uber-like private car delivery service, where independent contractors can use their own vehicles to deliver goods and be paid on a per-trip basis (aka “Crowd Shipping”). Prime Now outlets can be co-located in same building with AMZL. Sizes typically 15k to 40k sf.

11. AMAZON WEB SERVICES (“AWS”) – Amazon continues to add data centers to its cloud computing platform, and continues to seek shell spaces in Washington DC/Virginia, Ohio and Northern California. Sizes typically 70k sf to 130k sf. This group operates separately from the fulfillment center operations, but uses the same in-house real estate brokers.

To complement the fulfillment centers, Amazon is adding a new network of “Sortation Centers” in every market. These buildings are meant to sort outbound packages into zip-code deliveries by the USPS and soon by AMZL. Amazon Sortation centers and Logistics buildings prefer to be in “stand alone” buildings.
On the topic of the comparison with Brazil, great similarity to Mexico is detected regarding the fact that logistics efforts are focused first on the main cities (Rio de Janeiro and Sao Paolo). The rest of the cities require shorter facilities located in regional centers. Regional centers are expected to be located in the largest city of the region, and are used to store the merchandises that face availability problems.

4.4 How might the solution to the Last Mile problem evolve in the next ten years?

The Last Mile evolution is a very important topic for the future. Prologis will study the available alternatives in order to serve better its clients. The most interesting option is to think on macro fulfillment centers at the outskirts, on strategic positions, linked correctly to a system of small warehouses (known as CEDIS for the Abbreviation in Spanish for “Centers of Distribution”). CEDIS should be located in central places of the main cities, near to the consumer, in order to distribute merchandise effectively in densely populated districts. These small warehouses need to be operated by small or medium sized local delivery companies, specialized in handling specific traffic conditions. These small companies will work as subcontractors for the big ones, and will have a lot of work to do. Some characteristics of the future network of urban logistics spaces are shown in Exhibit 4.2.

This interaction between large peripheral warehouses and smaller central CEDIS is already happening in the USA. Many small distribution centers are supposed to be required inside modern cities. This new demand for space will impose a huge challenge for Industrial Real Estate, because bidding against other commercial uses in the Center Business Districts (CBD) will not be simple. According to DiPascuale, Wheaton (1996), warehouses have been the cheapest form of Commercial Real Estate during the last one hundred years. Maybe old industrial sites will revive. For instance, some old warehouses located in the center of Paris are about to be refurbished. Hence, the zones of Vallejo, Pantaco and Azcapotzalco in Mexico City could be a good place to start thinking on future mix use developments that include logistics facilities and local gathering centers. These “small” modular warehouses are set up from large storerooms divided by flexible modules that can produce spaces ranging between 400 and 1,000 square meters. These spaces are already available in Naucalpan, Tlalnepantla and Vallejo (all three submarkets belong to Mexico City). The rents range between 7 to 8 USD/square meter/month in Naucalpan, and between 9 to 10 USD/square meter/month in Vallejo. They are expensive when compared to the rents in the CTT corridor (5 USD/square meter/month). The logistic use of building rooftops is an interesting idea that must assess the costs of: lifting merchandise from ground floor to the rooftops, constructing light roofs, associated rents, and costs of opportunity related to rainwater harvesting and solar panels.

The built environment has a major opportunity that involves developing warehousing projects with the Built-To-Suit approach, in order to provide better facilities for the client’s internal and external logistics. A good warehouse developer should provide his tenants with the best products that fit their needs in order to offer competitive advantages that can be capitalized by renters. At the same time he should construct generic spaces that can be easily modified for new prospective leaseholders. The infrastructure of convenience stores (for instance, OXXO) located at the center of the cities offers great opportunities. This idea first was implemented in Tokyo. Amazon and DHL have developed for convenience stores Automated Parcel (or Packing) Stations (APS). Amazon’s APS, known as “Amazon Locker”, appeared in New York last year. Right now another one can be found at one Seven-Eleven convenience store located in Cambridge, Massachusetts, on the corner of Main and Windsor Street. Exhibit 4.3 shows two pictures of the “Amazon Locker” located in Cambridge, Massachusetts.

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22 Vallejo is more near to the Central Business District than Naucalpan.
Drones are not a long term solution for last mile. The security frame for drones in Mexico is a major concern due to high theft rates. Also, drones are not forecastable in the near future because of privacy issues. Even in the USA drone technologies for transportation are still not feasible. Drones could be a reliable transport system for short distances may be in more than 15 years in developing countries. We cannot predict drones will address transport problems in a big way for the near future. Amazon is currently studying the real scope that Drones could handle in the long term. But we cannot expect drone deliveries until Amazon has developed a larger cargo infrastructure. To that end, Amazon has just leased two cargo jets and is testing an air shipping network (named Aerosmith), based in Wilmington, Ohio, that will give them immediate ability to make air shipments between their largest fulfillment centers.

Around the world there are better ideas that involve transportation networks such as Uber. In 2016, Amazon will add a new Last Mile delivery network similar to Uber called Amazon Flex. Amazon wants to lower its shipping costs by owning the carriage of goods to their consumers from end to end. This will make them less reliant on UPS, FedEx, and other 3PLs. Amazon Logistics, or “AMZL” is a new network of buildings, trucks, vans and airplanes that is dedicated only to delivering Amazon shipments. Amazon began the development of this business with the objective of lowering their shipping costs and to providing more certainty in time of delivery. This service will augment deliveries, which are already being made by FedEx, UPS, USPS and other 3PLs. A typical Amazon market will have at least two, but frequently more than two full-sized fulfillment centers located in the outer ring of town within 2 hours of the majority of population centers. Amazon has chosen locations for the smaller facilities that are not so flexible – they will often go to a higher priced building to stay within a prescribed area in order to service prescribed customers around that area.
Regarding the futuristic technological improvements for the Last Mile problem, Winkenbach, Merchán, Blanco (2015) have done a complete SWOT analysis. Some examples of these innovations can be mentioned here:

- Mobile Warehouses, such as TNT Mobile Depot in Brussels, are another option that consists in using the trailer container as a small warehouse inside a city.
- Cargocycles are tricycles that carry a rear container for package distribution.
- Driverless trucks are supposed to be way more feasible than drones as a technological mean for solving the Last Mile problem.
- Amsterdam has begun to use the subway system for night merchandise distribution.
- The Nano packaging technologies are wrapping techniques aimed at optimizing the container space for each product carried.
- GPS and satellite sensors are technologies that will help in the near future characterize and manage the optimal logistics in megacities. Exhibit 4.4 shows a summary of the ultimate measurements done by lastmile.mit.edu/ for assessing the urban logistics complexity of megacities, for the most critical square kilometer at each city.

Exhibit 4.4 Characteristics of the most critical square kilometer at Megacities. Source: lastmile.mit

<table>
<thead>
<tr>
<th>Metropolitan Area of</th>
<th>Population (Millions)</th>
<th>Area (square kilometers)</th>
<th>Density (1/square kilometer)</th>
<th>Stores/square kilometer</th>
<th>Public meters of unloading areas</th>
<th>Deliveries / hour</th>
<th>Average vehicles / square kilometer</th>
<th>Disruptions/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beijing</td>
<td>18.83</td>
<td>748</td>
<td>11.5K</td>
<td>836</td>
<td>12,230</td>
<td>49</td>
<td>3,730</td>
<td>57</td>
</tr>
<tr>
<td>Bogotá</td>
<td>8.55</td>
<td>1,600</td>
<td>5.6K</td>
<td>733</td>
<td>5,800</td>
<td>24</td>
<td>4,320</td>
<td>14</td>
</tr>
<tr>
<td>Boston, MA</td>
<td>4.56</td>
<td>18</td>
<td>5.7K</td>
<td>85</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Kuala Lumpur</td>
<td>1.52</td>
<td>243</td>
<td>6.4K</td>
<td>585</td>
<td>1,870</td>
<td>60</td>
<td>9,920</td>
<td>137</td>
</tr>
<tr>
<td>Madrid</td>
<td>6.42</td>
<td>606</td>
<td>5.4K</td>
<td>1,420</td>
<td>10,740</td>
<td>51</td>
<td>1,770</td>
<td>77</td>
</tr>
<tr>
<td>Mexico City</td>
<td>20.12</td>
<td>1,500</td>
<td>5.9K</td>
<td>2,580</td>
<td>584</td>
<td>35</td>
<td>2,040</td>
<td>88</td>
</tr>
<tr>
<td>Rio de Janeiro</td>
<td>11.84</td>
<td>1,200</td>
<td>5.3K</td>
<td>2,620</td>
<td>1,860</td>
<td>92</td>
<td>854</td>
<td>14</td>
</tr>
<tr>
<td>Santiago</td>
<td>6.13</td>
<td>640</td>
<td>9.5K</td>
<td>1,800</td>
<td>415</td>
<td>22</td>
<td>387</td>
<td>19</td>
</tr>
</tbody>
</table>

The disorganized urban fabrics that predominate in Latin American cities will play absolutely against the best logistic practices that are expected to be developed in technologically advanced countries. According to Prologis officers same day delivery might have no short run solution. However, MIT Researchers think that there are great chances of implementing immediate deliveries in Latin America if competent professionals rethink the urban logistics. MIT Scientists also think that internet buyers in Latin America are very likely to create a lot of pressure regarding same day or same hour delivery. The cities of the future in Latin America are expected to have truck traffic restrictions. This is already happening in Río de Janeiro and Sao Paolo because of traffic jams.
Truck traffic restrictions, and parking prohibitions in front of convenience stores (such as OXXOs) will impose another challenge to expedite logistics. The arrival of multimodal Last Mile delivery using small bicycles and motorcycles should play the most important role in distribution where cities have vehicle restrictions. Part time students delivering orders near their schools and universities, aided with bicycles could be part of the solution. Winkenbach, Merchán, Blanco (2015) state that Last Mile can be solved using: 1) different freight transportation modes along the delivery route, and 2) intermediate logistics platforms or urban logistics spaces to consolidate and/or transship freight. Such systems allow companies to still leverage economies of scale from larger warehouses and shipments in the outskirts of the city, but also to comply with regulations that aim at reducing the environmental and social footprints of logistics operations in constrained urban areas.

Last Mile regulation is a very important subject. Public policies must be done in friendly terms so that delivery systems can play a correct economic role focused on fostering development. Winkenbach, Merchán, Blanco (2015) make some comments for the following cities:

- In general, regulations have enacted access restrictions to the city core and have targeted “large trucks” (> 7-8 meters long).
- New York City allows for larger vehicles and restricts based on roads rather than zones.
- Buenos Aires is the only city where dedicated freight parking infrastructure has been included systemically within the regulatory framework (“cajones azules”).
- Sao Paulo is the only city which has explicitly defined incentives for electric vehicles.
- Increasingly strict regulations in downtown areas in Buenos Aires and Mexico City can be expected in the near future.
- Enforcement is particularly aggressive in Mexico City.
- Regulations information availability varies significantly across cities: New York City (high), Buenos Aires (Medium), Sao Paolo, (Medium), Mexico City (Low).
- Safety information needs to be analyzed on a case basis due to data unavailability.

It is necessary to keep in mind that the Last Mile facilities might not be an interesting target to Prologis, due to the specific small characteristics. Local and smaller developers are involved already in these kind of small modular warehouses in Naucalpan, Tlalnepantla and Vallejo. But the overall Last Mile strategy adopted by huge E-retailers should be a major concern, aimed at visualizing the best future locations for huge distribution centers. Real Estate brokers such as CBRE, are already
4.5 What locations and types of logistics assets are poised to benefit the most in Mexico regarding the E-commerce phenomenon?

Mexico will have the greatest potential in its three main cities. Mexico City can be expected to be the leading location where 60% or more of the total new E-commerce related operations will be hosted. Income level is a very important variable that will dictate where the best locations are. The best markets will obviously be the ones with the larger volume of prospective clients. Land restrictions are also a great indicator of potential future value of assets. In particular the CTT Corridor in Mexico City receives the freight transport from the United States, and also from Asia. The railroad terminals that receive freight from the Pacific Coast are located near the CTT Corridor. Warehouses next to the “Circuito Exterior Mexiquense” in the Greater Mexico City Area, are also a good alternative for locating logistic facilities.

Mexico City, Monterrey and Guadalajara could be the best markets. Monterrey could be the second major market due to the fact that it is a Mexican City that is rapidly imitating trends from the United States. Nevertheless, Prologis officers are not certain if E-commerce for Monterrey could be supplied by some warehouses in Texas, and might also be limited because people in Monterrey have a very short driving distance from American shopping centers. Also, some people in Monterrey have access to use some Texan home addresses for E-commerce, and can retrieve the packages later on when they cross the frontier. A counter argument is that Palacio de Hierro established successfully in Monterrey a few years ago, selling merchandise that can be bought cheaper in Texas. CBRE expects a greater potential from Villahermosa’s warehouses than from Monterrey’s Industrial Real Estate, when talking about E-retail. Villahermosa is a more expensive market than Monterrey, and southeast Mexico is supposed to be served from Villahermosa, Tabasco. CBRE believes in the near future that Monterrey’s warehouses will be dominated by the automotive industry, not by the logistic operators. KIA and another vehicle company are expected to expand operations there. Federico Cantú does not share the same view with CBRE, due to the fact that www.uline.mx/ has
set an example of the Monterrey E-commerce distribution potential by recently leasing 500,000 square foot to Prologis. ULINE is distributing all around Mexico industrial products. Federico thinks that 60% of ULINE’s sales are internet transactions.

Guadalajara might not be the best market. The electronic industry located there is not performing well so far. This might affect Industrial Real Estate perspectives. Guadalajara has a very low logistic potential because of the short driving distance from Mexico City. An evidence of this is that Herbalife has decided to move from its warehouses in Guadalajara, because of the limited connectivity offered there. A fulfillment center will work in Guadalajara only if it is planned to work as a Regional facility for the whole Bajio zone. However, it is important to state that clients must be aligned with that Regional fulfillment vision before building logistic centers on Spec. Guadalajara is a very atypical market where logistic activity is important. Expensive Industrial Real Estate in Guadalajara (4.0 to 4.5 USD/square meter/month) has pushed warehousing interests to Guanajuato, Aguascalientes and San Luis Potosí, where storerooms can be found for 3 USD/square meter/month. Tijuana, Nuevo Laredo and other regional markets might have almost zero potential, but regional locations near main highways to big cities should be analyzed.

CBRE thinks that the best regional market for E-commerce could be Ciudad Juárez, Chihuahua. But Federico Cantó is very skeptical of Frontier markets due to the fact that the proximity to the United States is really very critical there (less than 7 miles). Amazon might be thinking on opening a second logistics facility in the CTT corridor before thinking on another city in Mexico. The idea of an Import consolidation center in San Luis Potosí is a good one. Nevertheless, this kind of centers must not be built on spec. BMW Motors decided to locate in San Luis Potosí in order to serve the three main markets of Mexico. However, Amazon rejected the idea of San Luis Potosí, and decided to stay close to the main Mexican market in order to diminish costs of last mile delivery for E-commerce.

Prologis is focused on land developments inside the toll boundaries of the city. These sites offer constrained opportunities that are expected to increase the value of Real Estate investments. Logistics parks located outside the toll plazas of the city will work in the near future, when land availability becomes null inside the limits. Right now only Liverpool, Costco and Chedraui are the Mexican firms that are located outside the tollbooths.

Prologis estimates that Rents could average 4.5 USD/square meter/month outside the toll boundary, while rents inside the toll plazas average 5.2 USD/square meter/month. Locations inside the toll boundaries are more attractive to potential tenants. If E-retail continues to lag in Mexico as
the land availability continues to strengthen, the E-commerce warehouses in Mexico could be located outside the tollbooth.

4.6 A possible alternative to locate warehouses at the CBD

Background

During the past centuries, economic pressure within the CBDs has forced Industrial Real Estate to relocate in the outskirts of the cities. As large cities grow, the warehouses tend to be located more than 13 miles from the CBD in cities such as Los Angeles or Mexico City. Now, the “Last-mile problem” has evolved into a “Last 10-mile problem”.

Up to the last decade, the supply chain has only served retail. Now E-Commerce is serving almost every residential, office, retail and hotel space. The supply chain has increased exponentially its delivery points, as well as its complexity. The denser districts are the ones that receive the most deliveries. Right now, the CBDs require more logistical and distribution services than the outskirts.

Time value is critical for modern societies. Same day delivery, as well as same hour delivery are every day more likely to receive better monetary premiums. However, traffic jams and urban restrictions require rethinking the “Last-Mile solutions” in order to serve a stricter clientele. Hence, having sorting facilities in the CBD makes more sense every day.

Limitations

How will mixed-use developments integrate architectonically speaking into their spaces industry, retail, office, housing, hotels, schools, etc.? Will the average industrial rent (6 USD/sqft) be able to compare with the average retail rent (30 USD/sqft) in CBDs?

Other limitations include: Warehouses are likely to require ground level locations. Traffic jams are more frequent every day. Old industrial sites near the CBDs are likely to again host warehouses, but the cities are more concerned about affordable housing, retail, and work spaces for those kinds of parcels. Due to privacy issues, drones in the US are not to be expected in the next 15 years. Uber-
like networks could help deliveries; however, sorting facilities are still needed. Truck traffic restrictions are imposed in CBDs, reducing the number of trucks that can serve a specific district.

**Operation Company + Property Company = Whole Company**

The value of logistics is increasing. Will this value leverage warehousing spaces in order to be considered highest and best use in districts that are gentrifying?

Operations can leverage real estate constraints according to Retsinas et al (2012). For instance: Hotels (Whole Co.) can be separated into: 1) A company that holds the property, producing a stream of rents (Property Co.). 2) A company that runs hotel operations, producing operating cash flows (Operation Co.). In that way, it is possible to unlock the value of the underlying asset by dividing both components. However, when liquidity is constrained for operations and/or property, the Whole Co. provides enough support for the business as usual.

**A modest proposal**

The racks shown in Exhibit 4.3, provide a good aesthetical alternative in terms of storage design that can make the warehouse integrate to mixed-use developments. Due to the fact that those racks can be found inside convenience stores, they can be allocated inside flexible spaces that can be easily reconverted into retail. A specific warehouse design is not really required. The operation scheme of these CBD warehouses is shown in Exhibit 4.5. It consists in large vehicles bringing in previously sorted packages from warehouses on the outskirts to the CBDs. Then, the CBD warehouse sorts the packages so that small Vehicles take the packages out to the delivery points.

![Exhibit 4.5 Operation Scheme of the CBD Warehouses](image)

One of the main advantages of this model is that it uses large vehicles to introduce the merchandise directly to the cities, making economies of scale for the last-mile problem. These racks contain 10
delivery spaces inside 2 feet wide * 3 feet long * 7 feet tall lockers. Considering a 3-foot aisle
between two of these racks, 20 spaces could be located inside: \((2 + 3 + 2) \times 3 = 21\) square
feet. Bearing in mind an additional 280\% space for the correct maneuvering of packages, 20 spaces
require \(21 \times 2.8 = 58.8\) square feet.

Assuming an intensive use of these premises, each space could be occupied 2 times / day (this
assumption is absolutely feasible). This translates into an availability equal to \(20 \times 2\) packages/58.8
sqft/day = 40 spaces/58.8 sqft/day = 1,200 packages/58.8 sqft/month. Now, an average rent of 30
USD / sqft / year = 2.5 USD / sqft / month. This rent should equal 10\% of the total business revenues
according to traditional retail leases. The revenues should equal 25 USD / sqft / month.

Hence, logistic operators located near the CBD could charge for each package:

\[
(58.8 \text{ sqft} / 1,200 \text{ packages / month}) \times (25 \text{ USD / sqft / month}) = 1.22 \text{ USD / package}
\]

This is a reasonable cost for the last-mile solution considering that today every package is charged
between 2 and 5 USD for delivery (Source: Dr. Daniel Merchan, MIT Center for Transportation and
Logistics). We can find rates from 4 to 11 USD / package on the internet\(^{23}\). In a nutshell these
business should charge for each package on a cubic square feet / hour basis (four-dimensional
solution). Using this scheme, a logistic business with these traits could leverage rent constraints
(Property Co.) for warehouses in the CBD’s. Some other variations for the costs can be found in
Exhibit 4.6. These costs should cover: rent of space, labor, technology, and operation of a sorting
facility. They are also likely to include some kind of transportation expenses of the packages for the
most expensive scenario. This idea is original and doesn’t resemble how the US Post Offices work in
downtowns.

Exhibit 4.6 Cost variations for this model when changing the basic hypothesis

<table>
<thead>
<tr>
<th>Turnover (Packages/day)</th>
<th>#Racks / 58.8 sqft</th>
<th>Fee (US Cents / Package)</th>
<th>Rent (US Cents / Package)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>20</td>
<td>122</td>
<td>12.2</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>82</td>
<td>8.2</td>
</tr>
<tr>
<td>3</td>
<td>22</td>
<td>74</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Competition

The following innovations have been detected as a formal competition to the idea here presented.

1. Amsterdam is beginning to use the subway system for night freight transportation. With this idea, more revenue helps diminish the subsidies to the subway system. However, a more intensive use of the trains could result in more operation costs. It is important to keep track of this idea. Maybe the CBD warehouses should be then located near a T-station.

2. Freight containers operated as mobile warehouses. This idea has a downside that regards: In which street is more convenient to park the “mobile” warehouses without any conflicts with the neighbors?

3. Micro-warehouses located in the basements of NYC. This type of warehouses receive the merchandise at 4 am. They are noisy and have a turnover equal to one.

4. Coca-cola in Brazil uses parking lots during night time as storage spaces. Again nighttime noises and turnover equal to one are downsides for this idea.

5. Wal-mart is using the capacity of its stores near the CBD as warehouses for E-retail. This is a very smart idea. Nevertheless, the idea behind it deals with operations leveraging Real Estate rents. Wal-mart increases the efficiency of Real Estate by incorporating light-industrial uses to conventional retail.

6. In the recent decades, the supply chain has evolved into a multi-shackle chain. This provides flexibility, but the last mile still remains a problem that is typically solved using a large vehicle that delivers small packages door to door.

7. Underutilized spaces. For instance, I have located a street front space under the stands of a high-school soccer field in Polanco (new Mexico City CBD) that could be used in this way. These kind of spaces are a huge opportunity for logistic operations. However, in order to find them, very savvy local people must remain receptive to the neighborhood dynamics.

8. Amazon Prime Now and Amazon Logistics. As mentioned in subchapter 4.3. One Amazon Prime Now is located in Midtown Manhattan. However it functions as a warehouse that stores the most demanded inventory waiting to be sold. It is not a sorting facility like the ones here proposed. Amazon Logistics have this same principle, but they are located in suburbs, and still use vans instead of motorcycles.

9. Air Rights. The idea of building above rights of way is very American. In American cities where constrained land is not an issue, these spaces could provide a good alternative for
industry. Exhibit 4.7 shows the view of the MIT Railway at Memorial Drive, where an industrial facility could be built.

Exhibit 4.7 Example of a site where a warehouse could be built using air rights

As a result of the analysis, there is not really a clear competition for this idea in dense and overcrowded cities such as New York, San Francisco, Hong Kong, Mexico City and Tokyo. Now that this idea has been validated as original and possibly useful, we should explore its implications with major logistic companies in order to gain their point of view regarding this proposal.

**Benefits of Small CBD warehouses for large warehouses in the outskirts**

Suburban warehouses could be less required, increasing the demand for warehouses in the outskirts. More logistic spaces in the outskirts could be required in order to sort efficiently the deliveries to the small warehouses in CBDs. The extra expensive rents for suburban warehouses could be eliminated for logistic operators (win-win situation). Due to the fact that these new warehouses could operate during daytime, noise mitigation is an important positive externality for zoning issues. If this idea isn’t feasible, the last-mile solution could tend to require more suburban medium-sized warehouses, and fewer warehouses in the outskirts.
5. Conclusions

Mexico has been a concern during the last years because E-markets have not developed there as in other countries. This study conducted some interviews with professionals related to the retail and logistics industries, and gained good insight into this phenomenon. Seven people from Prologis, two people from CBRE, two logistic and operations researchers at MIT, one person from Linio, one person from a Private Equity firm, and one person from a worldwide logistics group participated. From the interviews, six reasons were identified, classified, and analyzed. The reasons are justified by different market studies that reliable business consultants have done recently, as well as from personal experience from the logistics industry in Mexico. Due to existing non-disclosure agreements we cannot have direct access to the market studies of Mexican retail mentioned here, but the main conclusions that concern this paper were obtained and validated.

While corroborating the explanations for the general lag of development in Mexican internet retail, some qualitative correlations could be validated. First, the GDP 2014 (as reported by the World Bank) when correlated to the E-market size of each country is capable of explaining 76 % of the internet retail market size ($R^2 = 76\%$). Second, the data for credit card usage is able to explain the percentage of population using the internet for payments up to 50 % ($R^2 = 50\%$). Both computations serve to weight an estimated qualitative incidence for each of the reasons this Thesis has identified. Exhibit 5.1, provides a brief explanation of each reason, as well as its qualitative estimated incidence. The reasons shown in Exhibit 5.1 might also help explain the lags of E-retail in other developing countries such as India. New studies should be conducted in order to validate this last hypothesis.

Exhibit 5.1 Six reasons that explain the general lag of e-commerce in Mexico

<table>
<thead>
<tr>
<th>Explanation for delay in Mexican E-commerce</th>
<th>Qualitative Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lack of Confidence from the User – The Mexican shopper does not feel confident sharing personal information on internet. High rates of fraud and past bad experiences with banks hinder E-commerce. Some artless web pages also affect E-retail potential in Mexico as consumer experience becomes more sophisticated.</td>
<td>25 %</td>
</tr>
<tr>
<td>2. Unbanked Population – General financial literacy has not been reached by Mexicans. Although huge achievements have been done, there is still a big gap when comparing Mexico with other Latin American countries in terms of banked population. The new Fiscal Reforms are not helping credit cards.</td>
<td>25 %</td>
</tr>
</tbody>
</table>
3. *Undeveloped Infrastructure* – Mexican infrastructure for telecommunications and logistics is rated low when compared to the major economic players. This hinders commerce by affecting the general performance of this system. However, some countries with worse infrastructure standards perform better on e-commerce.

4. *Captive Retail Shoppers* – A huge portion of Mexican families receive remittances from the USA. The places where they cash out the money are stores where major retailers catch directly a good share of that economic power directly for their physical stores.

5. *Lag in General Development* – It might be "normal" to expect a general lag in technological implementations for a developing country, due to structural factors that hamper economic competition in the country. These factors include secure conditions for delivery, high shipping costs, undeveloped culture of effective time value, inefficient mailing systems, and lack of a legal framework that hampers doing business in that country.

6. *Shopping as a form of “Cheap” Entertainment* – Most people in Mexico have low incomes. They find shopping activities as a cheap way to hang out with friends and family. This limits the online purchasing power they have.

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undeveloped Infrastructure</td>
<td>5%</td>
</tr>
<tr>
<td>Captive Retail Shoppers</td>
<td>4%</td>
</tr>
<tr>
<td>Lag in General Development</td>
<td>37%</td>
</tr>
<tr>
<td>Shopping as a form of “Cheap” Entertainment</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total percentage points</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

On the other hand, some information helps support the fact that general lack of development for internet retail in Mexico will soon take a shift. The main ideas that justify this insight are summarized in the following bullets.

- Younger adults are expected to trust and expend more on internet transactions. They are the main clients of E-commerce, and are expected to increase their purchasing power in the short run. This demographic bonus is expected to be one of the greatest strengths for e-retail growth in Mexico.
- Internet penetration in Mexico is expected to grow 30% from 2014 to 2018, as stated by Credit Suisse (2015).
- There are continuous efforts from the Mexican banking system aimed at banking more people in Mexico. Also Amazon has been fostering this initiative recently according to Scotiabank (2015).
• The online shopping experience in Mexico provides almost equal satisfaction to the buyer when compared to traditional retail. Evidence of thrust building might foster internet shopping, and can help change shopping habits.

• The size of the population in Mexico, the size of its economy, and the size of Mexico City are factors identified as directly proportional to a huge future internet commerce market. This conclusion was also stated by Credit Suisse (2015).

• Mexico’s E-commerce has an expected yearly compounded growth of 26% for the next three years. By 2019 it is expected to double its size. Scotiabank (2015) expects the arrival of more E-retail competitors (for instance Alibaba) in the near future.

The main risks here identified that might affect E-retail growth in Mexico are here listed.

1. The number of credit cards has declined, and could decline more if the proper credit and tax policy is not implemented. Mexicans are averse to fiscal control. Also, a general misuse of credit instruments by the Mexican consumer has triggered a lower credit card preference. Likewise, the arrival of specific payroll, vehicle and personal credits have reported an important rate of cannibalism towards other credit products such as credit cards.

2. Identity theft is increasing with the growth of E-retail in Mexico due to the fact that online security and the proper legal apparatuses are not developed like in advanced societies.

3. Overbuilding could be stimulated by competitors relying on E-commerce speculations. This could be worsened by a possible macroeconomic crisis that is expected by some market analysts, such as Dr. David Geltner, in the short term (two or three years).

The Mexican internet market for physical goods that require transportation was equal to one billion USD in 2014, according to Credit Suisse (2015). This can be considered absolutely marginal. The E-commerce staggering growth in Mexico has not even echoed in the Industrial Real Estate statistics from the major brokers JLL and CBRE. If Credit Suisse (2015) and DHL (2015) provide conservative scenarios for future growth, and if Prologis (2014) offers a suitable estimation of the warehousing requirements for E-commerce, then the expected increase in demand for Logistic Real Estate class A between 2015 and 2018 due to e-commerce might range between 0.98 million to 1.65 million square feet (153,290 to 91,045 square meters).

Industry leaders expect Mexican E-retail to reach a less marginal, and more important situation by 2025. Meanwhile, Mexico must develop better fiscal and credit regulations, improved
implementations for telecommunication reforms, increased security issues for package delivery, superior E-retail platforms, enhanced mitigation of identity theft, cheaper mobile internet, higher relative value of time, effective taxation of remittances, upgraded infrastructure, and less unbanked population. Important marketing efforts from Amazon are expected in order to increase confidence from Mexicans on online shopping. Nevertheless, the most effective marketing efforts will come from mature Mexican retailers such as Liverpool, Palacio de Hierro and Walmart. Specific efforts from these last three retailers are expected in the next months.

Regarding the Mexican cities that are expected to have a greater E-retail potential, top industry executives expect that 60% of future E-retail operations could be hosted in the Northern part of Mexico City. Particularly in the CTT Corridor. Monterrey can also have potential, but its close proximity to the United States could not help. Villahermosa could be a better location when compared to Monterrey, because there is the logistics center for Southeast Mexico. Guadalajara is another possible market if a Regional distribution center is located there. However, Guadalajara’s distance from Mexico City could play against this location. A rough guess regarding E-retail logistic potential could be 15% Monterrey, 15% Villahermosa, and 10% Guadalajara. Frontier Markets such as Tijuana and Ciudad Juarez are expected to have zero potential.

On concern of the Industrial Real Estate requirements due to E-commerce, they are expected vary from client to client in a case by case basis. Necessities are not written on stone and almost every industrial facility could serve for E-retail. However, fulfillment centers of huge E-merchants are likely to require heights greater than 12 meters, more land ducks, wider spaces, and more installations for automation systems. Fulfillment centers are expected to be located outside the biggest cities. Small fulfillment centers at regional markets could require locations near to the main highways that lead to bigger cities.

From the built environment perspective, the Last Mile problem could be addressed in the next ten years with large fulfillment centers located in strategic positions on the outskirts of big cities, and fully linked to a huge network of small or medium warehouses located in central strategic locations in the cities. These smaller centers (known as CEDIS for the Abbreviation in Spanish for “Centers of Distribution”) are expected to be operated by medium sized subcontractors that serve large logistic operators. Bidding against other commercial uses is a great challenge for these industrial facilities. Pantaco, Vallejo and Azcapotalco are districts in Mexico City that will have tremendous potential for mix use developments that could include warehousing spaces. In Naucalpan and Vallejo, some
“small” warehouses are already available for Last Mile deliveries. The E-commerce generated by the Class A offices in Santa Fe and Polanco could use CEDIS located in Observatorio. The delivery at convenience stores (such as OXXO) is a short term solution that can face tremendous problems linked to available space. But Amazon’s Automatic Parcel Stations are a great technological advance for space solution when speaking about E-commerce delivery at convenience stores (see Exhibit 4.3). The built environment also will be responsible in Latin America for one of the biggest obstacles that the Last Mile and same day delivery will encounter: The disorganized urban fabric filled with disruptions. This problem is likely to be solved by rethinking urban logistics.

The Last Mile problem is also expected to rely on technological solutions such as unmanned vehicles or Uber like transportation networks (Amazon Flex is being developed right now). Drones are not forecastable in the near future due to various security and legal issues that are currently faced even in the United States. Bicycles and motorcycles will play an important role due to urban restrictions. It is important to mention that the Real Estate facilities and technologies linked to Last Mile solutions might not be interesting markets for large industrial developers like Prologis, due to the sizes and types of business. Nevertheless, these solutions will shape the best Real Estate locations.

We should monitor the expected trends of Mexican internet retail in the next three years, in order to compare real information with the forecasts here obtained. This study provides some general evidence that the growth potential of Mexican internet commerce is a huge business opportunity for all the industries related to it in the next ten years.

The last subchapter 4.6 presented a possible alternative aimed at solving the last-mile problem in dense and overcrowded cities. This idea basically leverages the expensive rents in CBDs with intensive logistic operations, so that sorting facilities can be located there. The computed costs for this idea could range between 122 and 74 US cents including some kind of transportation expenses. This could be considered feasible due to the fact that shipping costs in the US range between two to five USD in the US.

With the idea exposed on subchapter 4.6, Suburban warehouses could be less required, increasing the demand for warehouses in the outskirts. Also, more logistic spaces in the outskirts could be required in order to sort efficiently the deliveries to the small warehouses in CBDs. If this idea isn’t feasible, the last-mile solution could tend to require more suburban medium-sized warehouses, and less warehouses in the outskirts.
6. References


