Ideas for future-oriented agrologistics at CEDA

dr. R.B. Castelein, H.B. Axmann MSc, drs. ing. J.C.M.A. Snels, dr. M. Víquez Zamora

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PO box 17, 6700 AA Wageningen, The Netherlands, T + 31 (0)317 48 00 84, E info.wfbr@wur.nl, www.wur.eu/wfbr.

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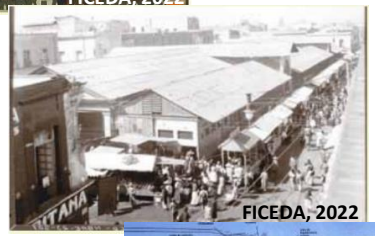
Outline

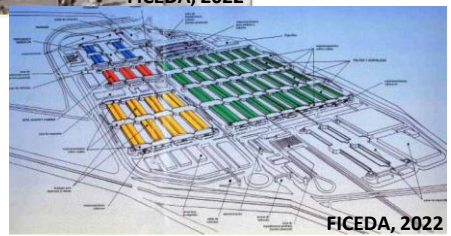
1) Introduction

Mexico City, historically a place of commerce

Plaza Mayor, XVIII



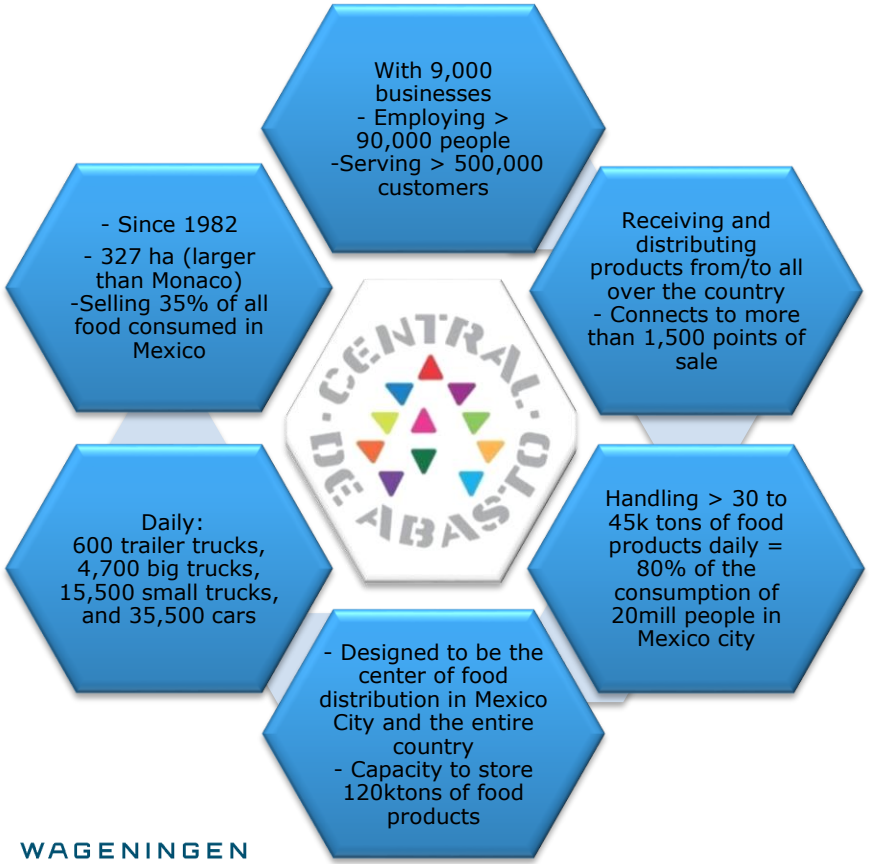
La Merced, 1920s
Mexico City
population: ~1 million



CEDA Plans, 1980s
Mexico City
population: ~13 million

40 years of history
Feeding more than 20 million people every day

CEDA: some key facts



- The world's largest wholesale market
- Most important food warehouse and distribution center in Mexico (5,5% from all food produced in the country per year)
- Social function of CEDA is crucial in supplying all levels of consumers in Mexico City and supporting numerous livelihoods

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Source: CEDA, 2022; SIAP, 2022 and Urban Travel Logistics, 2019.

Research question and approach

How can CEDA develop its agrologistics strategy for sustained success in the next 40 years?

Staying ahead and feeding >20 million in a sustainable way

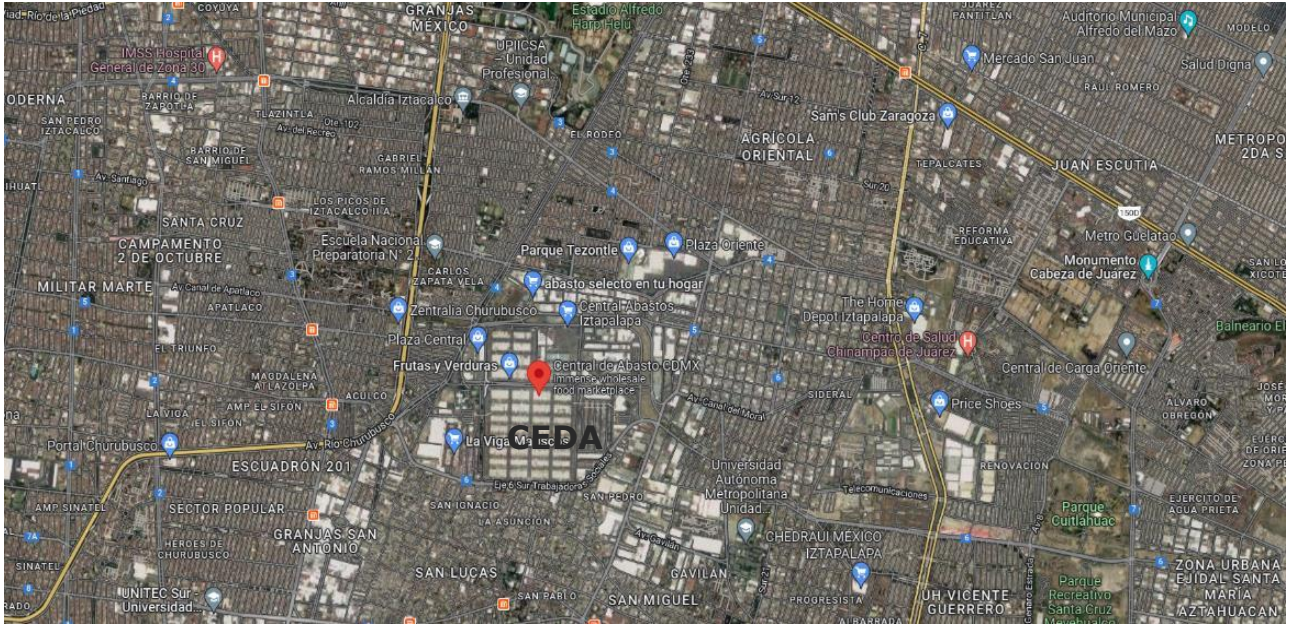
- Approach: Small scoping study (2 months)

1. Obtaining a general idea of / insight into the challenges by means of interviews and questionnaires
    - Interviews and brainstorming with CEDA management and local expert (dr. Angelica Lozano, UNAM)
    - Questionnaires to suppliers and buyers
    - Questionnaires to CEDA staff
2. Compare CEDA with similar markets in other countries in order to 'interpret' the current and possible future situation
3. Literature and desk study to substantiate 'development suggestions'

2) The current situation

Source: Archivo FICEDA, Central de Abasto, CDMX, 2022.

CEDA in Mexico City



Source: Google Maps

Heavy urbanization surrounding CEDA:

Iztapalapa: 15,809 inhabitants per km^2
Mexico City´s average is 6,202 inhabitants per km^2

Source: UNODC, 2021

Population Mexico City:
1972-> 9.55mill
1982-> 13.51mill
1992-> 16.18mill
2022-> 22.08mill

Expected for
2032-> 24.65mill
2037-> 25.42mill

Source: https://www.macrotrends.net

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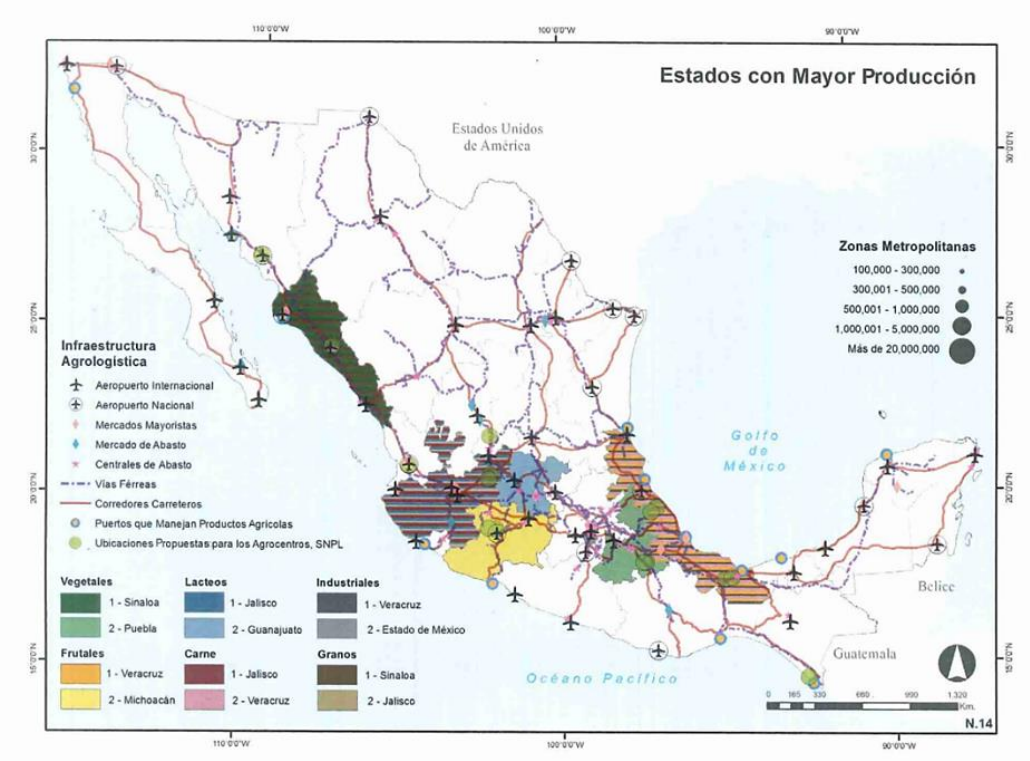
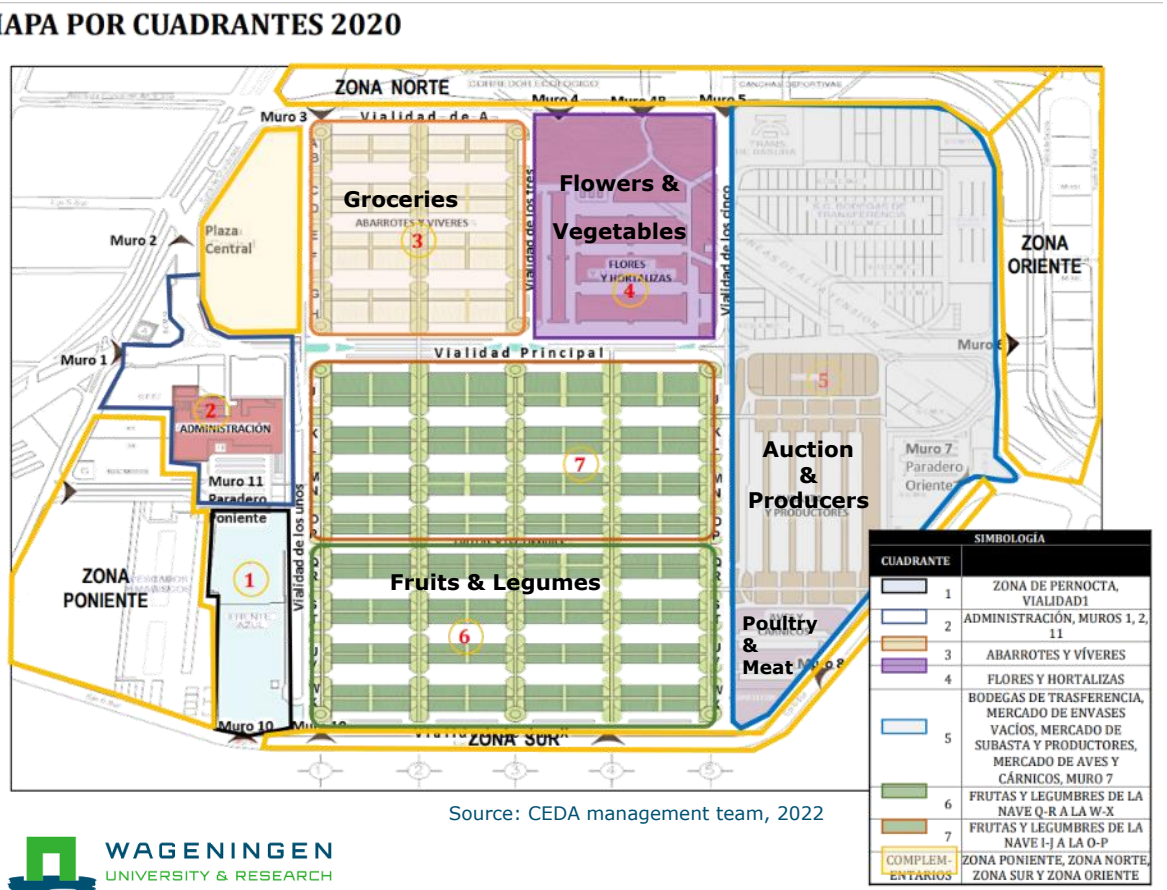
CEDA is at the interface between major production areas in Mexico, and Mexico City



Source: WFBR, 2015

CEDA layout



Source: CEDA management team, 2022

4 Entrances: muros, 1, 5, 8, 10
3 Exits: muros, 2, 4 y 6

Operating almost continuously; closed only daily from 6-10 PM for maintenance and cleaning activities

Achievements of CEDA

- Largest fresh food market in the world
- Fulfills a large amount of Mexico City's food requirements

- Pushing for healthy and accessible food, sustainability and a circular economy
    - Separation of organic and plastic waste
    - Biofuel production plant and solar energy
    - **ITACATE**: Food recovery and donation
    - Ferias del Bienestar – CEDA a Domicilio

Structuring agrologistics at CEDA

- Three main product flows:
  - Incoming (suppliers; mostly trucks, big and small)
  - Internal transport (‘diableros’)
  - Outgoing (customers; trucks, small vehicles, pedestrians)

- Three main segments:
  - Wholesale (Business-to-Business, B2B)
  - Retail (Business-to-Consumer, B2C)
  - Value-added logistics

Screening of the current situation - questionnaires

Suppliers/transporters

- Daily delivery to CEDA
- Surrounding bottlenecks: Avenida Eje 5 and 6, Rio Churubusco, Mexiquense reported several times
- Traffic jams were reported in general as bottlenecks but in particular at entrances and *Patios de maniobra*
- Most suppliers try to park as near as possible to their assigned *Bodega*
- Main traffic movement between 4-8am
- Main reported consequences of traffic congestion: Economic losses, delays in deliveries, losing clients
- Delays due to congestion vary from 30 mins to 4 hours, inside and outside CEDA


Source: Martha Jarquin, 2022


Source: Wikipedia

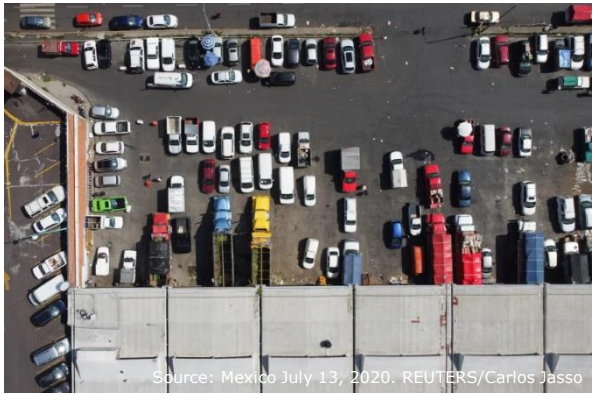

Source: Julio Verduzco, 2020

Screening of the current situation - questionnaires

Buyers

- Visiting CEDA at irregular intervals
- Main transport: Small vehicles, private cars
- Start arriving at CEDA around 8/9 am, most have left by early afternoon
- Coming from all sorts of distances (even >50km)
- Parking in aerial parking lots or as close as possible to the targeted bodega
- Experiencing bottlenecks near entrances and parking places


Source: Roberto Hernandez, El Sol de Mexico, 2020


Source: Mexico July 13, 2020. REUTERS/Carlos Jasso

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Screening of the current situation - questionnaires

Management

Main identified challenges **outside** CEDA*

- City roads not adapted to heavy traffic
- Transit in Mexico City: Oversaturated in general
- Lack of good and safe public transport
- Lack of policies/regulations to make a delimitation of hours/routes for specific vehicles
- Lack of urban planning surrounding CEDA

Main identified challenges **inside** CEDA*

- Infrastructure not suited for urban growth or larger trucks currently in use (largest ones from 48” to 53”)
- Internal logistics: Loading/unloading times and limited organization of internal transport
- Drainage and pavement need maintenance
- Lack of appropriate street/traffic signalling
- Lacking information/registration system, therefore fewer possibilities for data-driven decision making
- Free access to individuals, bikes and motorcycles - therefore lack of control
- Limited compliance with internal regulations: e.g. Restrictions to private vehicles in *Patios de maniobra,* trailers need to unhitch while unloading

* *Qualitative assessment, no specific order*

Screening of the current situation - questionnaires

Management

Various areas currently used sub-optimally, e.g.:*

- *Entradas* are used unevenly
- Areas of loading/unloading are used also as parking places creating major bottlenecks
- *Subasta y Productores* 10.6 ha is not particularly used for auctions
- *Envases vacíos* 1.7ha with 359 spaces to handle/commercialize empty containers
- *Bodegas de Transferencia* 11 ha. Waste management and storage- not necessarily storage for wholesalers
- *Zona de Pernocta* 5.1 ha to park 500-1000 vehicles – seems to have a lack of vigilance
  - parking big vehicles when no other space is found
- *Zona Norte – Poligono externo* commercialization areas, activities not necessarily linked to market

Modest gains possible from more efficient use of space; major congestion issues will likely persist

Envases vacíos

Source: Seila Montes, National Geographic, 2022

Flores y Hortalizas

Source: Abril Mulato, Goula, 2019

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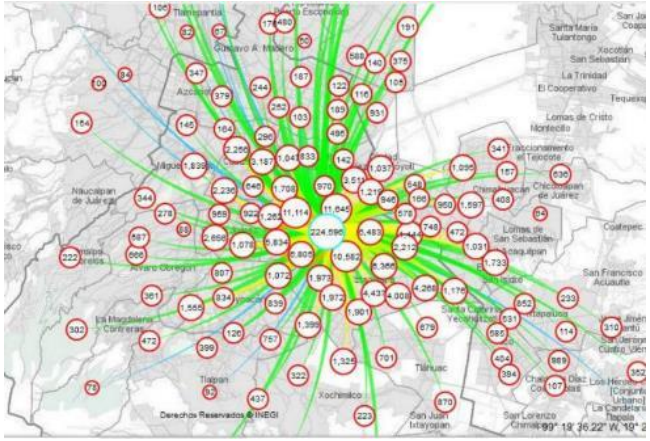
* *Qualitative assessment, no specific order*

Flows to CEDA

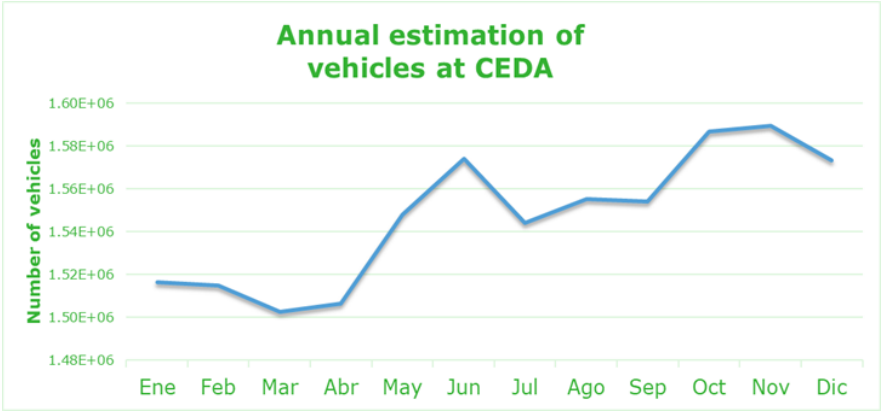
Vehicle flows (CEDA information):

- CEDA attracts traffic from all over Mexico; most individual visitors from Mexico City
- Approximately 53,000 vehicles visiting CEDA per day (suppliers and buyers)
- There seems to be a seasonal influence, with higher numbers in May/June and October/November and around public holidays
- Avenues/streets around CEDA not adjusted to high transit of heavy vehicles
- Major access routes and main bottlenecks at Eje 5 and Eje 6, Churubusco and Mexiquense



Source: INEGI, 2017

More than 220k trips to CEDA per day

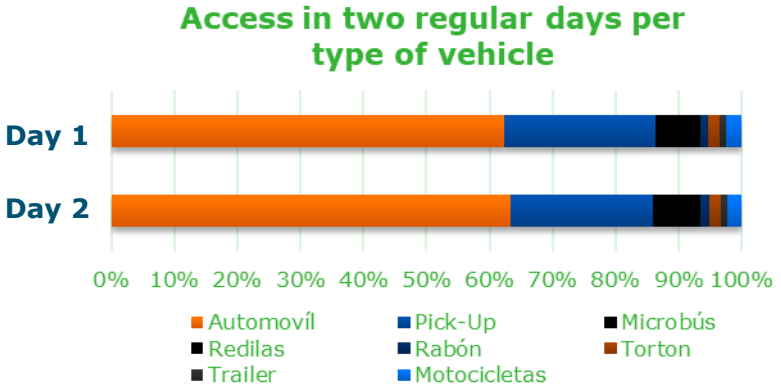


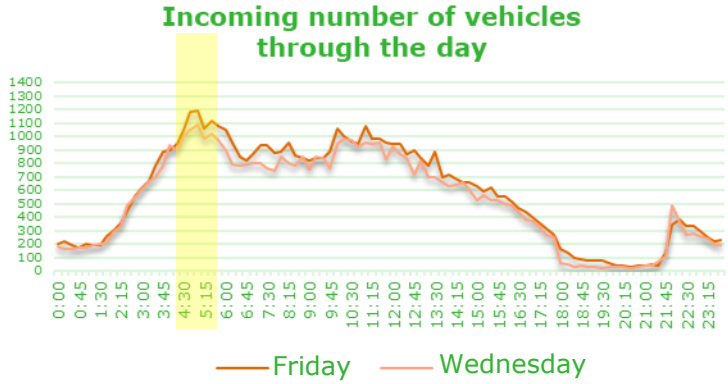
Source: URBAN TRAVEL LOGISTICS, S.A., 2019
Estudio de Aforo, CEDA.

Flows at CEDA

Inside transit (CEDA information):

- More than 85% of the vehicles entering CEDA daily are small/medium vehicles
- More than 80% of the vehicles enter CEDA through entrance stations 1 and 2
- Time of maximum incoming traffic 4:30-5:45 am with approx. 4.450 vehicles/h
- Entrance income estimation: $4.6million pesos/week (approx. 230k euros/week)
- Questionnaires reported high amounts of small vehicles (hand trucks, carts) "invading" main streets





Source: URBAN TRAVEL LOGISTICS, S.A., 2019
Estudio de Aforo, CEDA.

Market trends

1) CEDA will continue to be important trade, purchase and sales hub
    - Dominant 'Traditional trade' segment: public markets and traditional retail (small stores) (Garrocho & Campos-Alanis, 2018)
    - Supply chains through CEDA
    - Consumers still predominantly prefer to buy fresh fruit and vegetables in open market
2) Some competition from modern retail
    - Small but growing modern retail (supermarket) segment
    - Direct procurement from producers
    - Own supply chain and distribution centres
3) Development of (new) consumer demands
    - Growing food quality and safety focus
    - New and convenient (online) services
    - Megatrend of population and demand growth in Mexico City

Source: USDA Foreign Agricultural Service, GAIN, July 06, 2022 (Report Number: MX2022-0037)

Future expectations

- How can we expect current challenges to develop, based on observed trends?
    - Market and consumer demand grow (compared to 2022 10% population increase expected in Mexico city by 2032); current congestion issues will exacerbate
    - CEDA will need to meet changing consumer demands (food quality and safety assurance, on-demand services)
    - Is current space and operating model suitable for expected demands?
    - How to meet growing demands for more sustainable food supply (mitigate emissions and waste, reduce pressure on urban quality of life, and contribute more towards a circular bio-economy)?

The current situation - Summary

- Information and data gaps – Current analysis based on estimates and qualitative assessments
- Challenging to meet current demands with space and facility from 40 years ago; more demand growth expected due to growing city population
- Limitations of space at CEDA
    - Bottlenecks for big trucks
    - Shortage of parking spaces
- Congested city infrastructure around CEDA
- Considerable delays in goods flows
- Congestion and dangerous situations due to mixing of different types of road users

- **More market growth expected (10% over next 10 years) due to growing city; challenges will exacerbate**

3) Fresh city logistics

Source: https://www.abivin.com/post/what-is-city-logistics

Relevance for CEDA

- CEDA is the main hub between national agrologistics and urban food distribution
- Affected by transportation and logistics issues at the city level
- No direct influence on city-level logistics development

Therefore:

- Strategic orientation of CEDA should take context into account
- Market-level interventions can benefit from concepts and examples from (general) fresh city logistics

City logistics concepts & frameworks

Challenges

- Congestion
- Environmental pollution
- Land use
- Sub-utilization of capacities
- Physical obstacles/bottlenecks
- Traffic incidents
- Energy waste

Solutions

- Policy (government) → *Determines context in which CEDA operates*
  - Governance, planning, regulation, innovation
  - Different levels (local, regional, national)
  - Growing relevance of sustainability requirements
- Innovative solutions (market) → *Possible for CEDA to implement or influence*
  - Planning: Distribution, consolidation
  - Vehicles: Light vehicles, electrification
  - Scheduling: Off-hour deliveries
  - Cargo cycles
  - Hubs
  - Platforms

(Wolpert & Reuter, 2012; Dolati Neghabadi et al. 2018)

Other markets

Potential lessons from:

- Rungis (Paris) → Best practices
- Mercado Central (Buenos Aires) → Smaller peer
- Azadpur Mandi (Delhi) → Smaller peer with additional issues

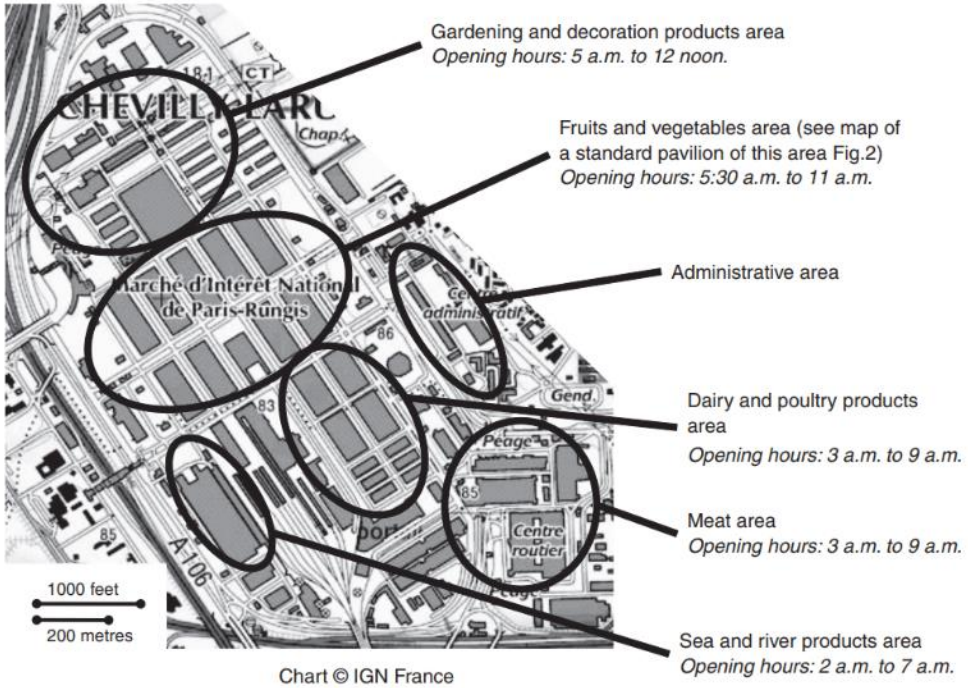
Other markets – **Rungis (Paris)** (1)

- Established in 1969 to ease congestion at Les Halles downtown
- Second-largest market in the world – After CEDA
- 232 acres, 1.5mln tons of food per year
- 26 000 trucks per day
- Wholesale focus
- Organized by product type
- Situated by Orly airport
- With own waste-to-energy plant

Source: R. Repko (2019)

Other markets – **Rungis (Paris)** (2)

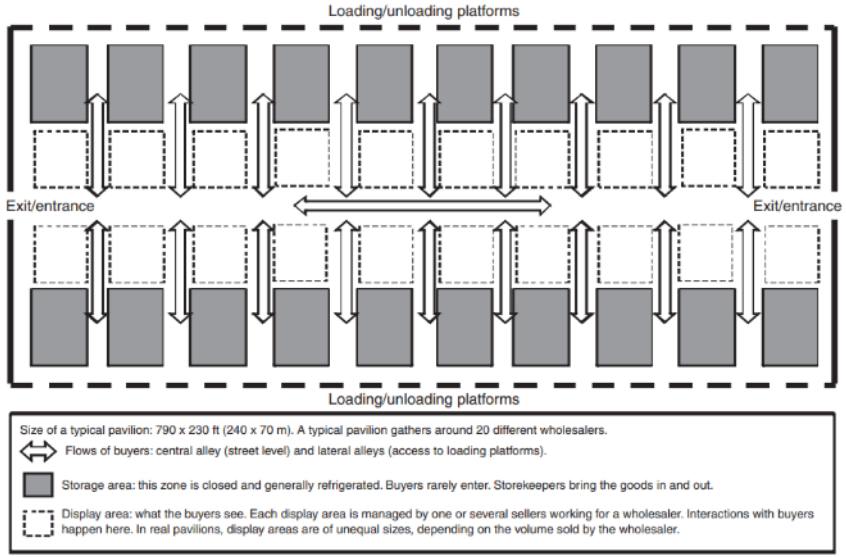
- Own railyard – delivery by train possible
- Sectors open at different times for delivery throughout the night / early morning
- Delivery time slots per section separate of opening hours for customers
- Paid truck parking at the complex
- Cold chain in meat/fish/poultry sections; storage cellars in fruit and vegetables and dairy sections



Source: Curchod (2010)

Other markets – **Rungis (Paris)** (3)

- Strict separation of loading/unloading and storefront activity
- Registration at the gate with debit or credit card (or DKV)
- Dedicated time slots at (un)loading docks
- Still congested around loading/unloading platforms
- Dedicated delivery areas per customer for large wholesale shipments



Source: Curchod (2010)

Other markets – **Mercado Central de Buenos Aires** (1)

- Built in the 1970s, completed in 1984
- Aim was to centralize food flows, ease congestion around the city, and control food safety
- The main wholesale market for Buenos Aires, largest in Argentina (OECD, 2019)
- 210 acres, ~1.5 mln tons of fruit and vegetables per year
- On-site quality inspection

Source: Corporacion de Mercado Central de Buenos Aires (2022)

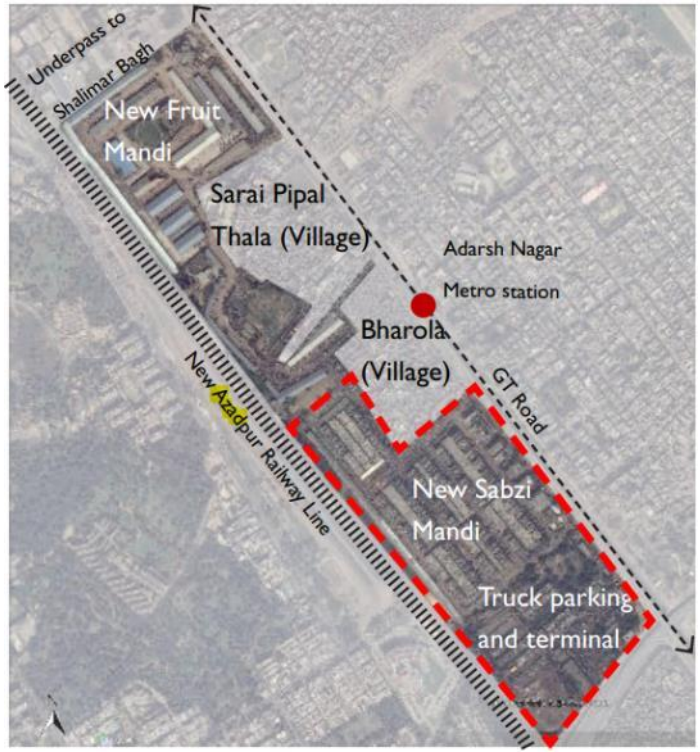
Other markets – **Mercado Central de Buenos Aires** (2)

- Wholesale area separated from retail area, different opening times
- Delivery hours (from afternoon until 02:00) and market hours (early morning until 11:00) separated
- Both growers and wholesalers sell at the wholesale market
- Toll booths on main entry road (Aut. Ricchieri), still frequently congested
- Stakeholder disagreements on opening hours; ongoing informal and unregulated activity (Viteri, 2010)

Source: Corporacion de Mercado Central de Buenos Aires (2022)

Other markets – **Azadpur Mandi (Delhi)** (1)

- Established in 1968-69, by now in middle of urbanized area
- Largest fruit and vegetables market in Asia
- ~80 acres
- Wholesale and retail market
- Operated by Agricultural Produce Marketing Committee (APMC)
- Separate truck parking, goods transfer with small vehicles
- Dedicated cold storage section
- Continuous operation, traffic peak between midnight and early morning
- Mix of permanent and temporary sheds



Source: Delhi Urban Art Commission (DUAC) (2015)

Other markets – **Azadpur Mandi (Delhi)** (2)

- Issues:
  - Poor infrastructure condition; space not suited to heavy traffic (DUAC)
  - Structural congestion in and around the market (DUAC)
  - Mix of formal and informal (illegal) activity, lack of oversight and enforcement (DUAC)
  - No segregated traffic (pedestrians, street vendors, small vehicles, large trucks) (Singh, 2018)
  - Encroachment of commercial activity into the roads (Singh, 2018)
  - Shops relatively small for today's volumes (Singh, 2018)
- Proposals:
  - Segregated parking and traffic (Singh, 2018)
  - Enforce regulations and restrict street vending (Singh, 2018)
  - Relocate wholesale market to (peri-urban) Integrated Freight Complex (DUAC)
  - Retain Azadpur Mandi as a sub-city (retail) market (DUAC)
  - Establish network of satellite markets around main Expressway (ring road) (DUAC)

Other markets – Potential Lessons for CEDA

- Paris
  - Separated delivery time slots per section of opening hours for customers
  - Closing time per areas
  - Wholesale focus
  - Faster and direct transport to/from airports and ports
  - Cold Chain Logistics
  - Paid parking also for delivery trucks
- Buenos Aires
  - Wholesale separated from retail: different areas + different opening times
  - Centralizing flows
  - On-site quality inspection> high-quality assurance
- Delhi
  - Segregated parking and traffic areas
  - Separation of wholesale and retail (sub-city market)
  - Enforcement of quality practices and internal regulation
  - Establish a network of satellite markets around main Expressway

Fresh city logistics - Summary

- CEDA has limited policy influence, but can consider market-based solutions (planning, vehicle use, scheduling, cargo cycles, hubs, platforms)
- Instructive examples from other markets that face similar challenges
    - All considered relocation from a cramped location, Rungis is now situated outside the city close to rail and air transport
    - Separation of flows and spreading of traffic peaks is essential, examples:
        - Separate areas per product group
        - Separate opening hours for delivery/purchasing, wholesale/retail, and/or per product group
        - Separate unloading/delivery from loading/purchasing
    - It proves challenging for urban markets to fulfill both wholesale and retail functions without severe congestion → Consider strategic reorientation (e.g. Rungis now only wholesale)
    - Organizing food safety and quality control can be a major added value of market management

4) Conclusions and exploration of solution pathways

Source: https://update.lib.berkeley.edu/2018/07/27/pathways-to-open-access-choices-and-opportunities/

Summary **SWOT** – CEDA in its current situation

	Positive	Negative

Internal	**Strengths**
	- Important hub function in agrochains and local market
	- Large facility in central location
	- Diverse service offer
	- Year-round supply
	- Attractive to wide range of customers (big wholesale clients to individual retail consumers)
	- Competitive pricing compared to modern retail
		Weaknesses
		- Structural internal congestion (aggravated at peak times)
		- Infra- and superstructure less suited to modern trucks
		- Ad-hoc (inefficient) allocation of loading/unloading areas
		- Inefficient mixing of
		  - flows (inbound/internal/outbound)
		  - transport modes (truck, car, bus, foot traffic
		  - segments (wholesale, retail, value added logistics)
		- Limited control over entry and internal activity
		- Lack of compliance to food safety and workers welfare
		- High negative environmental impact (emissions, waste)

External	**Opportunities** - Population, and therefore market growth - Consumer preference for fresh food from market - Value added logistics - Routes to be explored for local government lobbying and funding - More space available in peri-urban region - Provide higher-quality services and products	**Threats** - General traffic congestion in metropolitan area - Lack of urban planning with regard to freight transport - Poor city infrastructure - Limited space around CEDA - Limited opportunities to grow and adapt to challenges

The way forward (1)

- Can CEDA stay in the same place with the current operating model indefinitely? → Likely not
    - Pervasive congestion within market and surrounding areas
    - Some benefit can be expected from improvement of facilities (e.g. road maintenance, signage, adapted layout) and adaptations of operating model (e.g. peak smoothing, traffic segregation, control and enforcement)
    - But population and market growth will put increasing demands on current facilities, and in current location (in densely-populated urban area) congestion will persist

The way forward (2)

- **Recommendation 1**: For major gains in agrologistics efficiency, consider a strategic reorientation, looking beyond only the current location
- Three possible scenarios:

1	2	3
Keep everything in current location, with adjustments and improvements	Move specific market segments (retail, wholesale, value-added logistics) elsewhere	Look for an entirely new location for *all* activities
Not ideal, as congestion will persist and exacerbate	Retain other functions at current location with improved location and adapted operating model; opportunity to shift heavy traffic to less congested location	Not ideal, as current location has its benefits

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The way forward (3)

- **Recommendation 2**: Prioritize scenario 2, but specific strategy needs to be formulated as to *what* and *where,* which requires:

First filling in the data gaps:

- Where merchants and clients in different segments come from, when they come, and for which products/market locations
- CEDA's most important turnover drivers and trends over time (segments, markets, products)

Next deciding on CEDA strategy: Which market segments and products does CEDA want to prioritize at the current location, and which segments and products are better shifted elsewhere? If so, conduct spatio-economic analysis of alternatives to make location decisions.

For this also strategic alignment with key stakeholders on their roles and requirements is essential and needs to be organized to actively involve them in the transformation of CEDA

The way forward (4)

- **Recommendation 3:** Short and medium-term actions can be taken during the strategic reorientation

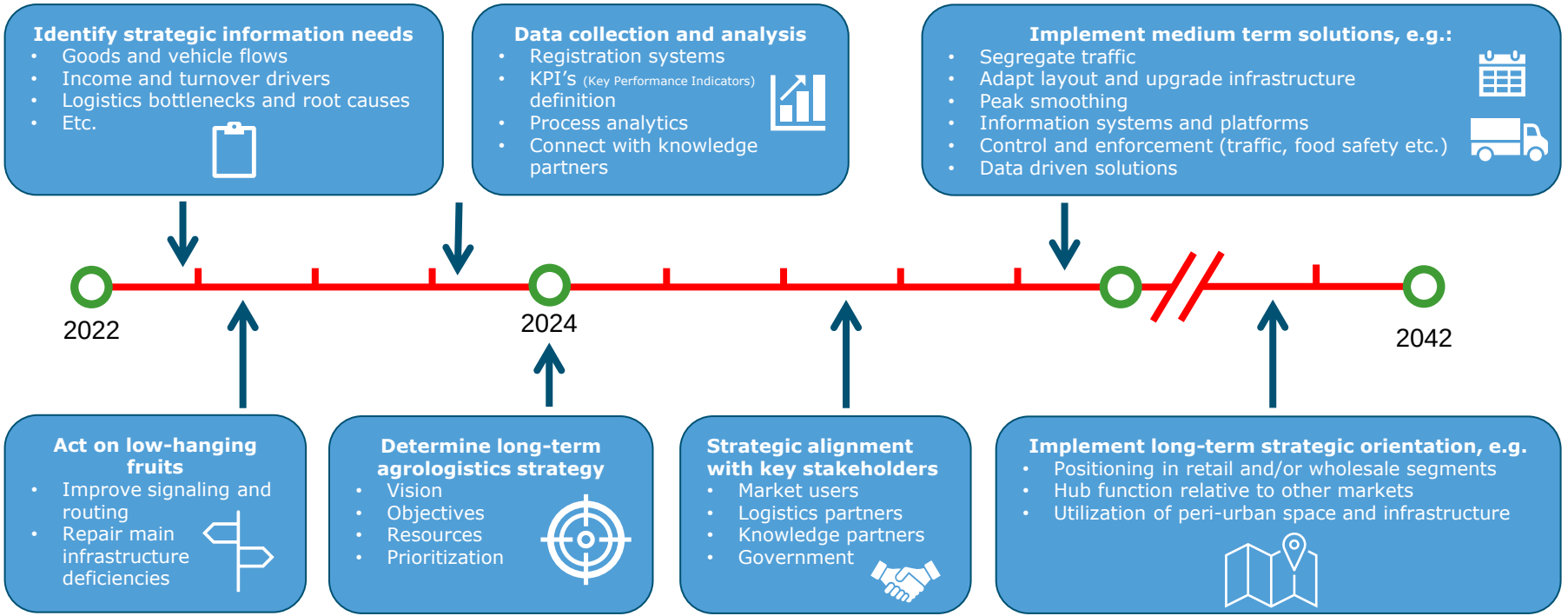
Act on low-hanging fruits

- Improve signaling and routing
- Repair main infrastructure deficiencies

Implement medium term solutions

- Segregate traffic
- Adapt layout and upgrade infrastructure
- Peak smoothing
- Information systems and platforms
- Control and enforcement (traffic, food safety etc.)
- Data driven solutions

Recommendations in concept roadmap towards CEDA's long-term agrologistics strategy



CEDA Strategy – General principles (1)

What will CEDA look like in 40 years? What will be the operating model, market demands and infrastructure needs?

- CEDA strategy should be guiding for which solutions are pursued
- Solutions are combinations of hardware, software, and orgware – involving the right stakeholders from the agrologistics ecosystem
- Distinguish between steps for:
    - Short term (identify and fill in information needs; internal, limited scope and impact, modest investment);
    - Medium term (internal, wider scope and impact, larger investments);
    - Long term (requires external cooperation, major scope and impact, major investment).

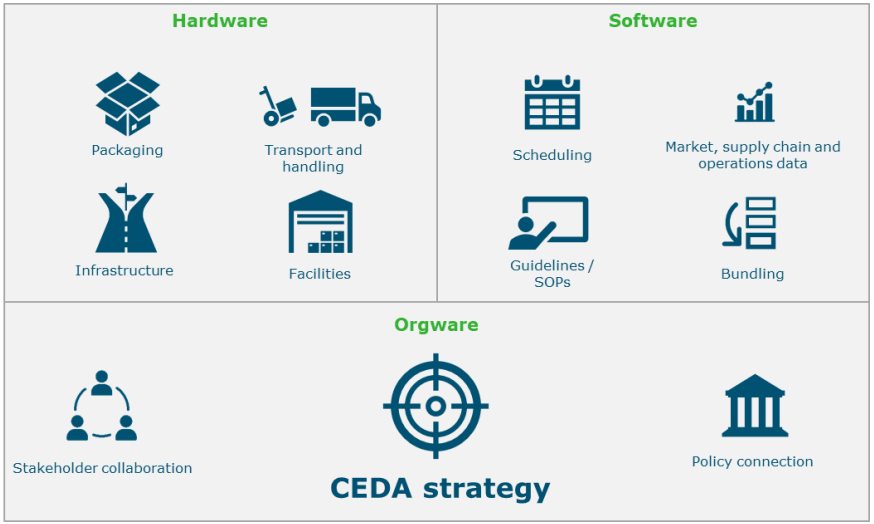
CEDA Strategy – General principles (2)

- For possible solution pathways, explore beforehand:
  - Information requirements – What do we need to know?
  - Preconditions, stakeholders and resources – What and who is necessary to make it work?
  - Business case – Is it economically feasible; is it the best use for our resources?
  - Complexity – How will implementation work in the context of CEDA and Mexico City?
  - Financing – Are there options for CEDA to provide paid (data) services; institutional or market funding?

CEDA Strategy – General principles (3)

- Organizations CEDA is (directly or indirectly) connected to:
  - Producers
  - Logistics service providers
  - Retailers
  - Food processing firms
  - Foodservice and hospitality
  - Government institutions - Compliance
  - Knowledge organizations

- Components of CEDA agrologistics system



Source: WFBR

Thank you

marcela.viquez@wur.nl

heike.axmann@wur.nl

joost.snels@wur.nl

bob.castelein@wur.nl

To explore the potential of nature to improve the quality of life

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