Transforming Micro-Retailing in Emerging Markets

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Nanostores, small family-owned businesses, are a critical component of the Mexican economy, providing employment and acting as major customers for consumer-packaged goods companies. Our capstone paper presents a study of innovative business models aiming to help nanostores survive and grow, at a time when the Mexican economy is projected to expand. The study includes field research from over 4,000 nanostore owners and consumers in Mexico and explores innovative business models worldwide to identify potential solutions. We employed a disciplined entrepreneurship process to narrow down six models, which were then workshopped in Mexico with suppliers, consumers, and nanostore owners to assess viability and gather additional insights. The study emphasizes the importance of gathering direct feedback to ensure solutions align with the expectations of nanostore owners and truly help them survive. We are confident that our six models will help the nanostores thrive in the face of potential disruptions.

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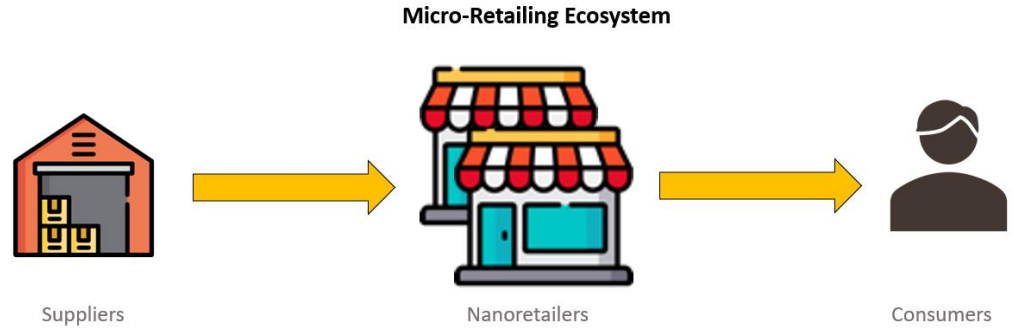
1 INTRODUCTION

1.1 Background

Across the world, there are over 50 million nanostores, small usually family-owned neighborhood retail stores (Fransoo et al., 2017). Nanostores account for 45%-95% of the consumer market in developing regions, including Latin America (Fransoo et al., 2017). They are a critical market to consumer-packaged goods (CPG) companies, with Procter & Gamble going as far as to note that nanostores overall are its second largest customer after Walmart (Fransoo et al., 2017). We see continued growth in urbanization, which favors "proximity shopping" that nanostores provide. Nanostores are a critical retail channel for consumers in urban emerging markets where time is precious and they do not have the income to waste time in traffic, with 75% of the population in Mexico City earning less than $16 per day (Fransoo et al., 2017). Figure 1 shows a high-level graphic of the micro-retailing ecosystem that we are exploring.

Figure 1:

Micro-Retailing Ecosystem



The focus of our research is Mexico, a growing market where nanostores serve a critical role and yet have not been widely studied. There is insufficient research of these Mexican nanostores'

business models and capabilities, putting them at risk of failure. Until now there has not been a large-scale study in Mexico to understand the full picture of the current business processes, challenges, and owner and consumer preferences. We are dedicating our research to study Mexican nanostores to allow this essential part of everyday life to grow and thrive for their consumers. Mexico is a dynamic and growing nation. As such we are confident our research has impact and application beyond Mexico with the findings applicable to other countries as well.

Mexico's GDP (Gross Domestic Product) grew by 4.8% in 2021 and is expected to continue to grow through 2023 (Mexico Overview, 2022). This projected growth in the economy provides an optimal opportunity for nanostores to change their business models. However, even in a thriving economy, nanoretailers can face turnover. In Mexico City for instance, "approximately 25% of nanostores turn over annually" (Fransoo et al., 2017). According to an article published in the *Harvard Business Review*, over 65% of people in the world earn less than $2,000 a year (Prahalad & Hammond, 2002). Many of these four billion people are not accessible by multinational corporations. Given the large population that cannot be reached by multinational corporations, nanostores may maintain their dominance through their ability to serve their customers and with flexibility to explore different business models.

In this capstone, we focus on defining alternative business models for Mexican nanostores because of the lack of resources and the potential number of businesses impacted. In Mexico, 98.8% of businesses are Small and Medium Enterprises (SMEs) (MIT Global SCALE Network, 2018, p. 19 para. 1). These enterprises struggle to adopt innovative supply chain practices, with the potential to drive productivity improvement. They have unique limitations and challenges, such as a small physical footprint that allows for only a limited SKU base and storage space. When nanostores can implement enhancements there can be big payoff. One study found that by

implementing planning functions, the SMEs saw improvements across their supply chain from inventory to customer service and saved the businesses $1.2 million across 10 companies (MIT Global SCALE Network, 2018, p. 16 para. 1). The savings mentioned in this study are an example of a saving achieved by SMEs. We believe there is comparable opportunity for payoff in nanostores.

Nanostores have a unique opportunity to take advantage of the thriving economy and leverage growth to create new business models. For example, nanostores in developing economies are well positioned to offer value-added services to the communities they serve through their close connections with their customer base (Escamilla et al., 2021). This localized customer knowledge offers potential value to CPG manufacturers. Nanostores differentiate themselves from other retailers by their connection to their customers' needs.

We are working on this research project with the MIT Low Income Firms Transformation Lab (LIFT)[1], a research lab with the "*goal of alleviating poverty and improving the lives of the bottom billion*". This project is part of a larger research project to innovate the traditional retail channel in Latin America. Research completed by studying business models and the best supply chain practices throughout the world reveal the leading business models within the context of urban Mexico. The background information shared allowed us to define our problem statement and research questions and are shared in the following section.

1.2 Problem Statement and Research Questions

The nanostores play a key role in the Mexican economy; however, as noted, they have not been widely studied, so there is the possibility that the nanostores are not employing the business model that best sets them up for long term success. A suboptimal business model runs the risk of

[1] https://liftlab.mit.edu/

both impacting customer service and hindering potential growth for the nanoretailer. A suboptimal model also runs the risk of hindering a business's ability to respond and pivot effectively, which we saw during the COVID-19 pandemic, as critical for long-term supply chain resiliency.

To assess the nanostore business model, we ask the broad question: how to improve the nanostore survival and growth with innovative business models? To answer this overarching question, we address the following sub-questions:

1. What potential business models have been piloted elsewhere in the world and what have the greatest opportunity for success in Mexico?
2. Are there synergies between vendors and nanostores that we can explore and opportunities for enhanced transparency and data sharing?
3. Are there other network designs for the nanostores that are worth exploring?
4. Are these nanostores serving the needs of their customer base?

We theorized that a business model that better accounts for the particularities of the nanostore drives financial growth and enhanced customer service. We anticipated that certain levers, such as incorporating additional revenue streams, or redesigning nanoretailer process flows, would result in a more effective model.

We assessed this in two steps. First, a review of the literature to understand what pilots and models have been applied in comparable markets. Second, through primary research via interviews and workshops, as well as data analysis from an ongoing comprehensive field study conducted in collaboration with Monterrey Tech.

The literature review revealed what pilots have already been tested in comparable markets and their success rate. For example, we observed pilots such as one leveraging third party apps for

payment and initiatives run in partnership with major companies. On the payment side, for example, the technology conglomerate Meta collaborated with retailers in India to use their WhatsApp platform for payment (Meta, 2022). On the partnership side, models such as Amazon's "I Have Space" program conducted in India which employs the nanostores to own the last mile delivery, or Coca Cola's hub-and-spoke model, which enabled a more effective distribution network for replenishment (Escamilla et al., 2021). We anticipated that pilots like these conducted in other markets would either have direct applicability to the Mexican nanostore market or would suggest successful components that we could branch off from in defining enhanced models. Our enhanced models were also tailored through a disciplined entrepreneurship approach to ensure that the end consumer was accounted for.

Further, field data from the primary field study was pivotal in helping us understand the customer base and the nanoretailers, ensuring that we designed a model that properly serves the market. Relevant data includes owners and customers' socioeconomic status, level of education, gender, access to technology, and shopping preferences.

1.3 Scope: Project Goals and Expected Outcomes

The data collected in partnership with Monterrey Tech in Fall 2022 further provided insights into current processes and allowed a more tailored approach to their supply chain capabilities. The MIT LIFT Lab in collaboration with Monterrey Tech launched an extensive field study with the goal of innovating micro retailing in Mexico. The students were broken into groups and geographic areas to collect data on each of the micro retailing stakeholders (logistics, consumers, shopkeepers). We discuss this further in section 3.1 "Descriptive Analysis of Consumer and Nanoretailer Fulcrum Data**".**

We defined the project success by our ability to assess nanostores' supply chain, business, and technology needs. We further defined project success by providing proposed business models and guidance on enhanced supply chain configurations, functions, and capabilities. These proposed business models are in the context of nanostores in Mexico and enable owners to implement the supply chain capabilities for the transformation.

The deliverables to the MIT LIFT lab include:

1. Business models with detailed supply chain configurations
2. Required capabilities for all stakeholders (i.e., nanostores, suppliers, customers)

The expected outcome for our stage of the project was to determine the business models that provide the best chance for survival and growth of the nanostores, through their customer service, financial profit and loss, and owner experience. Another expected outcome was to successfully transition the project to the LIFT Lab after the proposed adaptations and configurations are determined. These results may potentially be used to conduct field interventions.

To identify the business models and required capabilities for all stakeholders, our plan of work includes the following steps. First, we complete a thorough review of the literature to understand the existing research on nanostores and the Mexican market as well as new and innovative solutions. Next, we review the data collected in the primary field study which provides valuable insights on the urban Mexican nanostores in tandem with the process. Leveraging our insights from the review and the field data, we apply the disciplined entrepreneurship approach to narrow our focus and identify relevant business models that we validate through workshops/primary research.

The tangible benefits derived from the new business models set up the nanostores for success to continue to grow their business. We anticipate improvements in supply chain knowledge, increased cash from additional services, and reduced risks from supply chain disruptions. These improvements allow the nanostore owners to reduce stockouts, increase customer satisfaction, and remain competitive against new market entrants.

2 STATE OF THE ART

To address our driving question— how to improve the nanostore survival and growth with innovative business models—we reviewed the literature in these key areas: (1) the existing research on nanostores and their attributes, (2) the business models piloted already for nanostores in other markets, (3) the Mexican retail market, (4) new and modern solutions not necessarily piloted yet for nanostores.

2.1 Existing research on nanostores and their attributes

Nanostores are the dominant retail channel in most emerging markets, accounting for 45% to over 95% of the market depending on the region (Fransoo et al., 2017). Despite this there is an opportunity for additional study. The first significant effort to define and detail nanostores came from Fransoo and Blanco's book *Reaching 50 Million Nanostores* (Fransoo et al., 2017). They pulled from their field work, case studies, market data, and partnership with researchers in the emerging markets for this comprehensive work.

Fransoo et al. (2017) dive into the role of the nanostores and the value they bring in addressing issues such as avoiding urban traffic and related time constraints that come with the modern retail channel. They then highlight points of attention that are particular to nanostores, including the use of cash, providing credit to customers, and the lack of space, which drives multiple deliveries per week. They detail the supply methods to nanostores, the complicated last mile, and urban policy considerations such as parking limitations. Later chapters employ case studies to describe applications in other areas.

Escamilla et al. (2021) analyze marketing and sales as they relate to nanostores as well as expand on the supply and financial considerations. They develop Fransoo's commentary on the differences between modern and traditional channels into a logical point for point comparison

between the two models as shown in Table 1. The authors then identify three key challenges: infrastructure, inefficient operations, and financial services. The bulk of the remaining work is spent, as the title suggests, diving into ways nanostores can remain competitive through "agility, adaptability and alignment". We dive further into these suggested solutions as part of the second strand of research on pilots in other areas (Escamilla et al., 2021).

Table 1:

Main Operating Characteristics of a Nanostore Compared to a Modern Channel Store (adapted from Escamilla et al. (2021))

	Modern Channel (Supermarket)	**Traditional Channel Nanostore**
Functions	Professionals	Single store, owner-operated, family
Logistics	Distribution centers, 3PL	Direct deliveries
Financials	Credit, Bank Transfers	Cash
Line Items	Full Case Packs	Consumer units, mixed case packs
SKU Count	Thousands-tens of thousands	Hundreds
Category Depth	Half dozen to dozens	Single or double
# of Customers per Store	Tens of thousands	A few hundred
Technology Adoption	Enterprise systems, POS	None, cellphone, smartphone
Marketing Strategy	Brand, advertising, central merchandising	Community, convenience, high service

Note. This chart was adapted from Escamilla's article to visualize the main differences between the nanostore and the modern store. From "Improving Agility, Adaptability, Alignment, Accessibility, and Affordability in Nanostore Supply Chains", by R. Escamilla, J. Fransoo, J.C., and C.S. Tang, 2021, *Production and Operations Management*, *30*(3), p.678

In their article, Escamilla et al. reference the importance of their research, due to the longevity and popularity of nanostores in the future. One reason for nanostores' longevity is that more than half of the world's population lives in cities and are therefore a focal point of CPG companies for attention and investment (Escamilla et al., 2021). Nanostores represent over 50% of the retail market in many countries (Escamilla et al., 2021). However, nanostores are largely not part of

the formal government. While the formal governments in many cities want nanostores to join, their collection of mostly cash transactions presents traceability challenges. The impact is significant since the nanostores make up a large majority share of the retail market in these countries (Escamilla et al., 2021).

CPG companies are a large supplier to nanostores, and 40-70% of the CPG's products are sold through nanostores in emerging markets (Castañon, 2018**)**. Unilever, a large consumer packaged goods manufacturer, has approximately 50% of their sales in emerging markets. Nanostores are attractive to CPG companies due to their low barriers to entry, with small space requirements and low capital needed from the nanostore owner. However, the frequency of new nanostores opening and existing nanostores closing pose logistical challenges to companies, such as an increased logistics cost **(**Castañon, 2018**)**. Escamilla et al. (2021) discuss how nanostores collectively make up the second largest customer for CPGs.

However, nanostores are unique and have requirements like smaller package sizes and small ordering quantities. Limited amounts of products are allowed to be sold directly to the nanostores. Some countries impose an added tax if CPG companies sell directly to nanostores. There are regulatory factors that also come into play. CPG companies in Brazil, for example, are required by the government to pay a value-added tax for their customers (Fransoo et al., 2017). CPG companies also find it difficult to get the data they need from nanostores (Escamilla et al., 2021). Existing research on nanostores then allows us to research business models piloted in other parts of the world.

2.2 The business models piloted already for nanostores in other markets

Many business models already tested in other regions are valuable to review for potential applicability for Mexico.

Adoption of Value-Added Services including Last Mile Delivery

Escamilla et al. (2021) highlights pilots such as the "I Have Space" pilot that Amazon is running in India. The nanostore, in partnership with Amazon, can house and deliver locally in India with this solution. The nanostore owner manages delivery of 20-30 packages a day and acts as a pickup point (Amazon, 2018). This solution leverages the nanostore owner's close relationship with and understanding of the customer to coordinate the best time for the last mile delivery (Escamilla et al., 2021). In addition to e-commerce, retailers such as Oxxo use value-added services like cellphone top-ups (adding credit on a prepaid mobile phone), as relevant additions to keep nanostores competitive (Escamilla et al., 2021).

Solutions for Supplying Nanostores

Relevant research explores alternative methods to supply the nanostores, addressing concerns over frequent, inefficient deliveries. Bram Kin analyzes alternative methods for delivery in his study, variations on joint shipments, cross docks, and urban consolidation centers (Kin, 2020). Kin relies on case studies and surveys to assess the feasibility of alternative supply models. These include, for instance, a case study testing the use of an urban consolidation center in Antwerp and the use of excess van capacity in Brussels for delivery. Following the pilot in Brussels, the research team modeled expansion using an agent-based model, SYnchronization Model for Belgian Inland Transport (SYMBIT) (Kin et al., 2018). The surveys explore the factors that are important to a manufacturer when relying on a distributor. The results show that

sales effectiveness and presence of their products as the key factors. Kin's article advises the reader to consider the tradeoff between the distance from a supplier to the retailer and the volume carried to determine when to leverage an alternative mode of supply. Kin et al. (2018) concludes that as distances increase from the supplier, the option of an urban consolidation center or cross dock is more viable, whereas direct is more viable for shorter distances.

2.3 Mexican Retail Market

To assess applicability of these pilots in the urban Mexican market, it is pertinent to understand any trends or particularities in Mexico specifically. Mora-Quinones et al. (2021) address the question of whether the nanostore continues to survive in Mexico City or disappear with the fast growth of chain convenience stores. They provide background that there are 90,000 grocery retail stores in Mexico City. Nanostores account for 97% of the 90,000 as well as 84% of the grocery retail employment (Mora-Quinones, et al., 2021). They rely on full population data for Mexico City, a literature review, as well as a statistical analysis for in their assessment. They found that high-and medium-income consumers shop at nanostores, and the nanostores are well suited to urban environments where consumers buy for immediate use.

Mexico is an important market for nanostores. Escamilla et al. (2021) highlights that Coca-Cola has over 1.3 million points of sale in Mexico. Within Mexico itself, new practices have been successfully implemented in nanostores. For example, Red Quibo, the largest payment network in Mexico, was able to see success in Mexico with a 10% rate of adoption of their service and saw an increased profit margin selling to nanostores (Escamilla et al., 2021). The nanostore owners are challenged in Mexico with the need to have cash on hand to keep their nanostores properly stocked, since Mexican suppliers do not offer credit to nanostores. To work to address this, a startup in Latin America, Tienda Pago, offers a low-risk solution to offer short term credit

to nanostores for AB Inbev products using an application (Escamilla et al., 2021). This solution shows Mexico may be pivoting to a new way to deal with finances, allowing some flexibility to nanostore owners while also increasing the adoption of technology.

2.4 New and modern solutions not necessarily piloted yet for nanostores

E-commerce solutions are being developed to tackle the greatest challenges between businesses and end users. While these solutions have been piloted in certain regions, applicability shows potential for a variety of global users. For example, WhatsApp is one of the most downloaded applications of all time and the main source of communication amongst billions of users. Jiomart leveraged WhatsApp's existing popularity to create an end-to-end shopping experience in India, allowing for accessibility and ease of use. Users can open WhatsApp and start shopping by texting “Hi” to the Jiomart number, where they then see a catalog to shop (Meta, 2022). Innovative ecommerce platform Rappi, with a $5.25 billion valuation allows end users to order anything. The platform connects buyers with sellers in their area. Rappi also has value added features including quick deliveries, the ability to pay with card and receive back cash, and ordering services (Azevedo, 2021). Rappi understands their end user may have multiple needs and provides one platform to achieve customer satisfaction.

Amazon has examples of e-commerce solutions across the world. In India, Amazon is one of the most highly trafficked marketplaces, with a goal to keep expanding to more users. To reach their goal, Amazon must innovate and solve end user problems. Amazon uses their platform to create solutions, like creating an app with ease of use on low grade smartphones. They also use machine learning to learn more about their customers and increase the speed of delivery by moving the product closer to the consumer. Amazon also developed Seller Flex for areas with

more space to store goods in times of peak demand (Sangwan, 2018). In urban settings, Amazon created “I Have Space,” which has changed lives in India. Peak seasons draw in additional income for nanostore owners as well as allowing them to be spotlighted as partners of Amazon, drawing in more business (Amazon, 2018). These modern solutions have seen success in different businesses and areas of the world.

Through this state of the art, we gathered relevant background into current business models employed in other areas which we could draw from in our methodology.

3 DATA AND METHODOLOGY

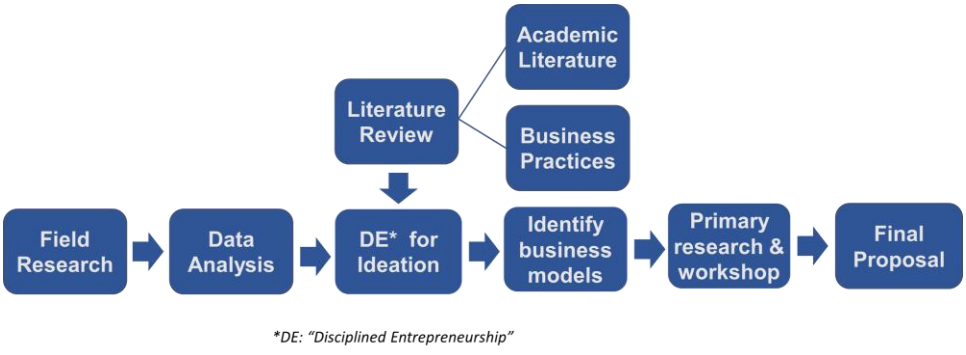
While there is relevant academic literature detailing the particularities of nanoretailers and many examples of new and innovative business practices, little research has been done on the applicability of these models specifically to Mexico. Through a combination of qualitative and quantitative methodologies we explored what innovative business models have promise and their related supply chain configurations.

Figure 2 shows a high-level process map of the research. The literature review and initial field research led to our methodology, which includes:

- Descriptive Analysis of Consumer and Nanoretailer Fulcrum Data (3.1)
- Disciplined Entrepreneurship for Ideation (3.2)
- Identification of Business Models (3.3)
- Primary Research in Field and Workshop (3.4)

Figure 2:

Capstone Process



Note. The chart depicts the high level of the process of our capstone research.

3.1 Descriptive Analysis of Consumer and Nanoretailer Fulcrum Data

On the quantitative side, we partnered with Monterrey Tech on an extensive field research study in Mexico, which provided valuable insight through observations and surveys of nanoretailer owners. This study spanned over 2,000 university students from Monterrey Tech and 10+ local research staff, as well as over 10 MIT students and 5 MIT researchers, with a goal of targeting 200,000 micro retailers. Monterrey Tech assigned the students an area of study, in which they swept and observed the nanoretailer owner and completed a comprehensive series of survey questions, which they logged in a dedicated application called Fulcrum. The students were split into groups of six, if possible, with one pair conducting a time study for the logistics (out of scope of this analysis), one pair conducting surveys of consumers in the nanostore area of study, and a third pair surveying the shopkeepers as well as collecting observations. The students received training on data collection guidelines, and they performed data cleansing and data visualization.

The survey questions for the nanoretailer range from orienting data such as the nanoretailer address and establishment date, and the type of store (nanoretailer, grocery, butcher, etc.) to detailed operational questions on the sales channels and inventory management practices of the stores. The questions, for example, dive into whether the nanoretailer has internet connection, the sales channels, payment methods, and their willingness to share data. These questions painted a clearer picture of the nanoretailer in their current operations as well as helped us assess their potential willingness to adapt to new ideas and technologies. In addition to the survey questions directed at the nanoretailers, there are additional survey questions specific to the consumers and their preferences. The consumer survey data assesses their consumer habits such as where they pay their bills, the means of transportation to their store, their interest in delivery and app

purchases, and then demographic data such as their age and gender. See Appendix C for a full list of questions surveyed and images of the fulcrum app.

Once the data was collected, the MIT LIFT Lab loaded it into Python, tools such as pandas, numpy, Matplotlib, and statsmodels, were used to visualize the results as well as assess any correlations to both understand the current state baseline and to guide our assessment of the current business models. The descriptive analysis helped us to identify any striking relationships, and key factors that would be critical for our model selection such as the extent of technology adoption and available space.

3.2 Disciplined Entrepreneurship for Ideation

On the qualitative side, we were advised by Paul Cheek, Entrepreneur in Residence at the Martin Trust Center for Entrepreneurship and Lecturer at MIT Sloan School of Management. To add an entrepreneurship approach to our capstone project, we completed part of the *Disciplined Entrepreneurship: 24 Steps to a Successful Startup* book by Bill Aulet (Aulet, 2013). These steps allowed us to think in a different frame of mind when gathering insights and selecting the proposed business models. Figure 3 shows the first three steps. For our capstone, we completed steps 1-3: market segmentation, select a beachhead market, and build an end user profile. See Appendix B for snippets into our work process in employing the disciplined entrepreneurship approach.

Figure 3:

The First Three Steps of Disciplined Entrepreneurship

Note. This outlines the 3 steps of the disciplined entrepreneurship process and aggregates into key themes. Adapted from *Disciplined entrepreneurship: 24 steps to a successful startup* (p.13), by B. Aulet., 2013, John Wiley & Sons, Incorporated. Copyright 2013 by Bill Aulet.

The first step of the disciplined entrepreneurship approach is market segmentation, where we listed all markets where there was viability for our product or service. Then we completed a market segmentation exercise, shown in Appendix B, to think through the viability of each market segment. The market segmentation exercise allows us to define the target market. We began by listing all the possible market segments for our solution. We then considered key variables that can be used to segment the market based on the needs of the end user. These include factors such as their tasks, urgency of need, and willingness to change. In the exercise, we also identified competition/alternatives and components needed for a full solution.

At the end of the process, we had our beachhead market, i.e., the ideal customer group for the proposed business model. Our beachhead market was identified as nanostores in urban Mexico. During this step, we performed another crucial activity: idea filtering. We added all the ideas gathered from our research over the past months to a document. Each idea went through the following filters: personal, business, external, and execution. We ranked these filters to

determine what ideas would have the most potential to our project to continue workshopping. An example of a personal filter would be having a passion or a strong knowledge base of the idea.

The second step was to conduct primary market research. During the second round of primary market research, we conducted additional interviews with nanostore owners. These interviews aimed to dive deeper into their specific survey results to learn their opinions on how they thought our business models would impact their nanostore. The main goal of the interviews was to learn about the nanostore owner's background, the store's daily operations, alternative revenue streams, and pain points. The third step of the disciplined entrepreneurship framework was to complete an end user profile based on the nanostore owners from the primary market research. This step allowed us to confirm what we know about the consumer, tailor our proposed business models, and ensure the solution was appropriate for the consumer. The disciplined entrepreneurship approach allowed us to begin identifying business models, as discussed in the next section.

3.3 Identification of Business Models

Leveraging the insights from the literature review, the disciplined entrepreneurship steps employed, and the survey field research, we defined our six proposed business models (see section 4.2). We then added additional detail to flesh out the models including the required capabilities, elements, visual models to describe them, to prepare to present them in a workshop in Mexico.

3.4 Primary Research in Field and Workshop

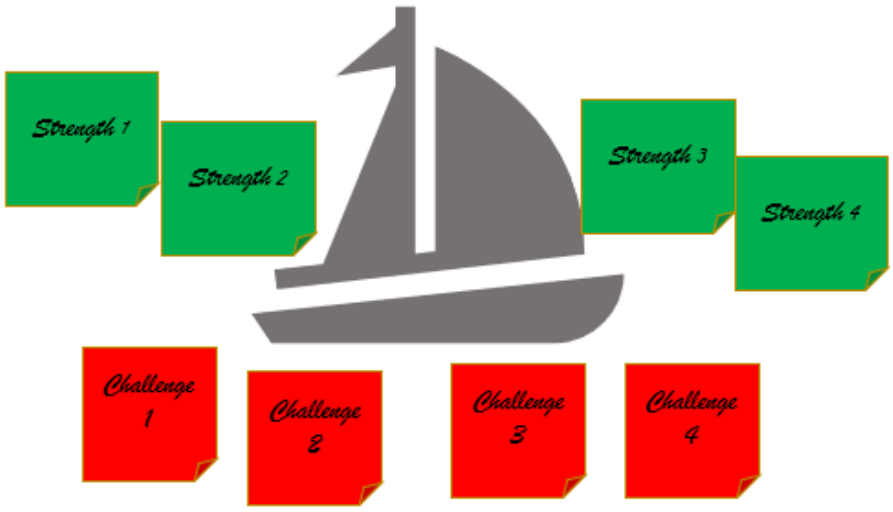
For the next phase in our capstone, we planned and conducted a workshop in Mexico City. The intent was to draw insights from this workshop to understand firsthand any limitations or considerations for future development of these models. We invited local nanostore owners,

consumers, and suppliers to participate in a 3-hour workshop with the goal of conducting business model validation and ideation for future research. We presented our six proposed business models, discussed in detail later in the results and analysis section, and gave time alone to come up with their own thoughts, feedback, and challenges with the models. Then, the participants were given ten minutes to discuss each model within their group, which consisted of a combination of the nanostore owners, consumers, and suppliers.

A volunteer in each group shared their highlights at the conclusion of the time. To demonstrate ideation for future research, a sailboat activity was played by participants within their stakeholder group. We drew a sailboat on a board to represent each stakeholder group. Each group then created a list of strengths on post-it notes regarding their relationship with nanoretailers. This represents the sail and pulls the stakeholder forward. Next, each group listed all the challenges experienced in their relationship with nanoretailers. This represents the anchor and what is holding them back. Each stakeholder group voted on the most common of their challenges faced and shared their perspective. The goal of the sailboat activity was to review all the pain points and determine whether any fit in with our proposed business models or whether there was an opportunity for another proposed business model. A graphical representation of this activity is shown in Figure 4.

Figure 4:

Sailboat Activity



Note. Visual representation of the sailboat activity in which strengths of the business are placed on top of the boat by the sail and challenges below by the anchor.

During our visit to Mexico, we attended the MIT LIFT Lab x Technológio de Monterrey Research Fest. During the conference, we heard presentations from the students who collected field research from each of the regions surveyed in Mexico. As part of their coursework in Fall 2022, the students completed the surveys with the nanostores and reviewed the data to create models to explain the data as well as final recommendations for each of the regions based on their particularities. We also presented our research to the conference as the keynote speakers. After our presentation, we ran a Q&A session and got valuable feedback from the students based on their knowledge and experience. See Appendix A for photos from the workshop, research fest and field work.

With the valuable insights from this workshop feedback, we better understood what we needed to consider in this capstone, and whether there were other challenges that we have not considered here but that should be addressed in future research. The business models from the workshop are further discussed in the results section.

4 RESULTS

This section will first discuss the key insights from our descriptive analysis before transitioning into a comprehensive description of each business model as well as any required capabilities.

4.1 Key Findings from Descriptive Analysis

At the time of writing this assessment we surveyed 4200 stores. In addition to the feedback from the nanoretailers, we received valuable insights from the consumer survey data. We collected information from 4900 customers on their preferences and habits. From these results, we gathered valuable insights on the nanoretailers and established an overall baseline profile, as well as an understanding of the consumer's experience and priority. Relevant insights are detailed as follows.

4.1.1 General Background

The retailers surveyed are 25% grocery and 23% micro restaurant, followed by a tail of stores such as butchers, dairy, and cafeterias. They have an average of 2.68 employees and on average they were established in 2012. The consumers surveyed were 52.1% male, with an average age of 35.5 years. Further details broken down by type of store the nanostore owner is from and the consumer visited are found in Figure 5, with an overall pie chart of the type of retailer surveyed shown in Figure 6.

Figure 5:

Nanostore and Consumer Summary Data

NANOSTORE SUMMARY DATA

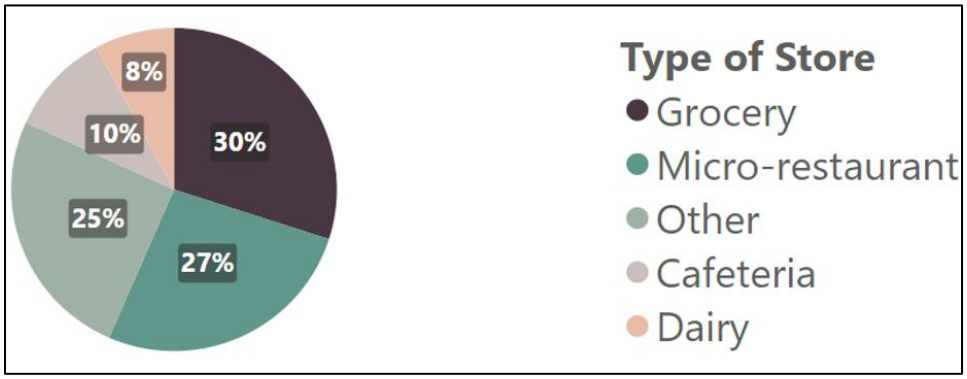
Type	# of Observations	% Of Observations	Avg Year Established	% Male Respondent	Avg # of Employees
Grocery store (aka. nanostore)	1035	25%	2009	11%	1.9
Micro-restaurant (aka. fondita)	943	23%	2013	13%	3.6
Other	550	14%	2013	10%	2.7
Store	374	9%	2012	11%	2.1
Cafeteria	353	9%	2016	13%	3.3
Dairy products	280	7%	2011	13%	2.2
Butcher shop	198	5%	2009	15%	2.6
Produce (fruits & vegetables)	167	4%	2012	12%	2.3
Service	166	4%	2013	10%	2.8
TOT	4066	100%	2012	12%	2.7

CONSUMER SUMMARY DATA

Type of Store Visited	# of Observations	% of Observations	Avg Age of Interviewee	% Male Respondent
Grocery store (aka. nanostore)	1846	38%	35	53%
Micro-restaurant (aka. fondita)	1284	26%	35	58%
Cafeteria	457	9%	30	52%
Dairy products	393	8%	37	50%
Other	380	8%	36	49%
Produce (fruits & vegetables)	332	7%	41	39%
Butcher shop	223	5%	41	38%
TOT	4915	100%	36	52%

Figure 6:

Type of Nanoretailer (Excluding Tail "Other" Category. Here, other refers to produce and butcher)



4.1.2 Technology and Services

Related to processes and technology adoption, we found that 60% of the stores have a smartphone, and 20-30% have a point-of-sale (POS) system (Figure 7). Further, roughly 50% of stores still manage and track inventory on paper, while only 20% utilize dedicated software (Figure 8). This indicates an area of opportunity and highlights a needs requirement if we advise a business model dependent on reliable inventory management, as there is a gap in current adoption of technology and services.

Figure 7:

Nanostore Devices

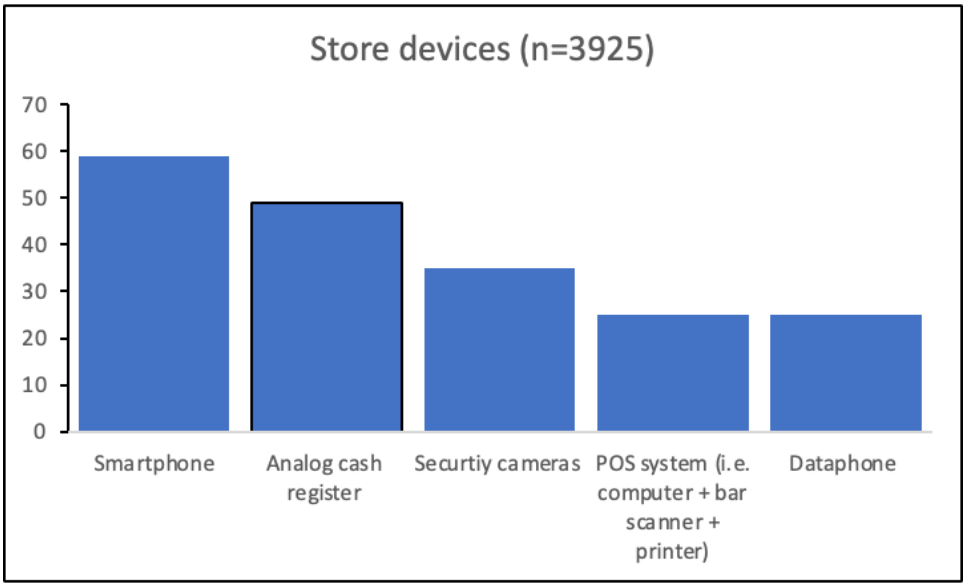
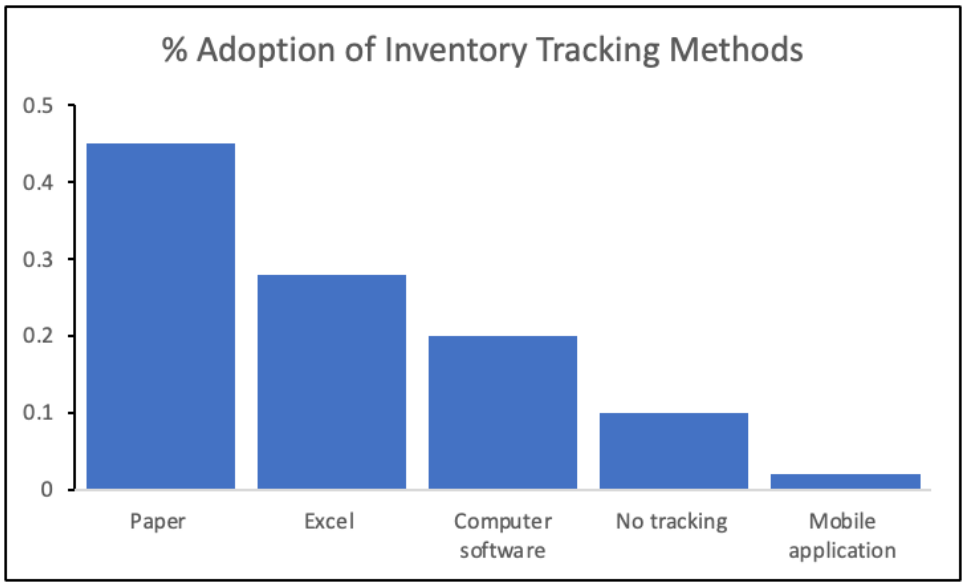


Figure 8:

Nanostore Method of Tracking Inventory



However, the survey results indicated that 67.6% of nanoretailers have an internet connection (Figure 9) and over 50% use WhatsApp as an alternative sales channel (Figure 10), which we found as a positive indicator of willingness to adapt technology in their processes. An astounding 80%+ of nanoretailers surveyed agree that they are open to investing in new technology and it is the best way to ensure strong customer service (Figure 11). Consumers also see the relevance of technology, making an average 2.8 app purchases per month (Figure 12).

Figure 9:

Nanostore Internet Connection

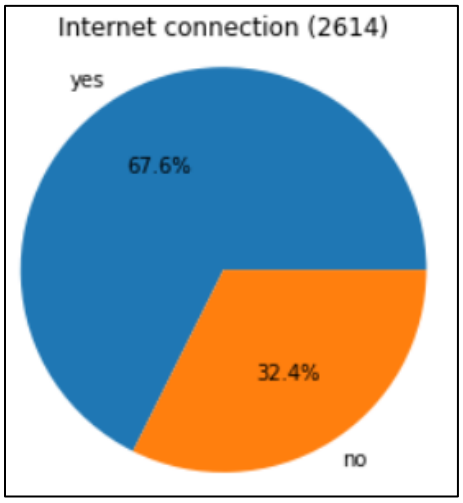


Figure 10:

Nanostore Adoption of Sales Channels

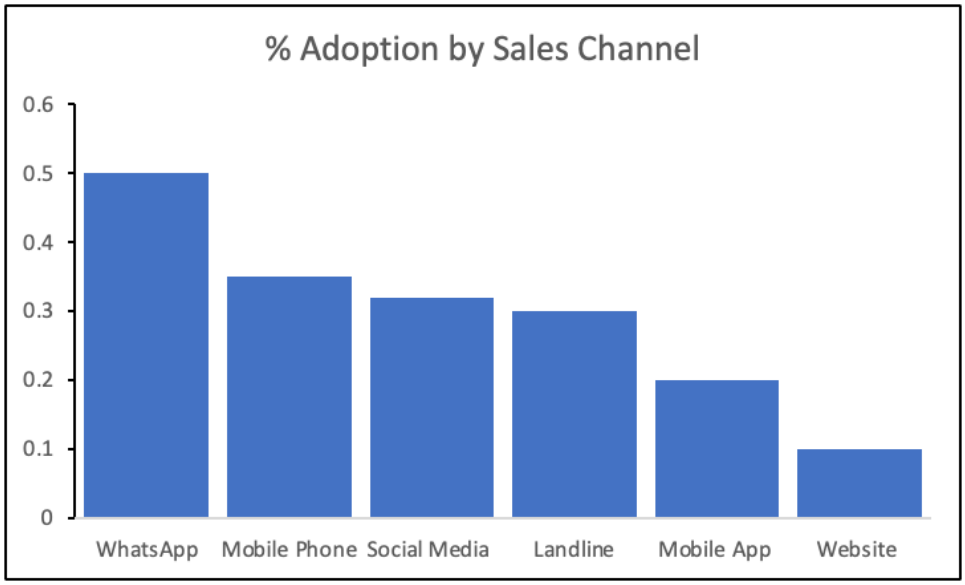


Figure 11:

Nanostore Willingness to Invest in Technology

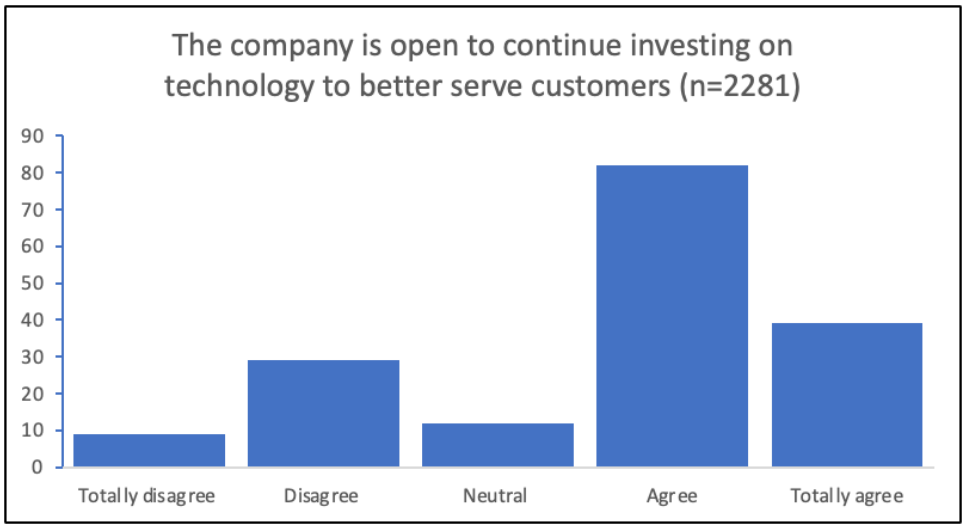
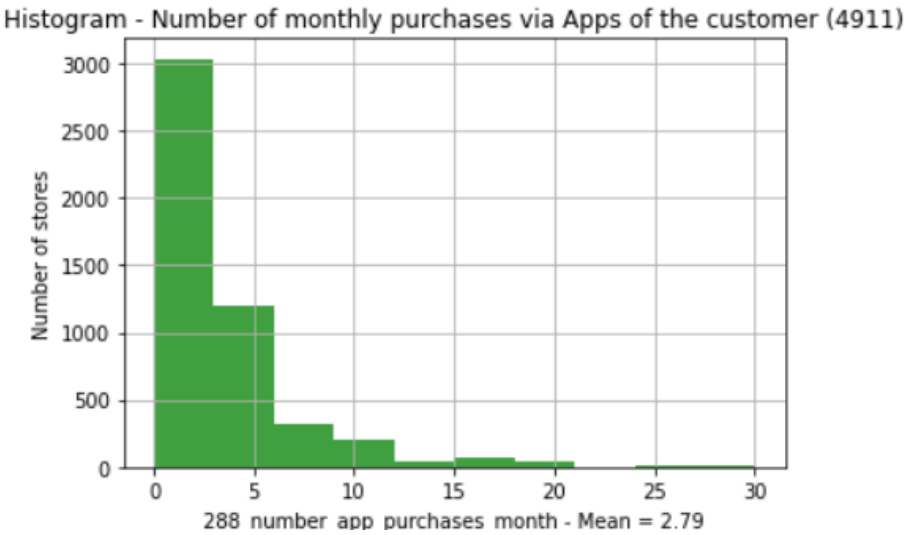


Figure 12:

Number of Monthly Purchases via Apps of the Customer



When asked whether they offer additional services, 60% of the nanoretailers noted that they do not offer any, the primary reason being that they do not think it significantly drives income (Figure 13). This point could benefit from further qualitative analysis to understand why the

owner feels this way. However, from the customer survey data, we see there is interest from the consumer end in having retailers providing additional service offerings. Roughly 33% of consumers currently pay their water bill in a convenience store like an OXXO (Figure 14). Further, 60% of the consumers surveyed note that they currently pay for top-ups in a convenience store, further highlighting the potential interest in retail as an avenue for additional services (Figure 15).

Figure 13:

Why the Micro-Retailer Does Not Offer Services

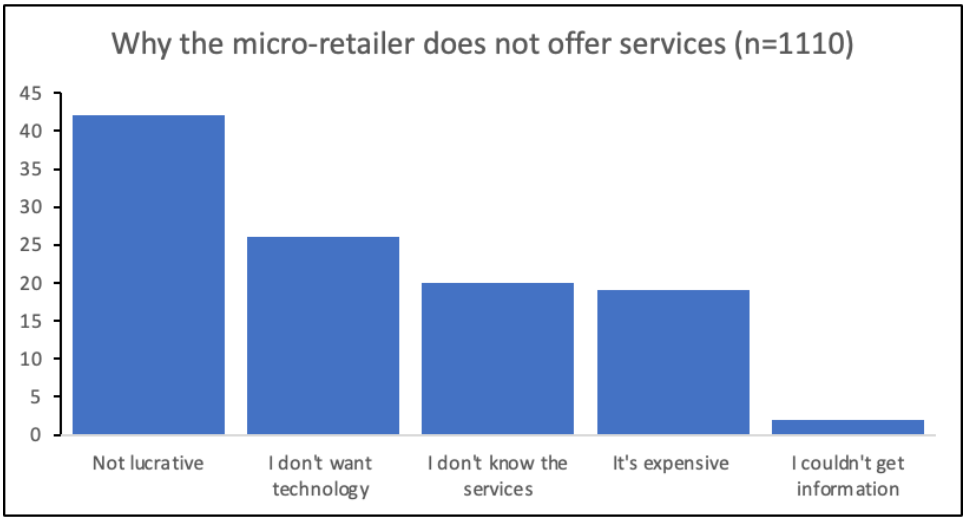


Figure 14:

Where the Customer Usually Pays Water Bill

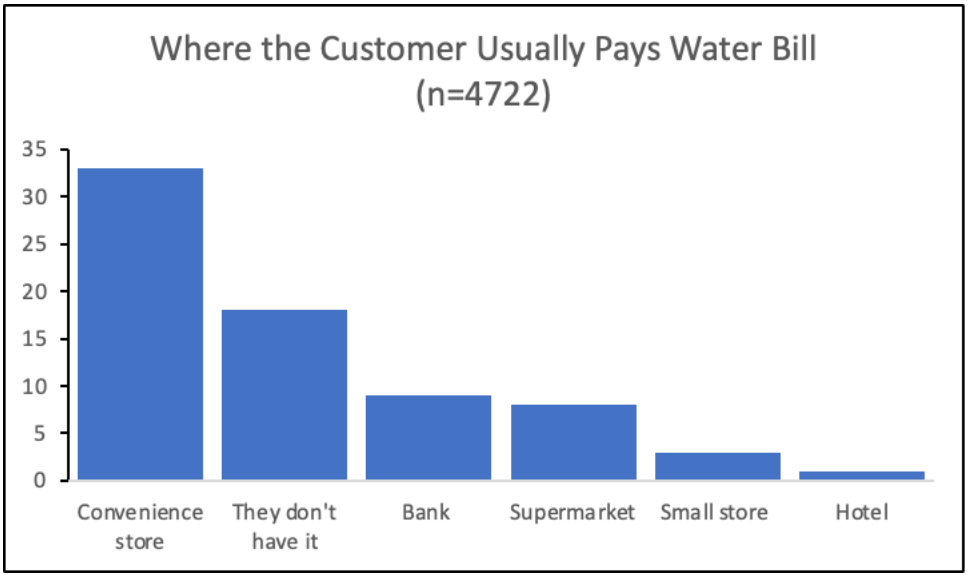
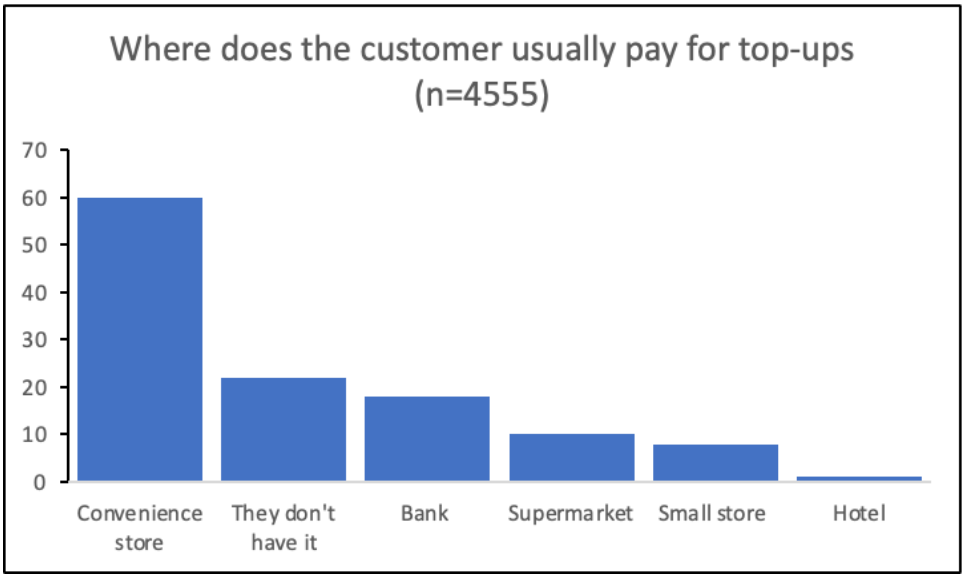


Figure 15:

Where the Customer Usually Pays for Top-ups



Further, there was an observed concern about transparency, with a high percentage of respondents reluctant to share information both with suppliers and other retailers. This could

create trepidation in adopting business models reliant on technology and likely required information sharing for success which may be hard to achieve unless the user was confident there would be confidentiality. That said, we did see a positive correlation between a willingness to share data and average margin, so if communicated effectively, this could help to persuade adopters of the potential benefit of transparency.

One noteworthy point is that only 30.9% of the nanoretailers surveyed noted that they have no space, which leaves nearly 70% of the surveyed nanostores citing that they still have at least 10% extra space (Figure 16). This is a positive indicator about the potential feasibility of a model like e-commerce last mile that relies on at least a small amount of space for the nanoretailers to hold additional inventory. We saw in the consumer survey data there is a related interest in e-commerce generally, with surveyed consumers making on average 2.2 purchases per month (Figure 17). There was also a potential willingness for consumers to pay for delivery services, with customers surveyed willing to pay 49.77 pesos for same day delivery (Figure 18).

Figure 16:

Micro-Retailer's Extra Space for Holding Inventory

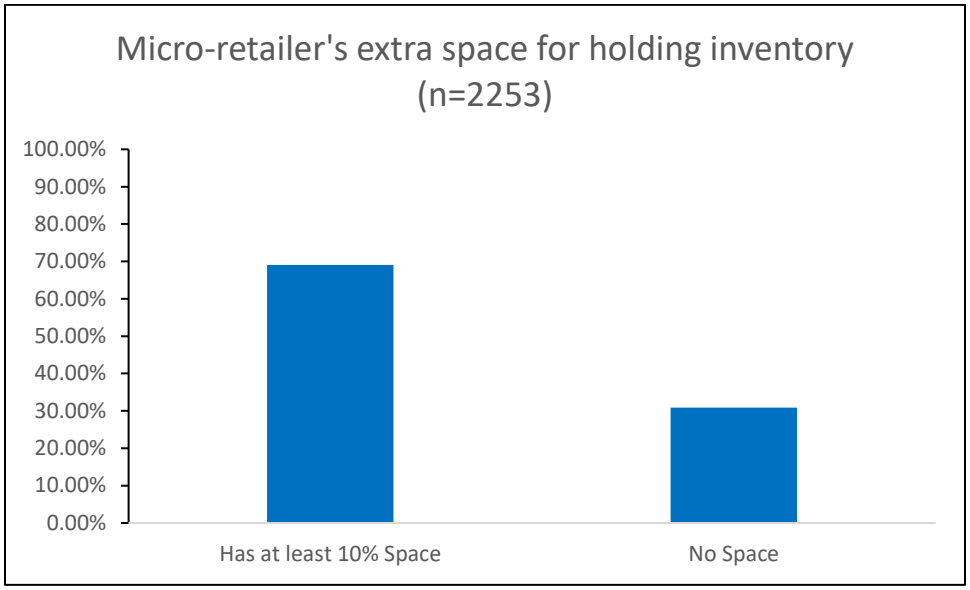


Figure 17:

Number of Monthly Online Purchases of the Customer

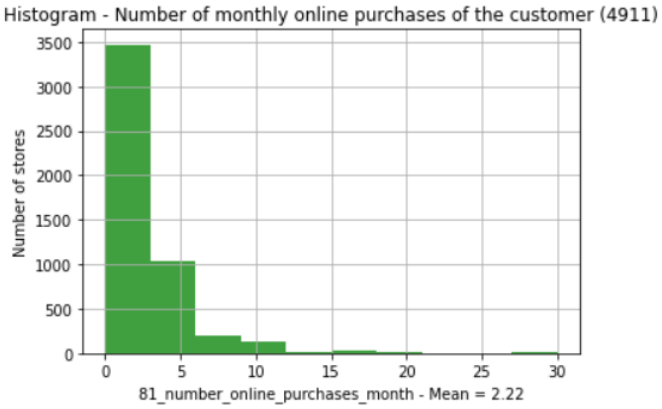
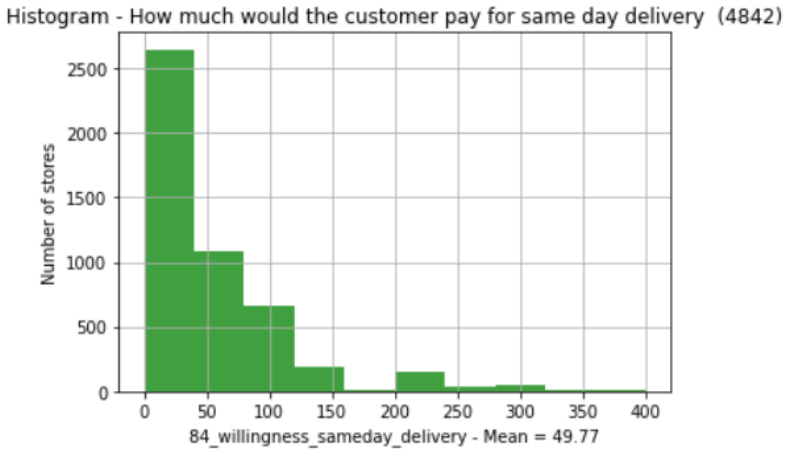


Figure 18:

How Much Would the Customer Pay for Same Day Delivery



4.2 Description of Business Models

Our results led to six proposed business models as detailed in Table 2, as well as an assessment of ease of implementation of each model compared to its anticipated value (Figure 19). For each proposed business model, there are elements, supply chain functions, and supply chain configurations to change for the proposed business model to be successful for all parties.

Table 2:

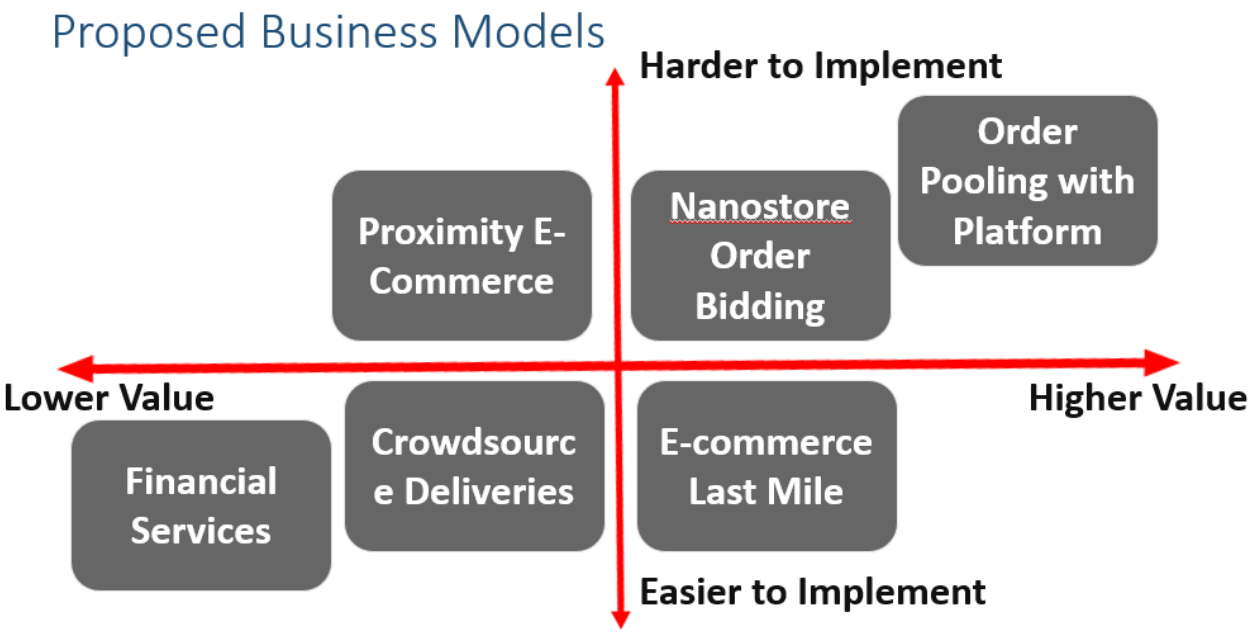
Six Proposed Business Models

	Crowdsourcing Deliveries	Order Pooling with Platform	Nanostore Order Bidding
Description	Suppliers utilize networks of local delivery services to deliver packages to nanostores	System that maintains nanostore inventory and pools demand into one order per supplier based on aggregate neighborhood demand	Centralized app where customers enter the item they want and, in an Uber-like model, the nanostores bid to accept and deliver the order from their store
Model			
Element	✓ Application ✓ Drivers ✓ Optional Cross Dock	✓ Internet ✓ Website ✓ Platform	✓ Internet ✓ Transportation ✓ App
SC Function	✓ Delivery	✓ Ordering	✓ Delivery
SC Config	✓ Adjusted first mile to nanostore delivery method	✓ Aggregation of nanostore ordering into batches	

	Proximity E-commerce	Financial services	E-commerce Last Mile
Description	E-commerce fulfilled from Nanostore inventory. Move fast-selling items closer to the consumer via nanostores, to offer delivery speed.	Nanostores offer additional services such as bill payment, top offs for customers, etc.	E-commerce delivers and collects packages through local nanostores (ie. "I Have Space" - Amazon)
Model			
Element	✓ Internet ✓ Transportation	✓ Internet ✓ Potential POS	✓ Internet ✓ Transportation ✓ Space
SC Function	✓ Delivery		✓ Delivery
SC Config	✓ Data feed to nanostores	✓ Financial and informational flow to financial services partner	✓ Nanostore as intermediary for retailer

Figure 19:

Initial Two by Two Business Model Matrix: Ease of Implementation vs Value



We will now dive into the details of each proposed solution individually.

4.2.1 Model 1: Crowdsourcing Deliveries

The first model is crowdsourcing deliveries. This model focuses upstream on the supplier. Once the nanostore places the order and the supplier confirms the order, circumstances such a delivery capacity or speed available may require the supplier to need a driver to deliver the goods. This model utilizes networks of local delivery services through a platform to complete the last mile delivery to the nanostore. A graphical representation of this model is shown in Figure 20.

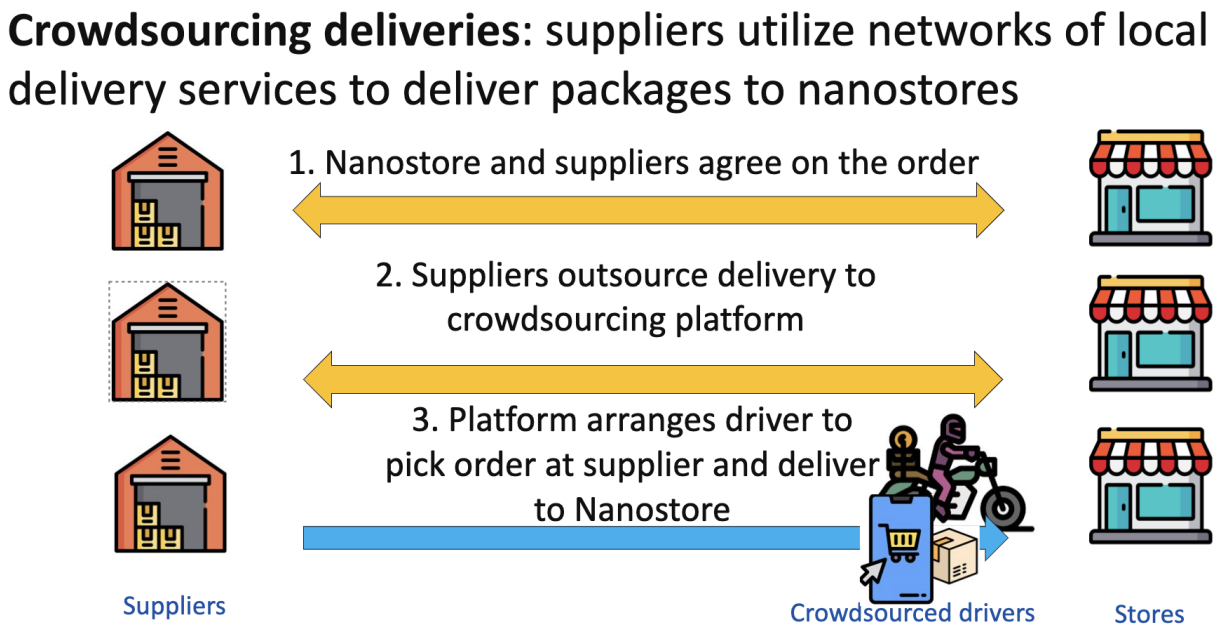
For crowdsourcing deliveries, additional elements include an application or platform for the local delivery service called by the supplier, drivers with the equipment willing to join the application, and an optional cross dock depending on the supplier's network. The supply chain function impacted is the new requirement that nanostore owners fulfill additional deliveries. Instead of

using their transportation contract, an outside party fulfills the delivery. For supply chain configurations, the first mile delivery method to the nanostore is adjusted, as they would rely on independent contractors as opposed to their normal transportation provider. We would consider this model a bit harder to implement with less value since we would need to develop a platform and the supplier likely has existing contracts with their transportation providers.

As we discussed this model in the workshop, some of the questions that came up during the workshop included the order sizes and how lead time is factored in to ensure the products are received when expected. The group also brought up questions related to payment and how the payment can be collected if the nanoretailers only operate on cash. We would also need to understand the overall cost versus value proposition. This is a valid concern and would be difficult to implement at the nanoretailers that only operate on cash. Therefore, this feedback suggests piloting this platform first with nanoretailers that operate with their suppliers via credit, while ensuring that the platform is clear on any order size limitations, with clear guidance on delivery estimated times of arrival. The group also brought up the question of government economic incentives to support the platform and longer term to support with creating a safe environment so third-party drivers are comfortable entering neighborhoods that today are more dangerous.

Figure 20:

Model of Crowdsourcing Deliveries



4.2.2 Model 2: Order pooling with platform

The second model is order pooling with a platform. This model is advantageous to both nanostores and suppliers through tracking inventory levels of nanostores, grouped by types of products sold and proximity to other nanostores. When the inventory level in the platform indicates it is time to reorder, the platform displays the other nanostores to see if pooling orders at the same supplier is an option and at what price discount. Then, the platform shares with the suppliers the order quantities per nanostore. The suppliers aggregate the demand and supply all nearby stores together. A graphical representation of this model is shown in Figure 21.

For order pooling with a platform, additional elements required for the nanostores may include access to the internet, a website, and the use of a platform to track and order inventory. The supply chain function which changes is the ordering function. The orders for products tracked by

the platform are now able to be ordered automatically or when the nanostore specifies on the platform. This likely results in aggregated batched ordering, which impacts ordering frequency and potentially sales patterns. This model is considered high value due to the anticipated scale benefits and high effort because there are numerous parties that need to be open to information sharing, which we saw from the survey results the nanostores are less open to. However, as noted in the survey results, they saw the importance and benefits of technology adoption and could optimistically be convinced with a strong argument.

The workshop feedback related to order pooling with platform cited a potential cost reduction with the ability to combine orders, with particular benefit for the items that are slower moving products and therefore less likely to have a full truckload. There are also particularly benefits for smaller suppliers. The group cited various concerns in adopting this platform, including hindering the relationship between the firm and the supplier as what was once a person-to-person transaction now is automated. Therefore, it is important to consider ways that the experience of the two-way contact can be maintained while using this type of platform.

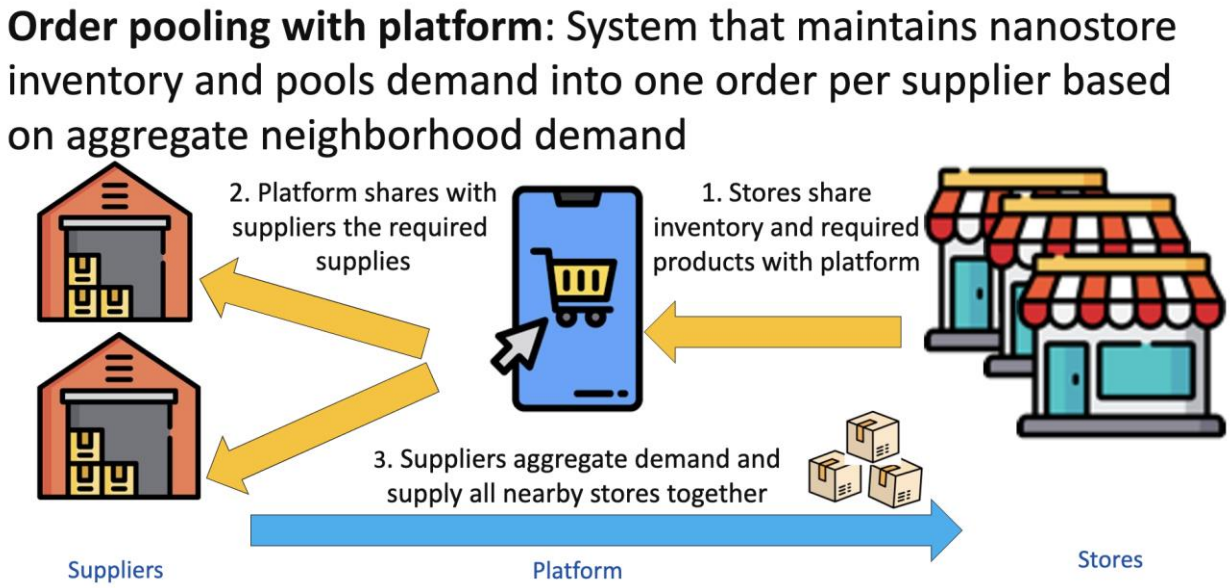
That said, one of the most interesting pieces of feedback is that small companies often do not like working with suppliers due to their poor attitude. Therefore, this model could provide a more automated alternative when the supplier/nanoretailer relationship is more of a pain point. The suppliers also noted they already sell to these stores, so they do not see the potential benefit.

An additional concern was about product quality, so we would want to ensure there is a feedback loop in the event of a concern over product quality. The workshop participants also cited a potential challenge with technology. This type of solution is dependent on a platform to house the nanoretailer order details, so it would be critical to identify who would be responsible for funding the technology and rollout to have the necessary infrastructure in place for success.

There was finally a question about what, if any, role the government would have here, any regulatory factors, or potential financial incentives.

Figure 21:

Model of Order Pooling with Platform



4.2.3 Model 3: Nanostore order bidding

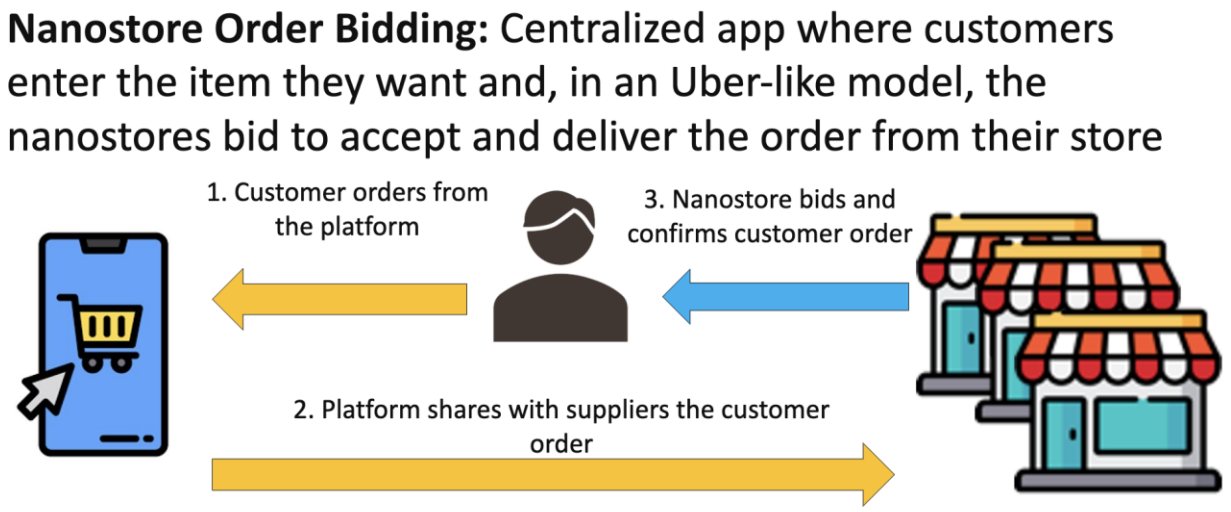
The third model is nanostore order bidding. Nanostore order bidding utilizes an application where customers are able to make purchases from nanostores. The customer may be unaware of a nanostore with a certain type of inventory available or inventory being sold for a certain price. After the customer orders from the platform, the platform shares the order with the nearest nanostore to the customer showing that inventory as available. The nanostore owners may accept or reject the bid placed by the user. Once a bid is accepted, the customer is notified the order has been confirmed, and the nanostore handles the last mile delivery to the customer. A graphical representation of this model is shown in Figure 22.

For nanostore order bidding, potential additional elements for the nanostores include internet, an application, and a means of transportation. For the supply chain function, there is a need to deliver orders from the platform to the consumer. This is different if the nanostore is not currently handling deliveries, and delivery speed needs to be considered. For similar reasons to order pooling with platform this was classified as higher value and harder to implement, with the additional value here of the extended customer base. This model ties in with the customer expectation of seamless and quick ordering, as shown in the premium they are willing to pay for quicker delivery from the survey.

The feedback on this business model was a bit split, depending on whether it was viewed from the customer perspective or from the nano retailer and supplier perspective. The consensus was that this model is very consumer centric, convenient, allows consumers to buy what they want, and saves them time. However, the workshop participants raised concerns that this model could create a price war and put additional cost on the nanoretailers. They raised concerns over unfair competition and the impact of the fee on the overall pricing. It is important that prior to rollout of this mapping it is clear how the platform is monetized and ensure any fee or price inflation that feeds to the customer is within the consumer's means. This is another scenario where a potential solution discussed was government intervention. In this scenario the government could potentially intervene by setting a price cap (to avoid the concerns of a price war), as well as regulating quality and security. There was also an idea brought up of dividing the platform into two segments, one for larger and one for smaller companies, to try to alleviate some of the concerns over unfair price competition. There is also a potential learning gap related to technology for users that are unfamiliar with electronic payments, so instructional materials that coincide with the rollout should be as clear as possible.

Figure 22:

Model of Nanostore Order Bidding



4.2.4 Model 4: Proximity E-commerce

The fourth model is proximity e-commerce. Proximity e-commerce wins orders based on delivery speed. Nanostores share their inventory levels with the e-commerce platform. Based on the nanostore's inventory levels and the fastest-selling products in the region, the e-commerce platform may push limited amounts of inventory to the nanostores to be closer to the consumer. The consumers order via the platform, which lists the products available and close to the customer. The platform then forwards the customer's order to the closest nanostore on the platform with inventory available. The nanostore then delivers orders from its own inventory to the customer, with delivery expected in less than fifteen minutes. A graphical representation of this model is shown in Figure 23.

For proximity e-commerce, potential elements include the internet, use of an application, and a means of transportation. Supply chain functions impacted are an increase in deliveries to end consumers and at a faster pace. For supply chain configurations, data maintenance is required

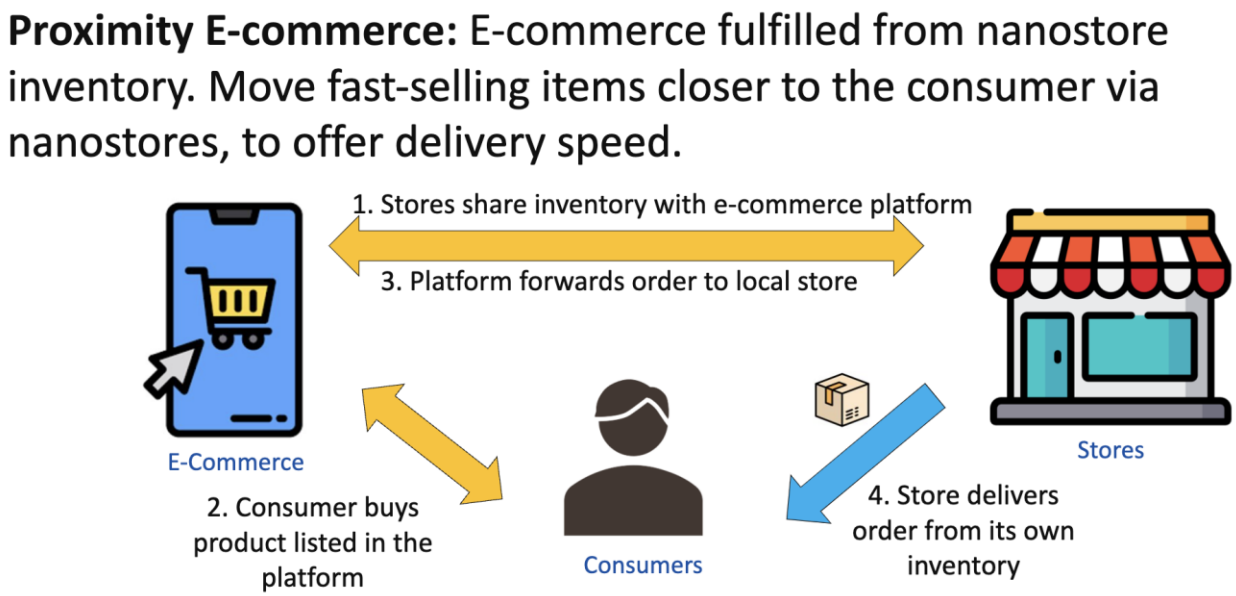
between the platform and the nanostores. Proximity e-commerce is classified as harder to implement with a lower value. Nanostores would need to be approved as sellers on an existing platform and be able to complete these deliveries with speed. As previously stated, these customers are willing to pay a premium to receive their goods at a quicker pace.

The feedback shared on proximity e-commerce mostly focused on concerns about working with the suppliers. There were concerns about the timing of ownership and payment strategy for items forwarded in advance by the e-commerce platform. One strategy considered is leaving the items on consignment and paying the supplier only if the item is sold and having the supplier complete reverse logistics for anything unsold or expired. This would instill more confidence in the nanostore owner to try to stock more of their products and help mitigate risks against unsold inventory.

Another issue raised is fighting with suppliers because they are pushing to sell very specific items that a nanostore may not want to purchase. The issue is further raised when either the product that was pushed does not end up selling well enough or the product that was pushed is more likely to be stolen from the store. Feedback was also shared regarding the need for the e-commerce platform to remain transparent with their items and quantities being pushed to the nanostore as well as maintaining a consistent delivery schedule. This predictability allows nanostores to prepare well for other parts of their business.

Figure 23:

Model of Proximity E-Commerce



4.2.5 Model 5: Financial services

The fifth model is financial services. Based on the data collected, there are nanostores that do not provide additional services to their customers. Nanostores offering financial services have a potential competitive advantage with an additional incentive for consumers to frequent their stores. Nanoretailers generally have trust built with their customer base and their customers are in the nanostores multiple times a week. Options for services include bill payment and top-ups for cellular phones. This is also an attractive proposition if other local nanostores do not offer these services. For financial services, elements include internet, equipment for the services, and limited dedicated space to store the equipment. A graphical representation of this model is shown in Figure 24.

For supply chain configurations, the financial and information flows impact the financial services providers. Financial services are listed as easier to implement with a perceived lower

value. This is due to competition in the market and a small fee associated with each transaction while renting equipment for the services. We saw in the survey results that there is a market for financial services as a high percentage of consumers choose to complete them today in retailers, however nanoretailers do not see the value so that would be a challenge to overcome if implementing.

Financial services were the business model the workshop participants were the most familiar with. Potential drawbacks from adding financial services to existing nanostores related to concerns of maintaining security and questioning if there is potential for the government to ensure safety over these resources. Today financial services are offered at larger retailers such as Oxxo, which the consumers may trust more than a nanostore that is less experienced in this area. However, as stated nanoretailer owners have established trust with their consumers due to the nature of the local relationship, which could help to ease this hurdle.

This concern also relates to how much trust a consumer puts with their local nanostore and if the customer service and convenience outweigh their safety concerns. The financial services also require equipment to complete the transactions, an added burden on the nanoretailer. Given the costs can be covered by the additional revenue services, the workshop shared there is a benefit of bringing more business to vulnerable populations.

While we were onsite in Mexico conducting field research, we found that there are cases of nanoretailers offering additional services. Of course, this is just a small example, but it does provide justification of potential applicability of this model. Figure 25 shows an example a nanoretailer we visited in Mexico that offers a wide breadth of services. There were expected services, such as phone top-ups, but they also offer services we haven’t seen from our research, such as gaming.

Figure 24:

Model of Financial Services

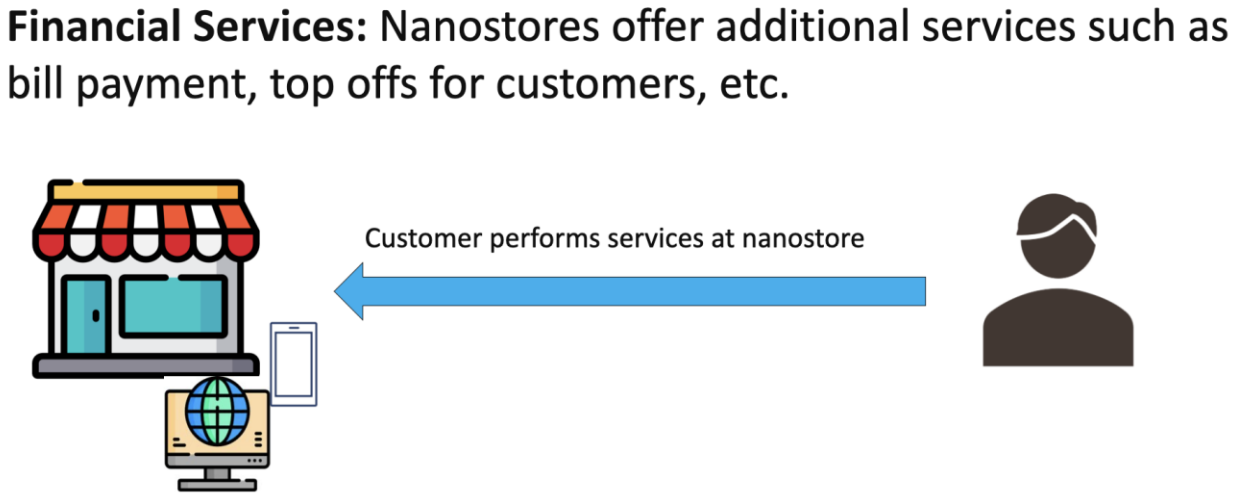


Figure 25:

Poster outside Nanostore of Additional Services

4.2.6 Model 6: E-commerce last mile

The sixth model is e-commerce last mile. E-commerce last mile allows consumers to make regular purchases on their preferred e-commerce platform. The e-commerce provider then

delivers the customer's order to a partnering nanostore located near the customer. The nanostore then either stores the package with a limited space requirement or delivers the package to the customer during non-peak hours. The e-commerce provider pays a delivery fee to the store for either option. A graphical representation of this model is shown in Figure 26.

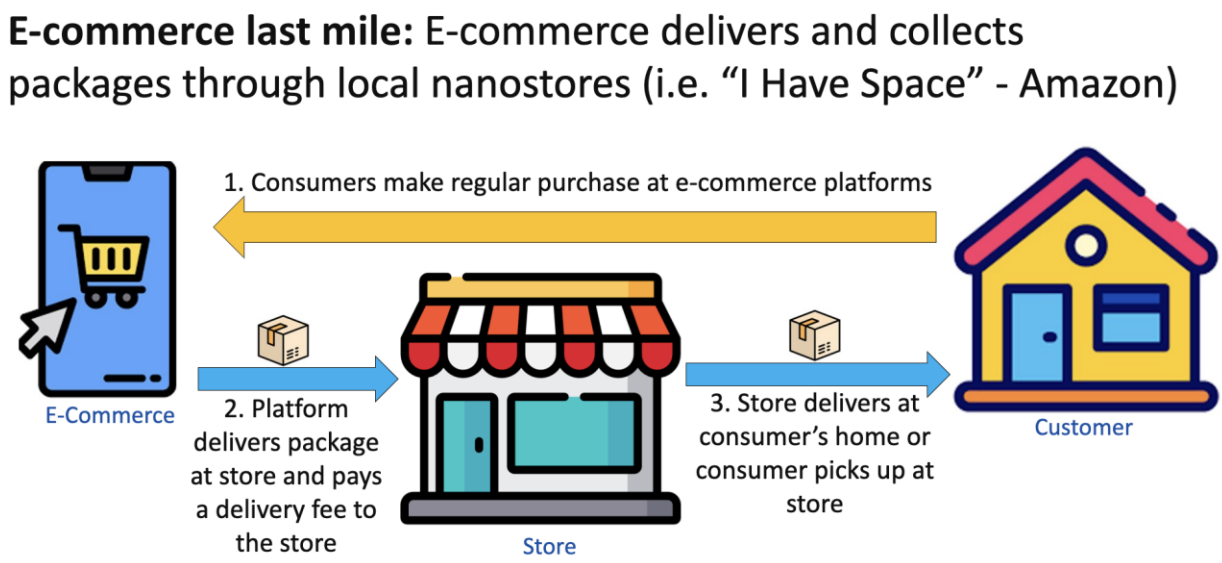
For e-commerce last mile, the elements required are access to the internet, partnership with an e-commerce provider, use of a platform, means of transportation, and limited physical space in the nanostore to temporarily store goods. For supply chain functions, the nanostore owns additional deliveries. For supply chain configurations, the nanostore is partnered with an e-commerce retailer and serves as the intermediary for the e-commerce platform and the customer. E-commerce last mile is listed as easier to implement with a higher value since there already is an existing system design, piloted in India. The company owning the platform sets up the deliveries and the nanostore is guaranteed a delivery fee. We know there is an interest in online ordering with customers making an average of 2.8 transactions a month (Figure 12). Nearly 70% of nanostore surveyed have space available for this model which is a promising viability indicator (Figure 16).

E-commerce last mile triggered a lot of feedback from the workshop. The suppliers, consumers, and nanostore owners shared a mix of concerns and positive feedback from the model. Their concerns focused on implementing security measures to protect both the nanostore and their client's packages. There were also technology concerns that may limit the model to certain nanostores. The elements include cell phone service and Wi-Fi connectivity. The nanostore owners also require communication with the e-commerce platform to ensure how many packages to expect to ensure enough space is available. This model did bring positive feedback on its potential to bring more clients into their nanostores.

We will now discuss the next portion of our workshop, the ideation phase.

Figure 26:

Model of E-commerce Last Mile



4.3 Workshop Ideation

As a part of our workshop, after we briefed the nanoretailers on our business models, we moved into an ideation activity, to explore whether there were other challenges that the consumers, nanoretailers and suppliers face that we did not address through our business models. As shown in the photographs in Appendix A, we received a lot of valuable feedback.

Nanostore Ideation

From the nanoretailers, some of the feedback included financial concerns like salaries, bank commissions, payment terms, financial literacy, and high rent. Other concerns related to technology, applications (time to use them and their commissions), equipment, and difficulties using social media.

We were able to take away from this ideation that for any nanoretailer business model we implement, it is critical the related technology is clear and easy to follow as difficulties with technology are a current pain point.

For future analysis, it could be interesting to dive into some of these challenges a bit further, such as the space issue, where perhaps there are solutions like larger businesses renting out their space for the nanoretailers to use for overflow, matching the nanoretailers with the larger business owners.

Supplier Ideation

We ran the same exercise separately for the suppliers and their feedback revealed a few common themes. They were also concerned about technology, platforms are user friendly, and everyone has access and availability. They also had financial concerns that the shopkeepers have credit cards, and they can understand the cost to secure the client. They also had more strategic

challenges including their ability to scale and expand coverage, while maintaining their client base and the relationship with the client and sharing offers.

To address these challenges, a future analysis could perhaps be a tool that the suppliers could use to assess the total cost to serve of their nanoretailer customers and an analysis of the threshold between incremental revenue from expanding the customer base compared to the potential impact of less time to devote to the existing client relationship.

Consumer Ideation

From the workshop, the feedback shared by the consumers revolved around products. The consumers were concerned about price abuse on the products (as they may be charged a premium) or price fluctuation from day to day. The consumers also desire quality products that are from reputable, national brands. If the products are not from reputable brands, the consumer is ultimately wary and concerned about the quality. This causes the consumer to not purchase the product. There needs to be an ample selection of products available, not only highly processed foods. Expired products or keeping old inventory is a reason consumers lose faith in certain nanostores.

Other takeaways from the workshop included customers' desire for payment options other than cash. Some consumers wished to pay with a card or food vouchers. For the future, the nanostores can increase relations with their suppliers. This relationship between nanostores and suppliers may define the level of service the nanostore receives, impacting the products they can sell and the delivery speed.

5 DISCUSSION

We will now briefly discuss the key findings of our research as well as our observed limitations and our guidance on future research.

5.1 Elaboration on Key Takeaways

It is critical that models are applied in context of nanoretailer and consumer environments.

A survey of this magnitude provided an unparalleled understanding of the nanoretailers and their customers in urban Mexico. It drove insights such as the limits of their current process modernization (50% tracking inventory on paper). However, there were also positive indicators in their current processes (67% internet connection and 50% using WhatsApp as a sales channel). This statistic paired with 80%+ open to investing in new technology shows that the interest is there and if given a compelling argument and with the necessary means, the nanoretailer owners are open to change. On the consumer end we saw they also look to the future with an interest in online purchases and a willingness to pay extra for same-day delivery. If given the right level of support and partnership, there is an interest in innovation on the part of both the nanoretailer and the consumer.

Collaborative feedback from key stakeholders across the supply chain can provide insight and context beyond a survey.

The feedback received from the ideation provided invaluable insights going beyond collecting data and the literature review. There were seemingly unlimited challenges aired by each of the stakeholder groups during the workshop, which allowed them to voice their concerns and call out more issues that we had not presented in the workshop. One pattern that emerged and spilled over from the business model discussion was the need for government intervention for success,

highlighting its importance for support and resources. Technology was another pain point, with stakeholders expressing a willingness to adapt and embrace new solutions in the future but citing educational or cost barriers. Another issue raised was the potential lack of trust between stakeholders, especially with regard to offering credit to each other. Lastly, stakeholders were more focused on the success of their own role in the supply chain, prioritizing their own interests over consumer preferences. These insights provide valuable context for addressing challenges and concerns raised during ideation and move towards a more collaborative and successful nanoretailing experience.

5.2 Limitations

Our capstone research had certain limitations. First, the disciplined entrepreneurship approach is biased towards the background of the entrepreneur. We employed a personal filter, where we ranked the ideas in part based on our own experiences and preferences. This could potentially have left "good" ideas on the table that did not rank as high due to our own interests. Second, our workshop in Mexico included only individuals who lived geographically close to Mexico City, excluding direct feedback from participants representing other cities in urban Mexico. Relatedly, the workshop went through multiple rounds of summarizing and translation, which of course can result in information loss if key details or context was missed.

5.3 Future Research

As the landscape of nanoretailing in Mexico continues to evolve and adapt to changing business needs and consumer behavior, there are opportunities for future researchers to build upon the results of this capstone. It would be prudent to run a pilot in Mexico for each of the proposed business models to validate and assess success rate. There are also changes in adaptation to technology and future researchers may investigate further the impact of technology with the rise

of e-commerce and mobile payments. Another potential study noted after the workshop is the role of government policies and regulations in the success of nanostores, such as tax incentives or support for applications or small business development. Exploring these and other topics allows future researchers to build upon our work and contribute to a deeper understanding of the complex dynamic landscape of nanostores in Mexico and Latin America.

6 CONCLUSION

6.1 Conclusion

Nanostores, or small retail stores, are the primary retail experience for many worldwide. They are critical to the economy, a major source of employment, a large consumer for CPG companies, and of course are incredibly important to the end consumer, who relies on them for essentials. Nanostores cannot be treated the same as large modern retailers, and it is critical to study the local context to understand the needs specifically for these nanoretailers in Mexico. We can draw from learnings from studying these retailers in Mexico to apply to other areas in Latin America. To better understand these Mexican nanoretailers, we studied field research from 4,000+ nanostore owners and end consumers, as well as explored innovative business models employed worldwide through a disciplined entrepreneurship lens to identify potential business models.

We identified six business models across the supply chain that showed initial promise. We then took these models to a workshop in Mexico for business model review and ideation with suppliers, consumers, and nanostore owners. We gained valuable insights on additional challenges and ideas and an assessment of our models' viability and a full scope of what would need to be fleshed out prior to implementation. These included concerns such as the role of government, the funding and implementation for new technology, and ultimate rollout ownership. All of these would need to be considered prior to rollout. There was a healthy dialogue and excitement surrounding the potential for these Mexican nanoretailers.

We recommend pilot testing as the next step to uncover additional insights and continue gathering end user feedback and developing trust. Overall, we gained the following key insights from this research: it is critical that models are applied in context of nanoretailer and consumer

environments and collaborative feedback from key stakeholders across the supply chain can provide insight and context beyond a survey. If these key learnings are applied, we are confident the solutions applied will better align with nanoretailers' needs and expectations and enable them to grow and survive.

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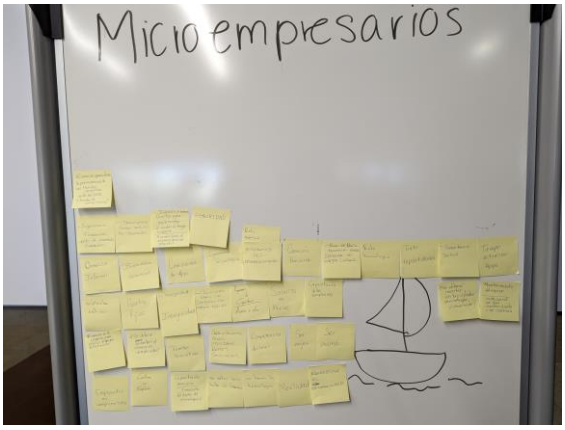
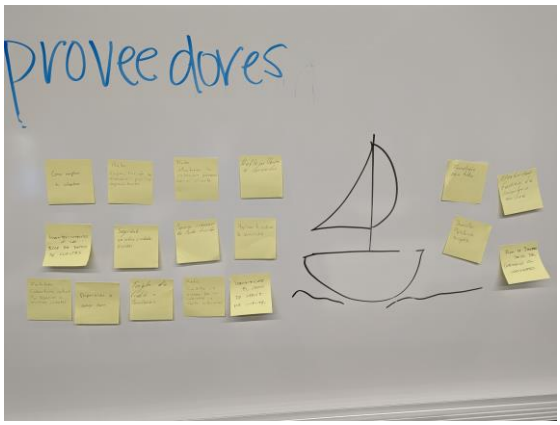
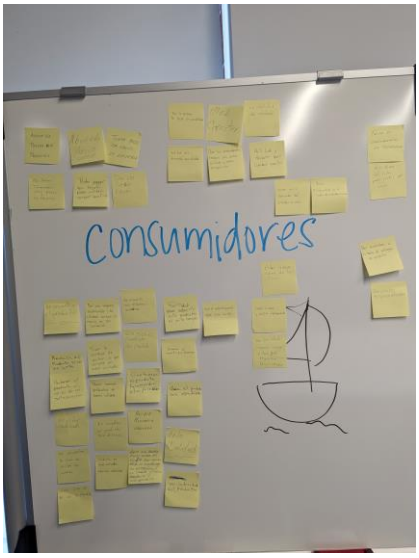
APPENDICES

Appendix A: Photos from the Mexico Visit







Images of the sailboat activity we completed in Mexico. Ideation of the nanoretailer, consumer, and supplier groups. The yellow sticky notes reflect the challenges they experience in relation to the nanostore from their perspectives.

Images from the workshop in Mexico in February 2023. Camilo Mora supported facilitating the workshop which involved several small group discussions.

Photos of our keynote presentation on our research. The presentation was delivered at the Monterrey Tech Sante Fe Campus in February 2023.

Image of the MIT LIFT Lab judging the student competition at Monterrey Tech on innovative solutions to support the nanoretailing environment.

An example of a nanostore that we observed in our field observations in Mexico City in February 2023. Note the small size and lack of space.

Appendix B: Disciplined Entrepreneurship Exercises

Snapshot of Long List of Ideas

Ideas-

Joint replenishment/collaborative approaches

Demand forecasting in partnership with suppliers

BeeQuick in China (50 million nanostores book)-like instacart but nanostore owners handle delivery and they also handle information better

VMI

Centralized planning

SKU rationalization

Bank loan programs through partners

- Loading/unloading areas
- Off-hour deliveries
- need to focus more on applicable practice that grows cash availability
- Capture level of adoption
- Key level of prioritization to improve productivity and survival
- How does MSEs survival/productivity affect large firms
- Not an idea but don't do adoption of tech like an ERP, need fundamental SCM practices

The whatsapp ordering solution in India in partnership with JioMart

Leased application for inventory management/WM (a very slim down ERP) or in partnership with a VMI

Way to tie in education/training in a non offensive way

- Can address inventory management practices like sku rationalization
- productivity

Ecommerce solutions for ordering from suppliers (Egypt example)

Using nanostore for last mile (order for pickup, basically an amazon locker)

- Or nanostore delivers-walk/bike
    - Can leverage off of the connection they have with their customers-can expand on this even more
        - Can forecast up and coming demand well and pack size
        - When person lives, who lives there, when they should deliver (I.e. when the person is at home), preferences
    - Cargo bikes are much more efficient in populous cities

Last mile either from cross dock or actually from supplier location (or urban consolidation center-with modal shift?)

Or crowdsource option for finding last mile drivers (or crowdsourcing nanostores for fulfillment and delivery-I.e. beequick)

Look more into payment methods employed in other countries (tax breaks of being part of formal economy). Does it solve itself by using technologies like whatsapp

Apart and then together we thought of ideas to support the development of nanoretailers, encouraged to think of crazy ideas. This is an example of one of our idea lists in the brainstorming process.

Market Segmentation Exercise

Using nanostores for ecommerce last mile					
Market Segment Name	micro restaurant urban Mexico	E-commerce platforms urban Mexico	other niche store? (butcher, optical, nail shop) urban Mexico	retailers urban Mexico	Final Consumer who would pick item at store, urban Mexico
End User	Store owner	Logistics manager	store owner	Store owner	Buyer
Task	new role to hold and deliver packages	Deliver	new role to hold and deliver packages	Sales and income	Get their packages
Benefit	diversify value prop, incremental $	Cheaper	diversify value prop, incremental $	incremental $	cheaper, faster, more reliably
Urgency of Need	Low	High	Medium	Medium	Low
Example End Users	Delivery staff	Logistics manager	staff	Store owner	Buyer
Lead Customers	Bar owner	existing platform customer	moms?	tech savvy, likely educated	busy platform customer
Willingness to Change	Low	Medium	High	High	Medium
Frequency of Buying	Weekly	Daily	Daily	Monthly	Weekly
Concentration of Buyers	competitive	Oligopoly	competitive	competitive	competitive
Other relevant market segment considerations	Working hours, store devices/technology adapted, # of employees	Promised delivery lead time (hours x days)	Availability of extra space, store devices/technology adapted, # of employees, products prone to impulse-buy	Availability of extra space, store devices/technology adapted, # of employees	Difference by age, income, location (urban dense, suburbs, poor neighborhoods), mobility,
Size of Market (# of end users)	10s of thousands	2-5	10s of thousands	10s of thousands	1M
Est. value of end user ($1, $10, $100, $1K, etc.)	$100	$100,000	$100	$100	$1
Competition/ alternatives	--	Home delivery	--	--	Home delivery, buy at a store
Other components needed for a full solution	security, Smart Phone with internet, Space, delivery means (bike, available employee)	Knowledge about stores	security, Smart Phone with internet, Space, delivery means (bike, available employee)	security, Smart Phone with internet, Space, delivery means (bike, available employee)	Smart Phone with internet, credit card (or other payment methods)
Important partners	as needed to fulfill above components		as needed to fulfill above components	as needed to fulfill above components	
Other relevant personal considerations		working relationship with stores			

This is an example of using disciplined entrepreneurship to perform a market segmentation for one of our business model ideas, using nanostores for e-commerce last mile delivery. In this example, we explored different types of markets that could make sense for this model and described their particularities.

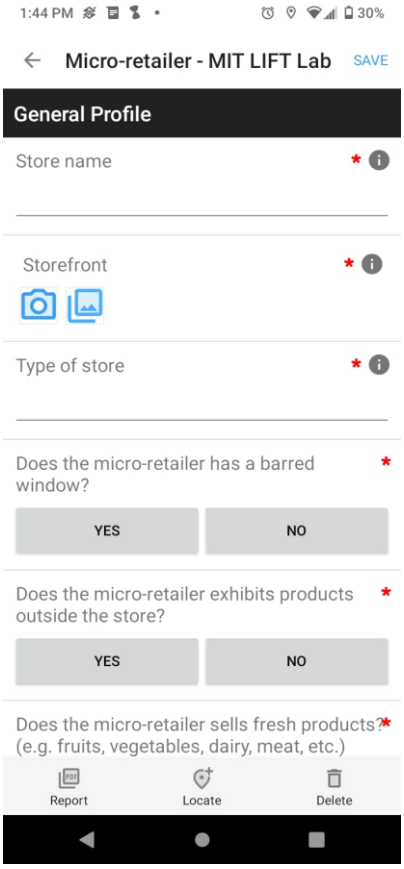
Narrowing Activity

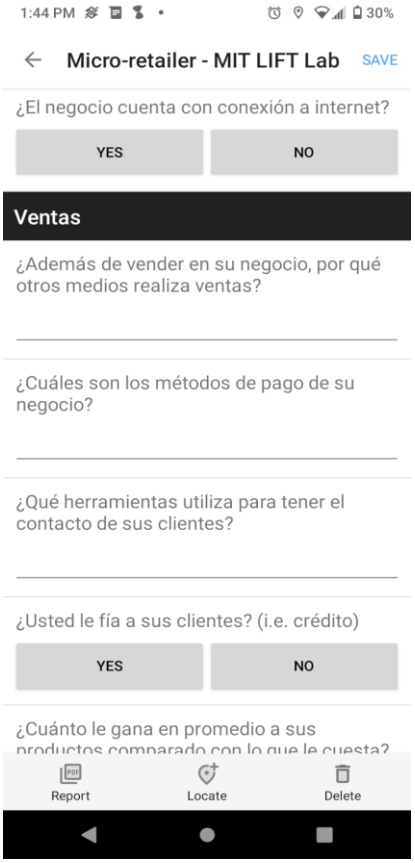
	Personal	Business	External	Execution
Hannah	Crossdocks-I have a lot of experience and comfortability with it	Amazon I have space shows to be a lucrative opportunity (should research $$) Last mile delivery has opportunity when we consider the operational inefficiency for CPG of traditional delivery	Concerns about adoption of VMI idea according to survey results Not a lot of consumer interest in using nanostores for other services according to survey results Trade credits/loan approaches have legal and policy barriers	Amazon's I have space has been executed in India Beequick/Rappi type solutions have successfully rollouts elsewhere
Emma	E-commerce solutions form ordering from suppliers Amazon's I have space	- Crowdsourcing -Cargo bikes - Central load/unloading areas - Nanostores offering additional services like charging phones - Sell information to suppliers	- Training on supply chain practices and finances -Cash versus card vs credit - Orders of economy with other nanostores - Inbev app only stopping at requested suppliers and maybe with a time frame of non peak hours	–POS terminal software and card to capture financial transaction ch.14
Fabio		-adopting other services brings in incremental income-yastas		

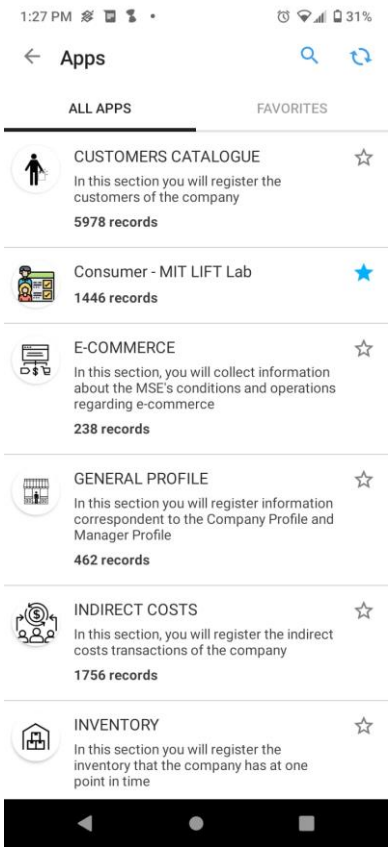
In this exercise we followed the disciplined entrepreneurship approach and used four filters: personal, business, external, and execution to assess which ideas to move forward with from our brainstorming activity.

Appendix C: Fulcrum Application Images and Data Dictionary

Images of Fulcrum Application







Images of the Fulcrum application the Monterrey Tech students used to collect feedback on the consumers, micro retailers, and logistics. In this example you can see Micro-retailer UI.

Fulcrum Dictionary Customer

Item	Description	Type of variable
fulcrum_id	ID of the observation	String
created_at	Timestamp of the creation of the observation	String
updated_at	Timestamp of the updated observation	String
created_by	email of the creator of the observation	String
updated_by	email of the person who updated the observation	String
system_created_at	Timestamp of data uploaded to the database	String
system_updated_at	Timestamp of the date of updates to the database	String
version	Version of the instrument	Integer
status	Blank	
project	Blank	
assigned_to	Blank	
latitude	Latitude of the observation	Decimal
longitude	Longitude of the observation	Decimal
geometry	Geometry of the location of the observation	String
date	Date of the observation	String
address_sub_thoroughfare	Address - Exterior number	Integer
address_thoroughfare	Address - Street	String
address_suite	Blank	String
address_locality	Address - borough	String
address_sub_admin_area	Address - neighborhood	String
address_admin_area	Address - City	String
address_postal_code	Zip code	String
address_country	Country	String
address_full	Complete address	String
time_of_the_survey	Time of the survey's application	String

282_payment_method_that_purchase	Type of payment method for the purchase the consumer just made in the store	Efectivo Tarjeta de débito y/o crédito Transferencia interbancaria Giro postal (p. ej., Western Union) Cheque bancario Trueque (p. ej., comercio o intercambio) Aplicación móvil (p. ej., Rappi, Uber Eats, MercadoPago) No realizó compras
282_payment_method_that_purchase_other	Type of payment method for the purchase the consumer just made in the store - other	String
283_fulfill_needs	Did the consumer find everything he/she wanted	Binary
300_did_not_find	What did the customer did not find in the store	String
237_distance_household_interviewee	Distance from the customer's household to the store	0 a 3 cuadras 4 a 6 cuadras 7 a 10 cuadras más de 10 cuadras
237_distance_household_interviewee_other	Distance from the customer's household to the store - other	String
299_means_transportation_consumer	Means of transporation that the customer used to visit that store	A pie Bicicleta Motocicleta Automóvil Transporte público
299_means_transportation_consumer_other	Means of transporation that the customer used to visit that store - other	String
238_frequency_buying_store	Weekly visits to that store	Integer
284_additional_products_store	Other products the customer would like to find in the store	String

301_electricity_bill	Where does the customer usually pays for the electricity bill	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
301_electricity_bill_other	Where does the customer usually pays for the electricity bill - other	String
305_electricity_bill_store	The customer would like to pay for the electricity bill in that store	Binary
302_water_bill	Where does the customer usually pays for the water bill	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
302_water_bill_other	Where does the customer usually pays for the water bill - other	String
306_water_bill_store	The customer would like to pay for the water bill in that store	Binary
303_gas_bill	Where does the customer usually pays for the gas bill	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
303_gas_bill_other	Where does the customer usually pays for the gas bill - other	String
307_gas_bill_store	The customer would like to pay for the gas bill in that store	Binary

286_topups	Where does the customer usually pays for topups	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
286_topups_other	Where does the customer usually pays for topups - other	String
308_topups_in_store	The customer would like to pay for topups in that store	Binary
287_wire_transfers	Where does the customer usually makes wire transfers	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
287_wire_transfers_other	Where does the customer usually makes wire transfers - other	String
309_wiretransfers_in_store	The customer would like to make wire transfers in that store	Binary
320_other_services_in_store	The customer would like other services offered in that store	Binary
304_additional_services_store	What services would the customer like to be offered in that store	String
81_number_online_purchases_month	Number of monthly online purchases of the customer	Integer
288_number_app_purchases_month	Number of monthly purchases via Apps of the customer	Integer
289_number_whatsapp_purchases_month	Number of monthly purchases via WhatsApp of the customer	Integer

83_willingness_ultrafast_delivery	How much would the customer pay for ultra-fast delivery (less 1 hour)	Integer
84_willingness_sameday_delivery	How much would the customer pay for same day delivery	Integer
241_age_of_the_interviewee	Approximate age of the customer	Integer
240_gender_interviewee	Sex of the customer	Binary
indicate_the_type_of_store	Type of store where the customer purchased	Grocery store (aka. nanostore) Micro-restaurant (aka. fondita) Cafeteria Produce (fruits & vegetables) Dairy products Butcher shop
name_of_the_store	Name of the store where the customer purchased	String
storefront_picture_just_once_if_possible	ID picture of the storefront	String
storefront_picture_just_once_if_possible_caption	Blank	
storefront_picture_just_once_if_possible_url	Picture of the storefront - URL	String
gps_altitude	GPS altitude	Decimal
gps_horizontal_accuracy	GPS accuracy	Decimal
gps_vertical_accuracy	GPS accuracy	Decimal
gps_speed	GPS speed	Decimal
gps_course	GPS course	Decimal

Fulcrum Dictionary Micro Retailer

Item	Description	Type of variable
fulcrum_id	ID of the observation	String
created_at	Timestamp of the creation of the observation	String
updated_at	Timestamp of the updated observation	String
created_by	email of the creator of the observation	String

updated_by	email of the person who updated the observation	String
system_created_at	Timestamp of data uploaded to the database	String
system_updated_at	Timestamp of the date of updates to the database	String
version	Version of the instrument	Integer
status	Blank	
project	Blank	
assigned_to	Blank	
latitude	Latitude of the observation	Decimal
longitude	Longitude of the observation	Decimal
geometry	Geometry of the location of the observation	String
date	Date of the observation	String
address_sub_thoroughfare	Address - Exterior number	Integer
address_thoroughfare	Address - Street	String
address_suite	Blank	String
address_locality	Address - borough	String
address_sub_admin_area	Address - neighborhood	String
address_admin_area	Address - City	String
address_postal_code	Zip code	String
address_country	Country	String
address_full	Complete address	String
time_of_the_survey	Time of the survey's application	String
282_payment_method_that_purchase	Type of payment method for the purchase the consumer just made in the store	Efectivo Tarjeta de débito y/o crédito Transferencia interbancaria Giro postal (p. ej., Western Union) Cheque bancario Trueque (p. ej., comercio o intercambio) Aplicación móvil (p. ej., Rappi, Uber Eats, MercadoPago) No realizó

		compras
282_payment_method_that_purchase_other	Type of payment method for the purchase the consumer just made in the store - other	String
283_fulfill_needs	Did the consumer find everything he/she wanted	Binary
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237_distance_household_interviewee_other	Distance from the customer's household to the store - other	String
299_means_transportation_consumer	Means of transporation that the customer used to visit that store	A pie Bicicleta Motocicleta Automóvil Transporte público
299_means_transportation_consumer_other	Means of transporation that the customer used to visit that store - other	String
238_frequency_buying_store	Weekly visits to that store	Integer
284_additional_products_store	Other products the customer would like to find in the store	String

301_electricity_bill	Where does the customer usually pays for the electricity bill	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
301_electricity_bill_other	Where does the customer usually pays for the electricity bill - other	String
305_electricity_bill_store	The customer would like to pay for the electricity bill in that store	Binary
302_water_bill	Where does the customer usually pays for the water bill	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
302_water_bill_other	Where does the customer usually pays for the water bill - other	String
306_water_bill_store	The customer would like to pay for the water bill in that store	Binary
303_gas_bill	Where does the customer usually pays for the gas bill	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
303_gas_bill_other	Where does the customer usually pays for the gas bill - other	String
307_gas_bill_store	The customer would like to pay for the gas bill in that store	Binary

286_topups	Where does the customer usually pays for topups	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
286_topups_other	Where does the customer usually pays for topups - other	String
308_topups_in_store	The customer would like to pay for topups in that store	Binary
287_wire_transfers	Where does the customer usually makes wire transfers	Banco Supermercado Tienda de conveniencia (e.g. OXXO) Tiendita Fonda CFE No lo hago
287_wire_transfers_other	Where does the customer usually makes wire transfers - other	String
309_wiretransfers_in_store	The customer would like to make wire transfers in that store	Binary
320_other_services_in_store	The customer would like other services offered in that store	Binary
304_additional_services_store	What services would the customer like to be offered in that store	String
81_number_online_purchases_month	Number of monthly online purchases of the customer	Integer
288_number_app_purchases_month	Number of monthly purchases via Apps of the customer	Integer
289_number_whatsapp_purchases_month	Number of monthly purchases via WhatsApp of the customer	Integer
83_willingness_ultrafast_delivery	How much would the customer pay for ultra-fast delivery (less 1 hour)	Integer

84_willingness_sameday_delivery	How much would the customer pay for same day delivery	Integer
241_age_of_the_interviewee	Approximate age of the customer	Integer
240_gender_interviewee	Sex of the customer	Binary
indicate_the_type_of_store	Type of store where the customer purchased	Grocery store (aka. nanostore) Micro-restaurant (aka. fondita) Cafeteria Produce (fruits & vegetables) Dairy products Butcher shop
name_of_the_store	Name of the store where the customer purchased	String
storefront_picture_just_once_if_possible	ID picture of the storefront	String
storefront_picture_just_once_if_possible_caption	Blank	
storefront_picture_just_once_if_possible_url	Picture of the storefront - URL	String
gps_altitude	GPS altitude	Decimal
gps_horizontal_accuracy	GPS accuracy	Decimal
gps_vertical_accuracy	GPS accuracy	Decimal
gps_speed	GPS speed	Decimal
gps_course	GPS course	Decimal