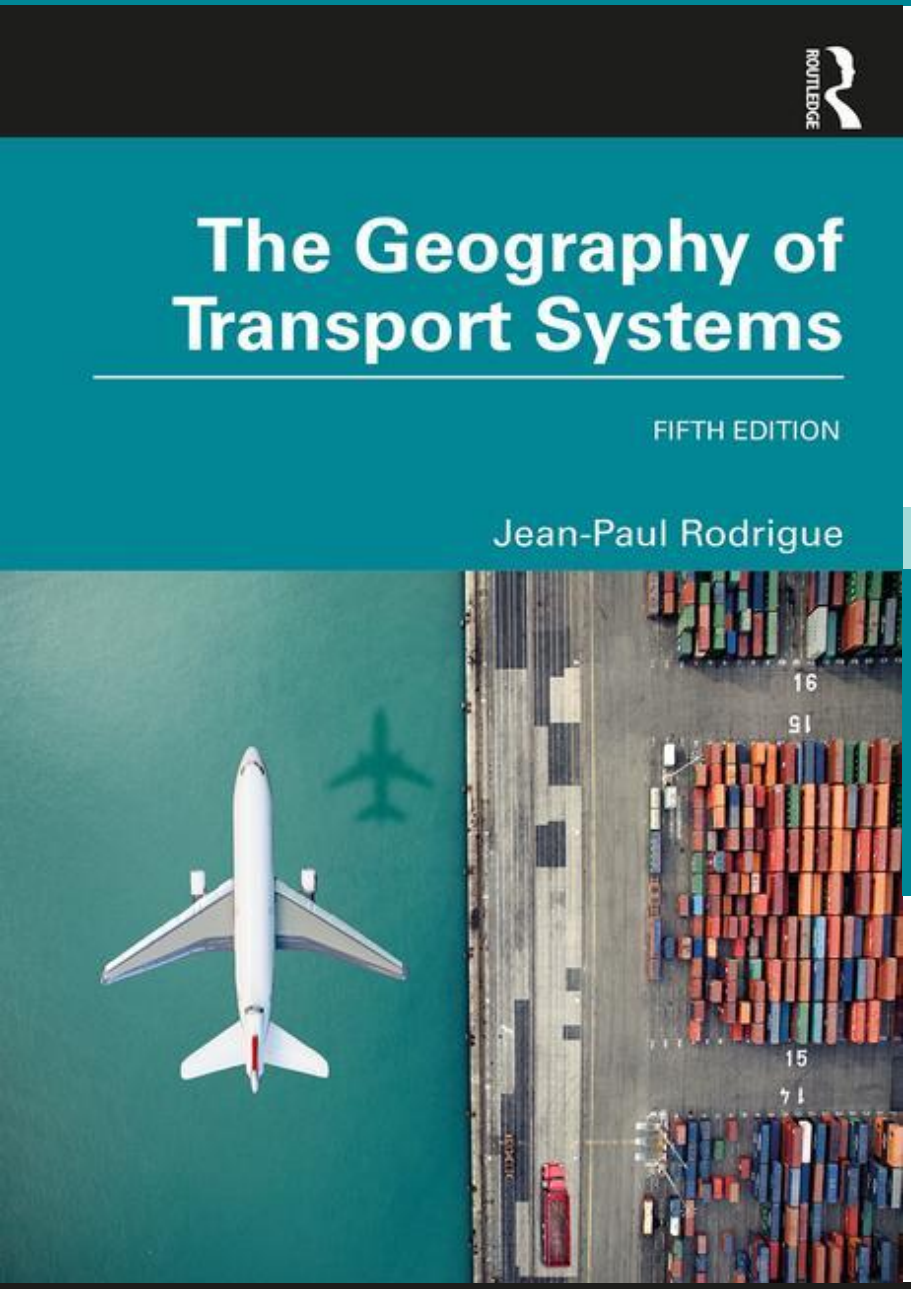


Applications and Case Studies – Part II (Freight Issues)

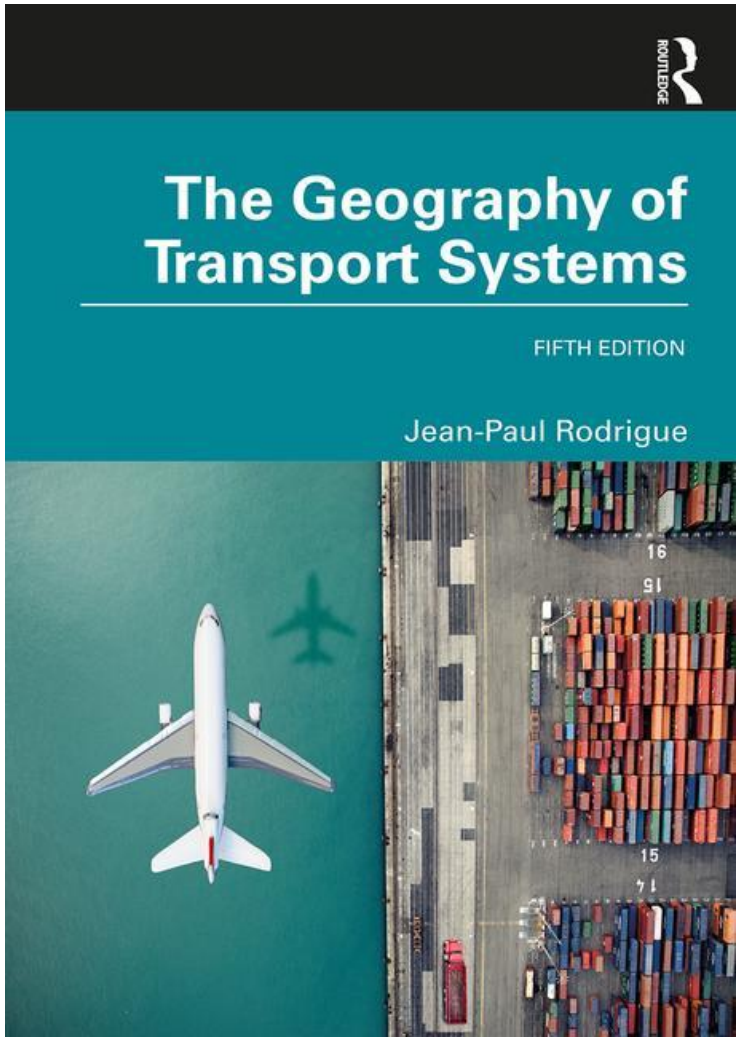
APPENDIX B

Jean-Paul.Rodrigue@hofstra.edu

Usage Conditions

- DO NOT COPY, TRANSLATE OR REDISTRIBUTE THIS DOCUMENT.
- The contents of this document can be freely used for personal or classroom use ONLY.
- Although the material contained in this document is freely available, it is not public domain. Its contents, in whole or in part (including graphics and datasets), cannot be copied and published in ANY form (printed or electronic) without consent.
- If you have accessed this document through a third party (such as a content farm), keep in mind that this party is illegally redistributing this content. Please refer to the true source (https://transportgeography.org/) instead of the third party.
- Permission to use any graphic material herein in any form of publication, such as an article, a book or a conference presentation, on any media must be requested prior to use.
- Information cited from this document should be referred as: Rodrigue, J-P et al. (2018) The Geography of Transport Systems, Hofstra University, Department of Global Studies & Geography, https://transportgeography.org/.

Table of Contents



The Cold Chain

The Cold Chain Market: Products, Geography and Distribution

Product

- Physical attributes requiring specific temperature and humidity conditions.

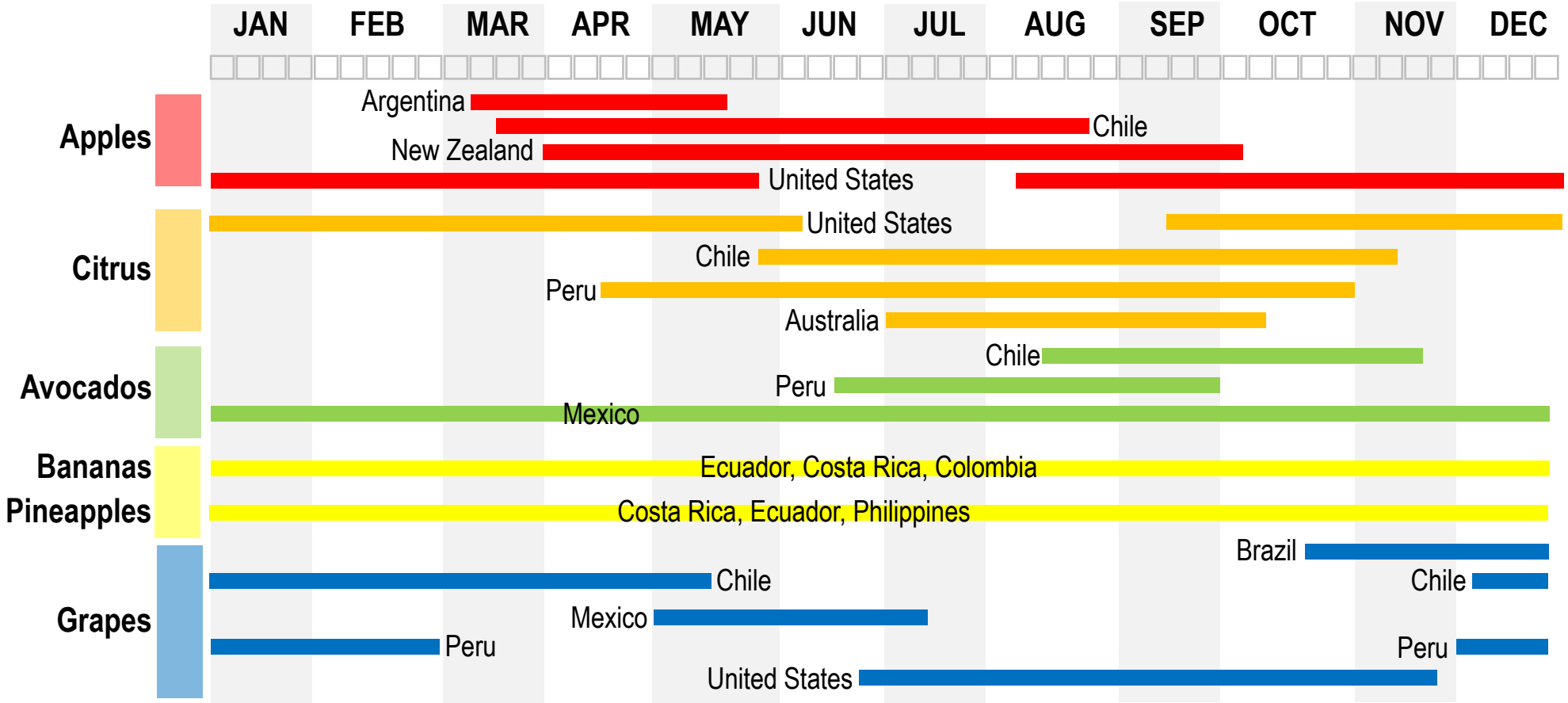
Geography (Origin / Destination)

- The supply and demand of perishable goods.
- Distance and seasonality.

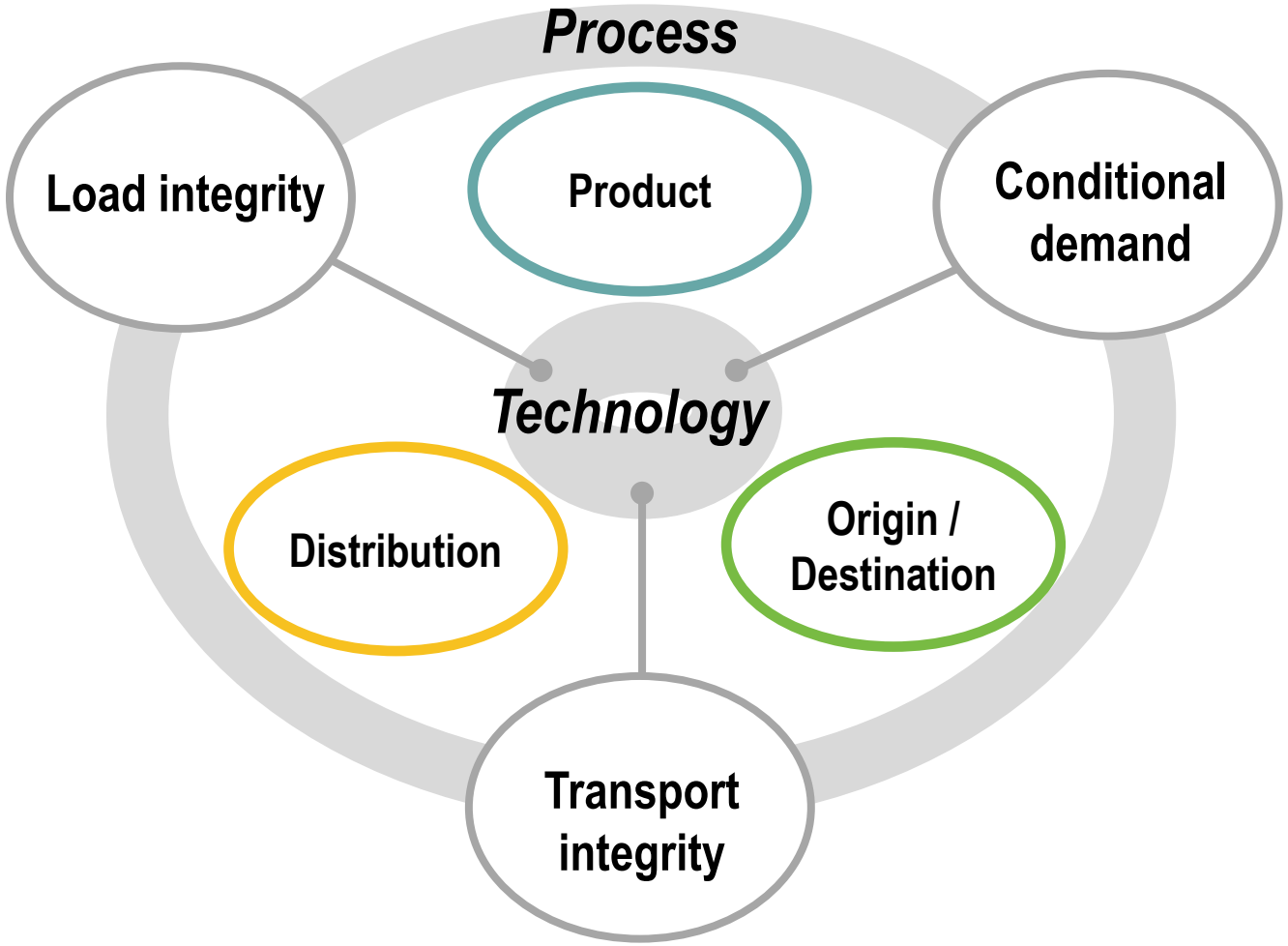
Distribution

- Infrastructural and managerial capabilities.
- Fixed and mobile assets.

Availability of Fresh Produce by Season and Region



Elements of the Cold Chain



Operational Conditions of Cold Chain Logistics

Conditional Demand

- Each product has a perishability level.
- Shelf life and revenue.
- Demand conditional to qualitative attributes.

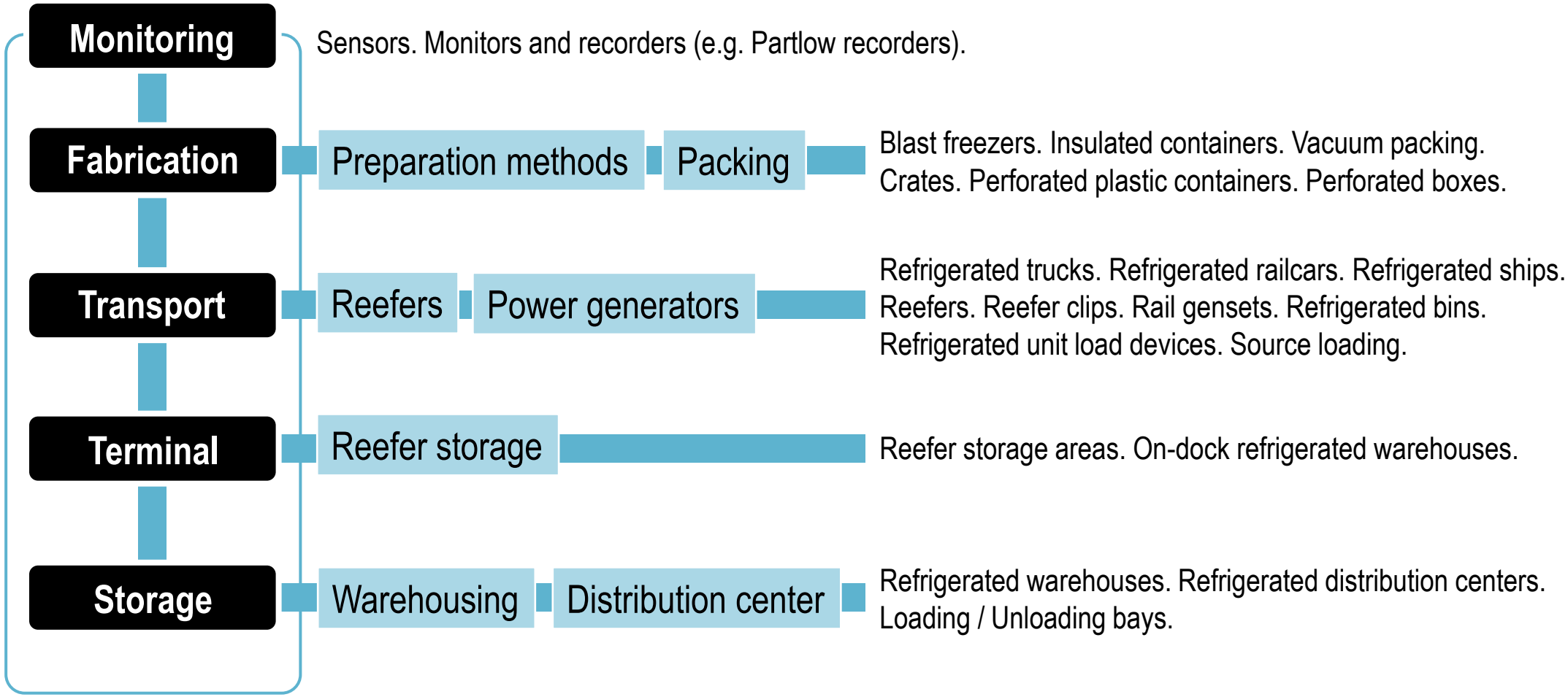
Load Integrity

- Packing, packaging and preparation.
- Reefers as the common load unit.
- Empty backhauls.

Transport Integrity

- Uninterrupted integrity of the transport chain (modes, terminals and distribution centers).
- Specialized modes (speed) and terminals.

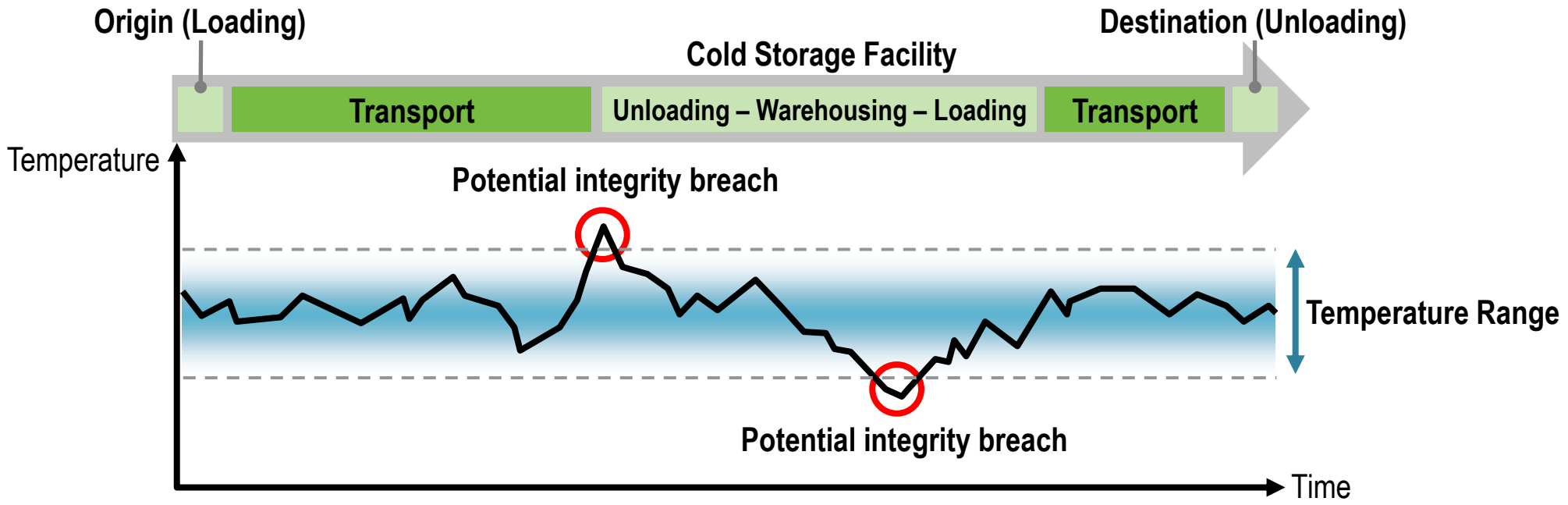
The Cold Chain Technology



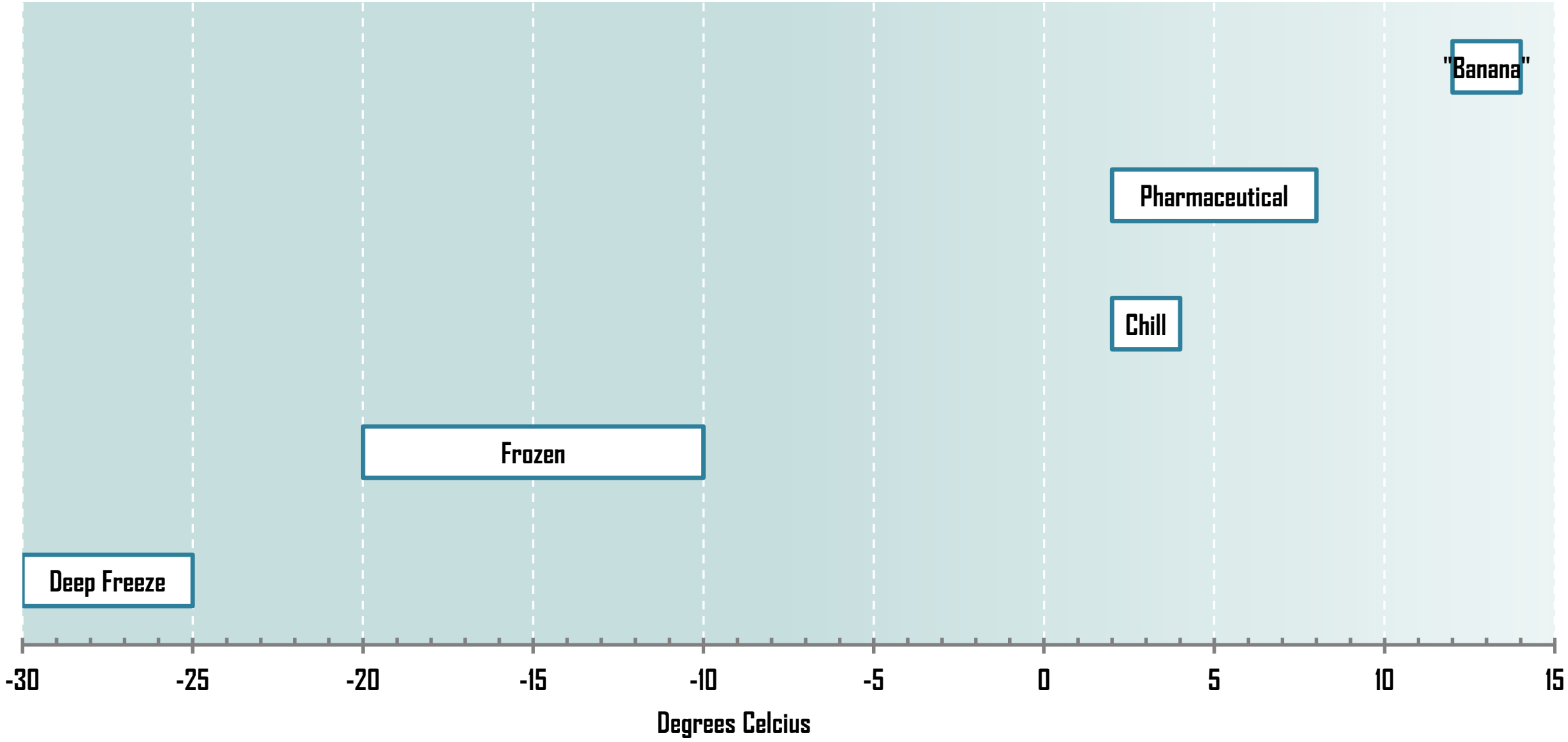
Main Power Generators for Reefer Transport by Mode

	Power Source	Issues
Road	Clip-on or underslung generator	3-4 days autonomy.
Rail	Genset and clip-on generator	Related to volume and distance. 2 stacked gensets for 16 containers for 7 days. Clip-on generators for smaller volumes or shorter distances.
Maritime	Ship power plant	10 to 20% of ship slots.
Intermodal Terminals	Reefer plugs and gensets (rail)	1 to 5% of port terminal slot capacity.

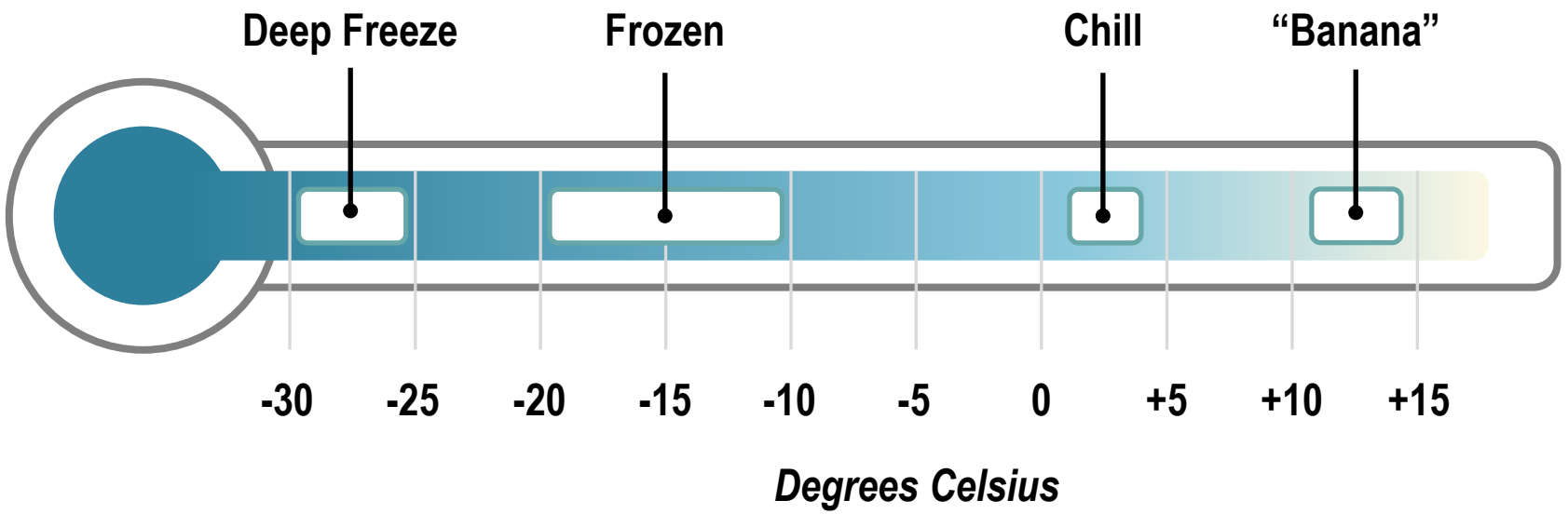
Temperature Integrity along a Cold Chain



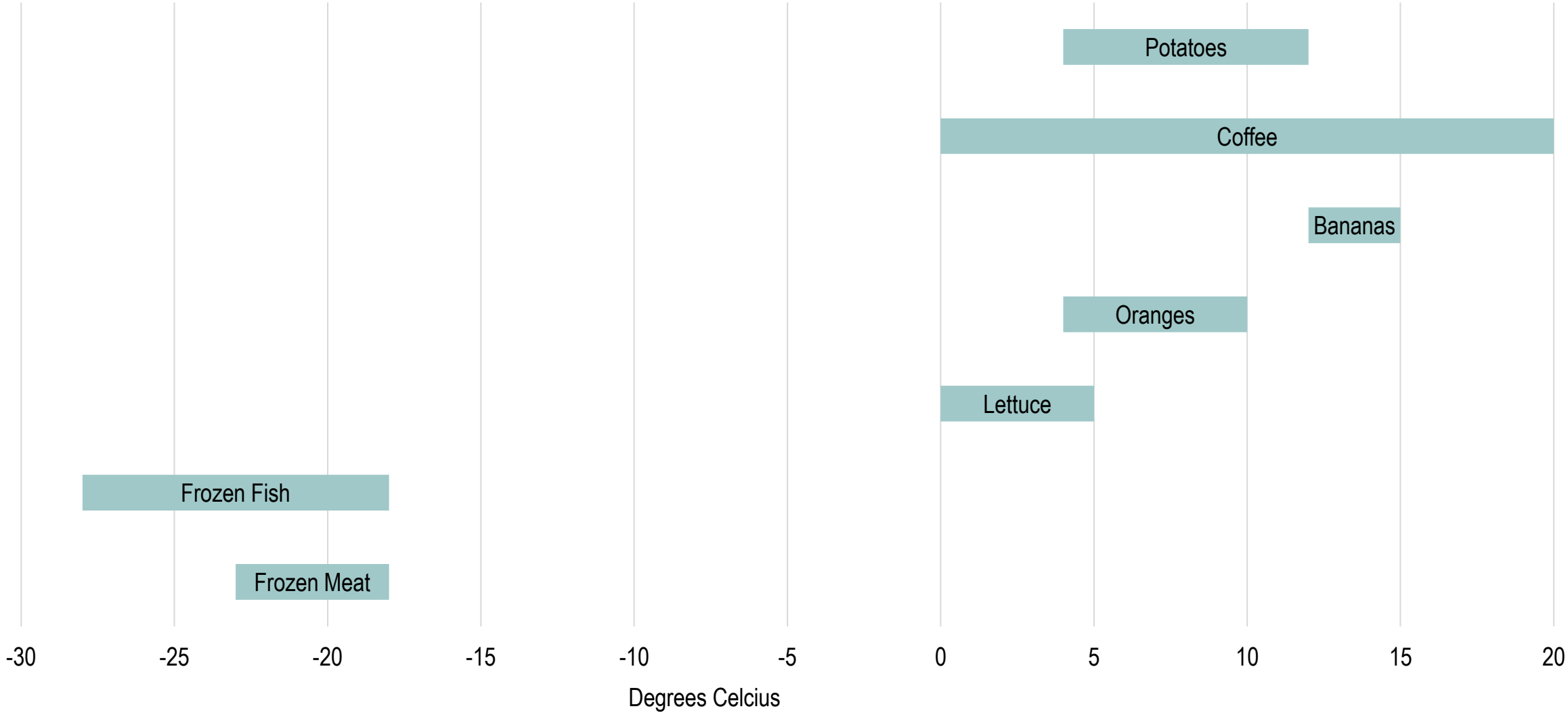
Temperature Standards for the Cold Chain



Temperature Standards for the Cold Chain

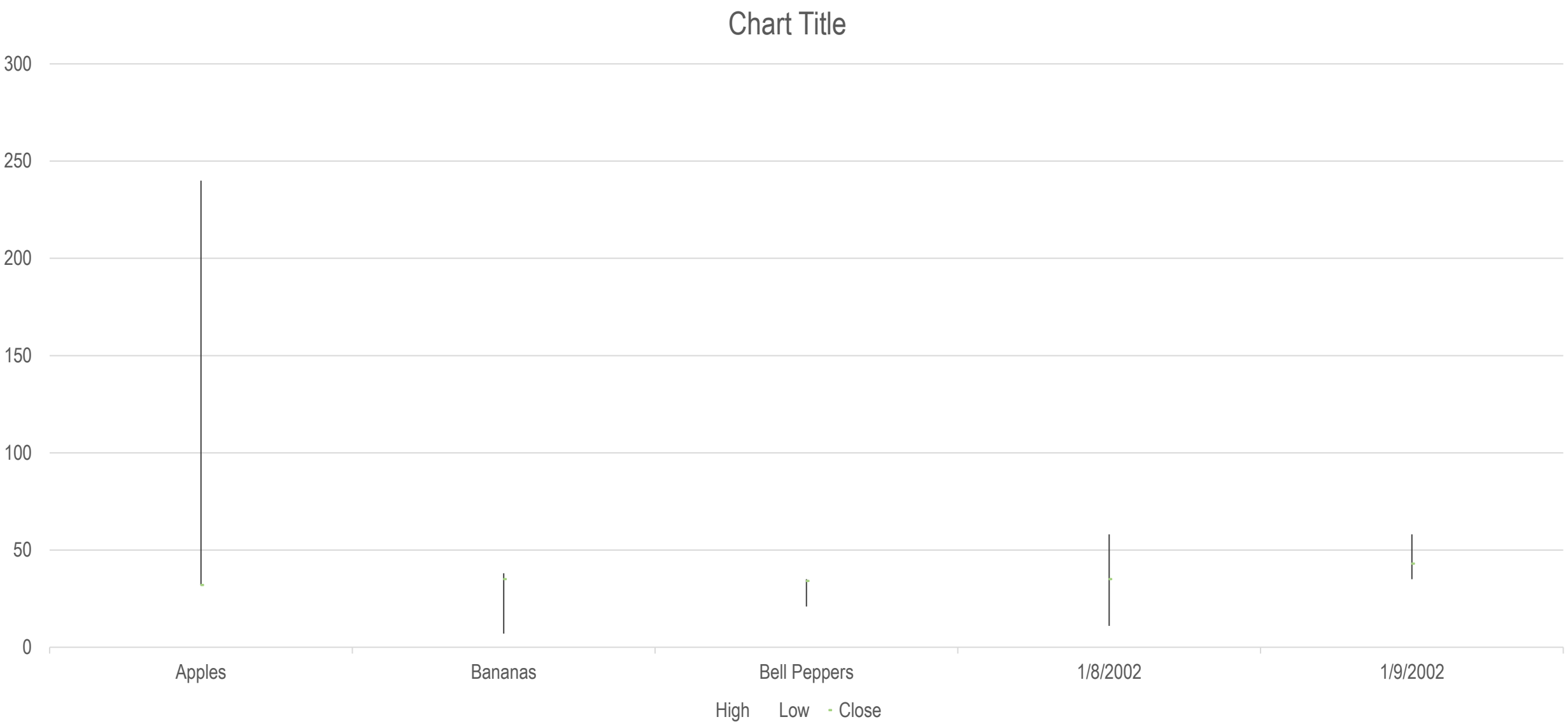


Temperature Requirements for the Cold Chain Transport of Some Commodities

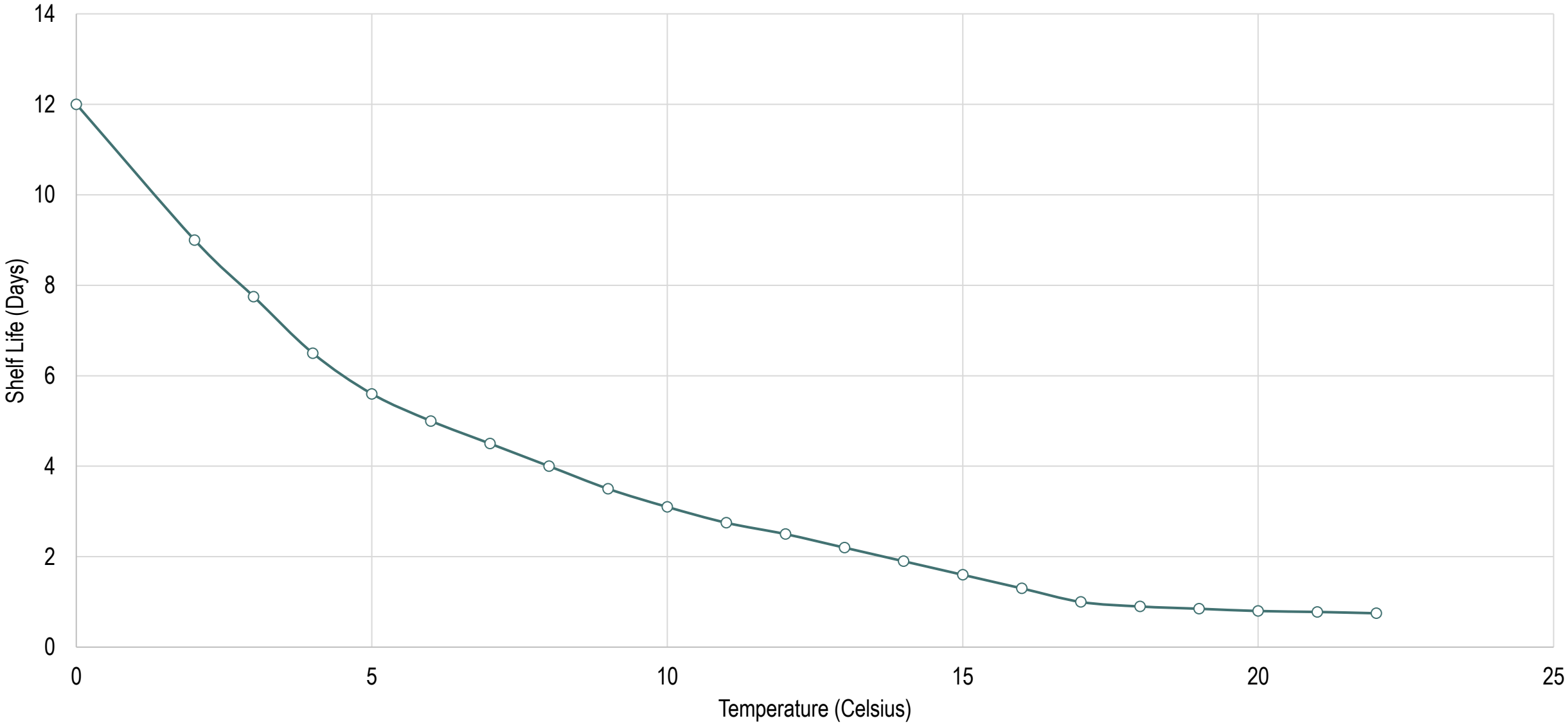


Shelf Life of Selected Perishable Food Products

Product	Shelf Life (Days)	Optimum Temperature (Celsius)
Apples	90-240	0
Bananas	7-28	13.5
Bell Peppers	21-35	7
Cabbage	14-20	1
Eggs	180	1.1
Onions	30-180	1
Lettuce	12-14	0.6
Fresh Meat (beef, lamb, pork, poultry)	14-65	-2
Oranges	21-90	7
Pears	120-180	-0.6
Potatoes	30-50	10
Seafood (shrimp, lobster, crab)	120-360	-17.8
Strawberries	5-10	0.6
Tomatoes	7-14	12

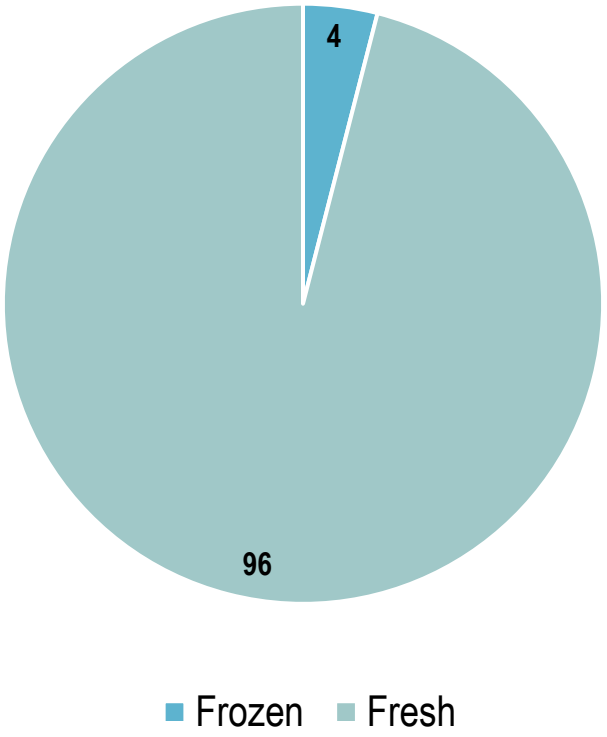


Lettuce Shelf Life by Storage Temperature

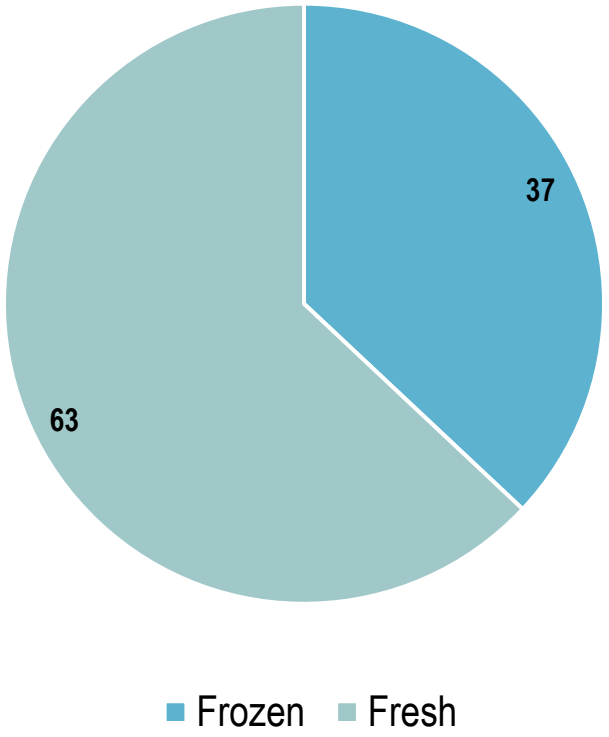


Preponderance of Fresh and Frozen Cargo by Transport Mode

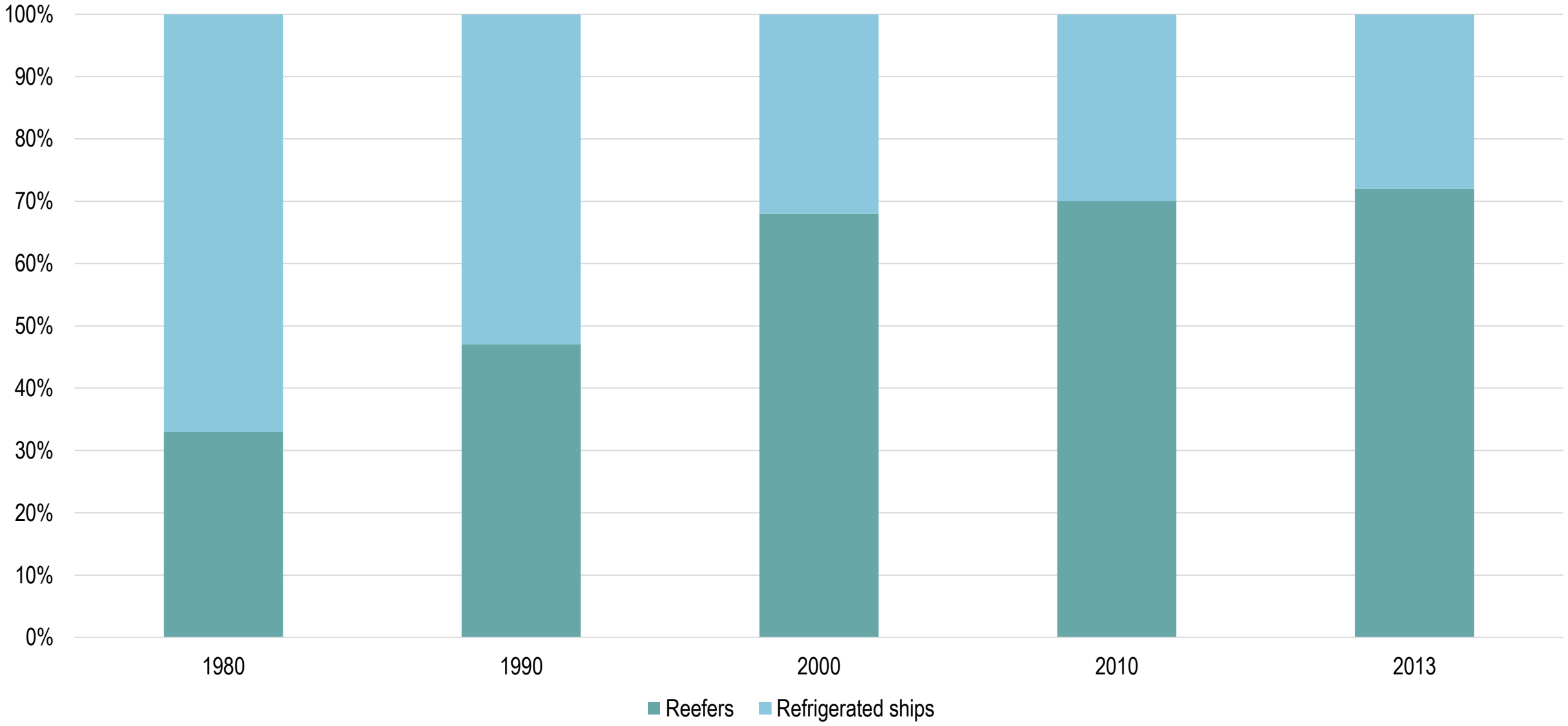
Global Fresh / Frozen Share in Air Cargo



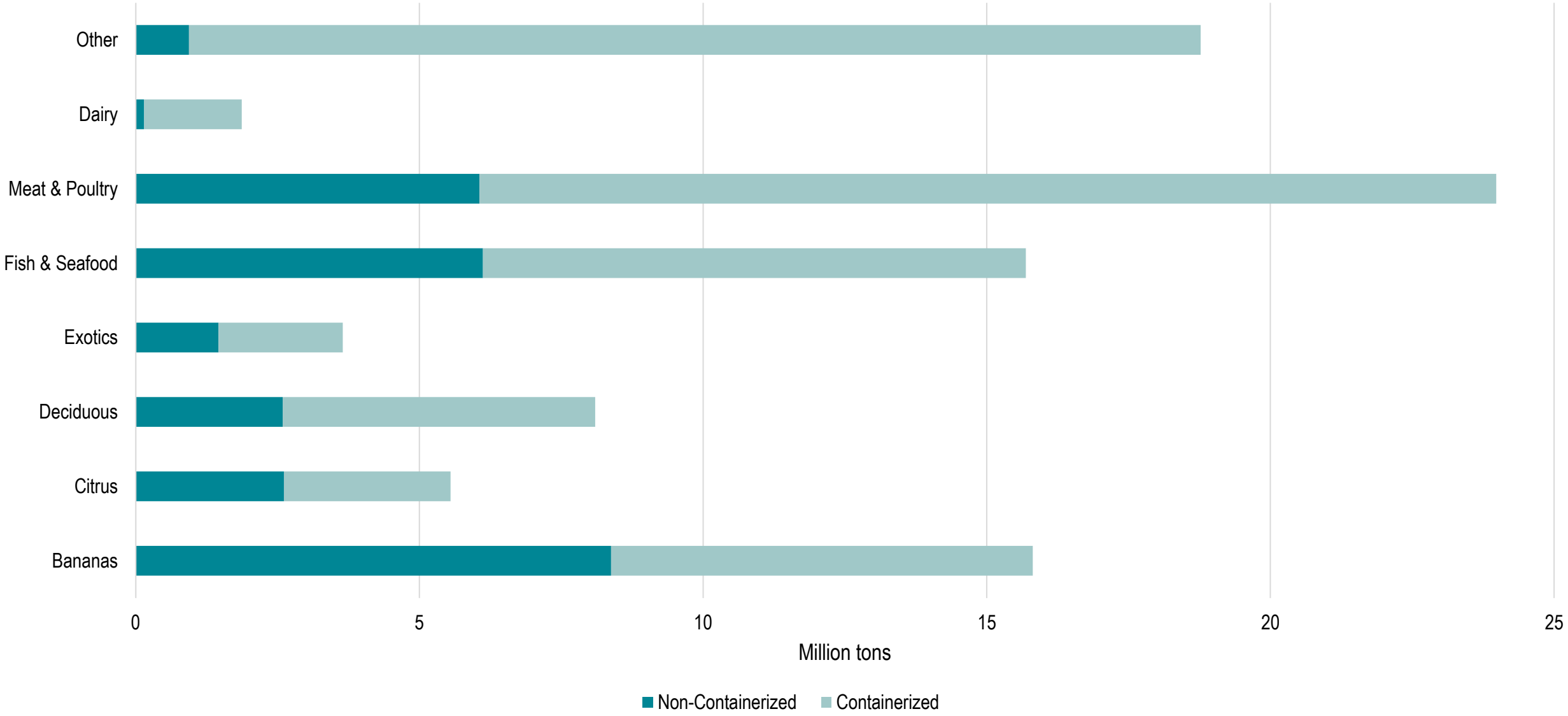
Global Fresh / Frozen Share in Maritime Cargo



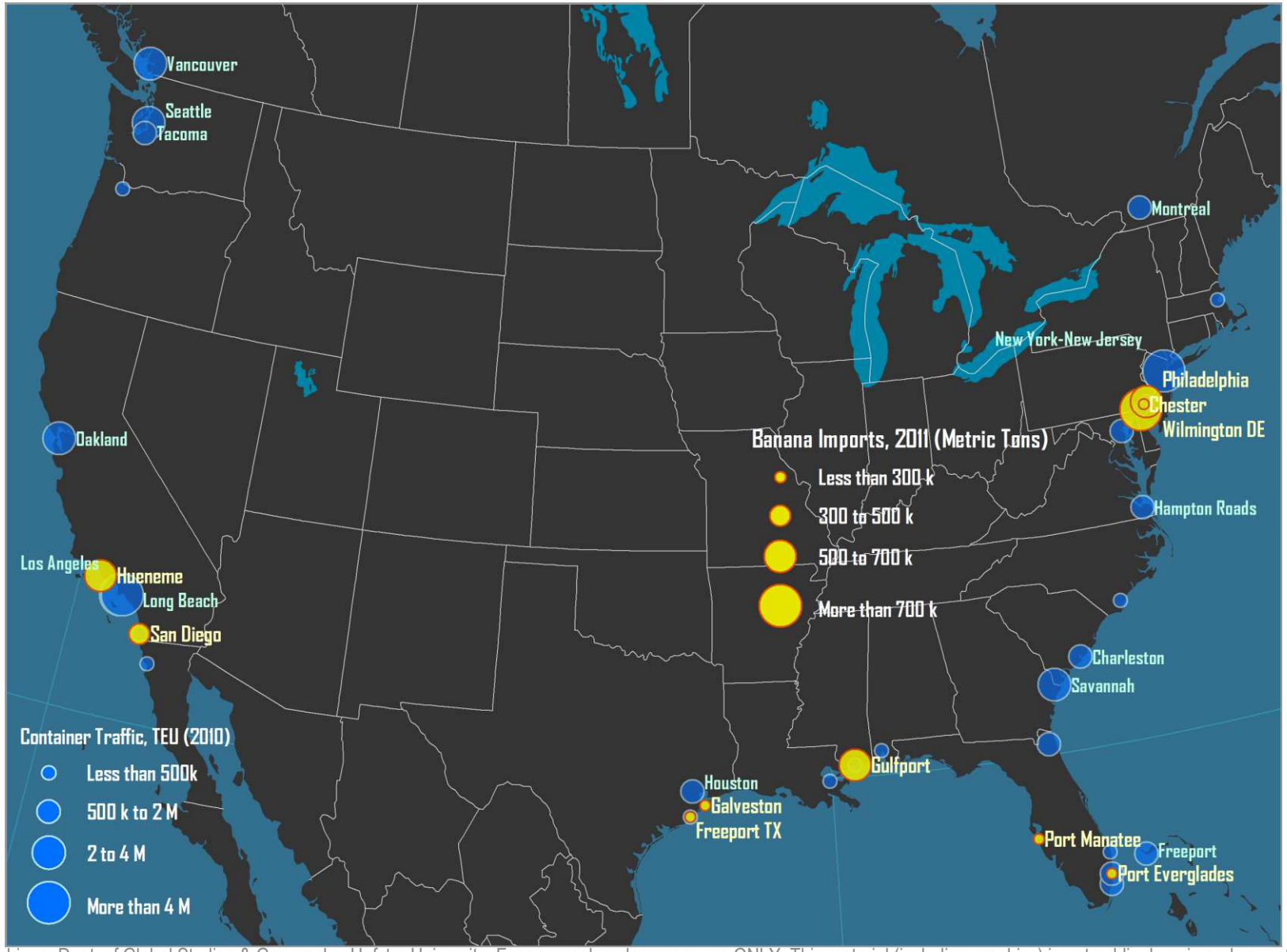
Share of Refrigerated Transport Capacity in Maritime Shipping



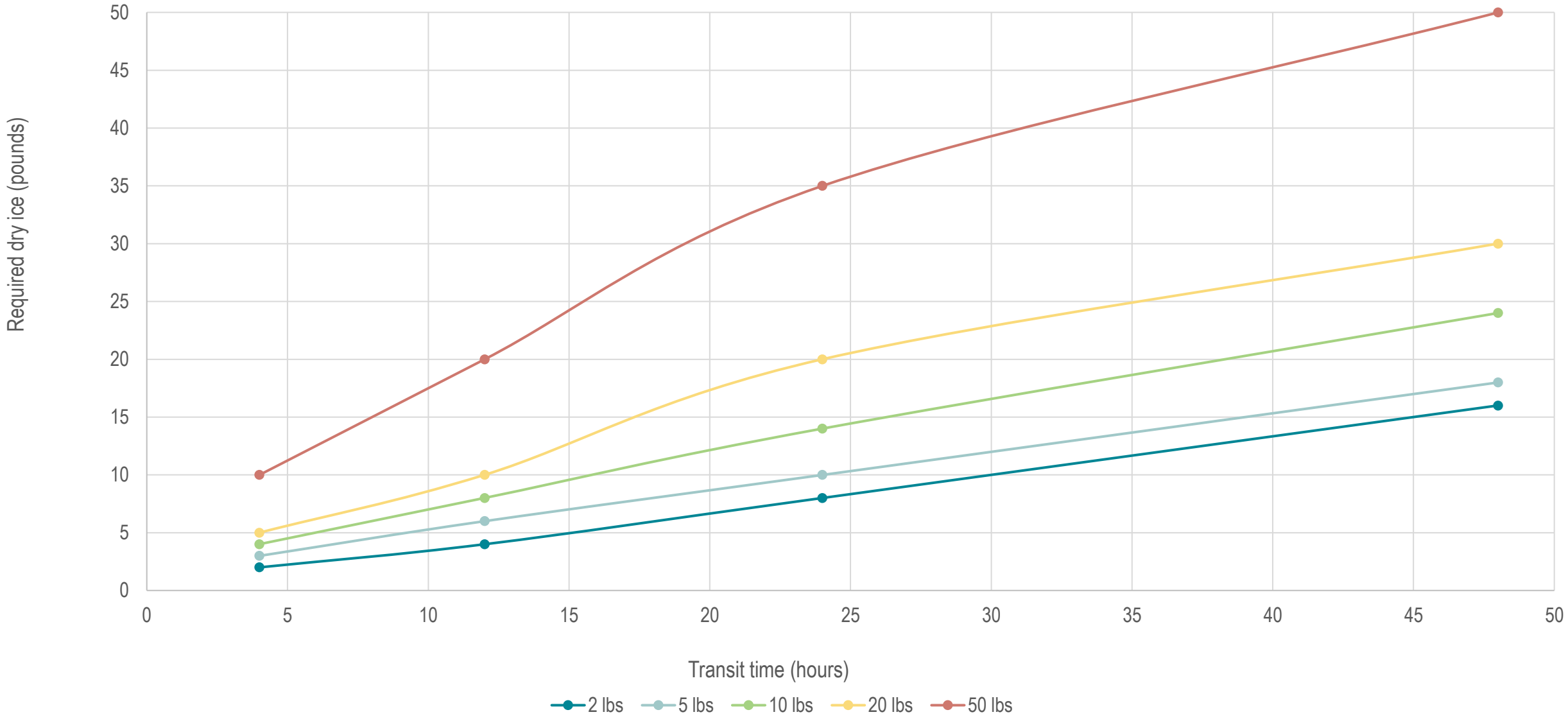
Refrigerated Cargo Carried by Maritime Transport, 2012



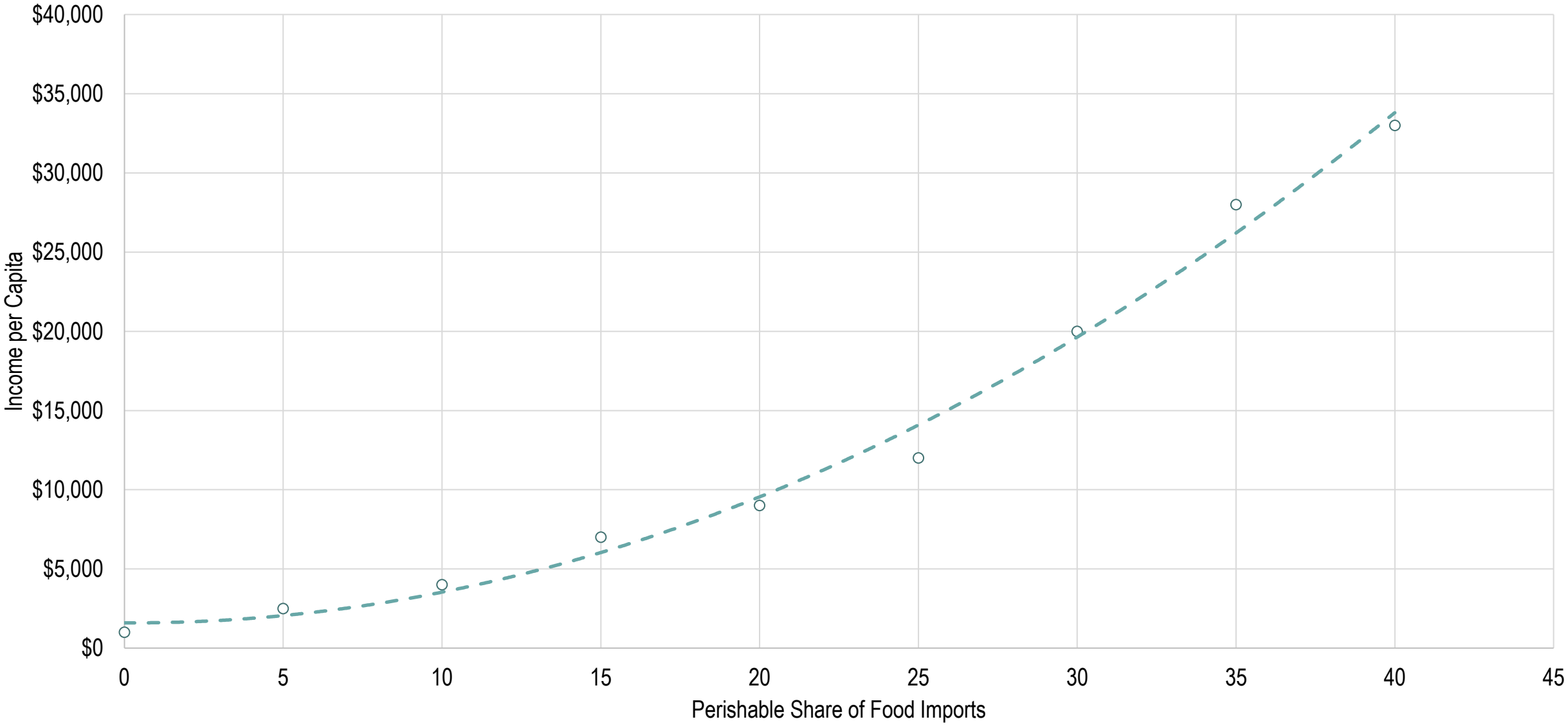
Main American Banana Import Ports, 2011



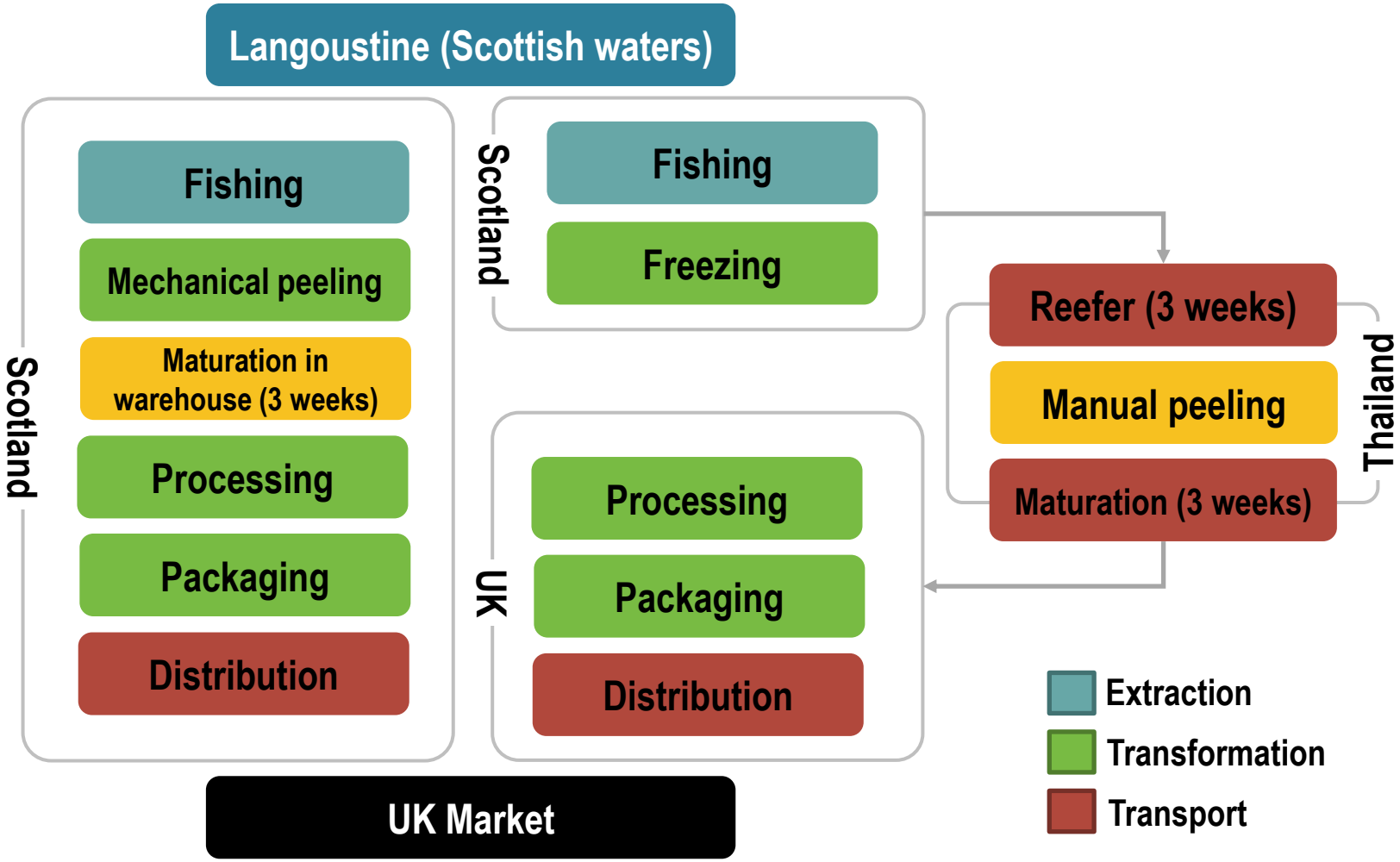
Amount of Dry Ice Required for Packing Frozen Food in a Well Insulated Container



Income per Capita and Perishable Share of Food Imports



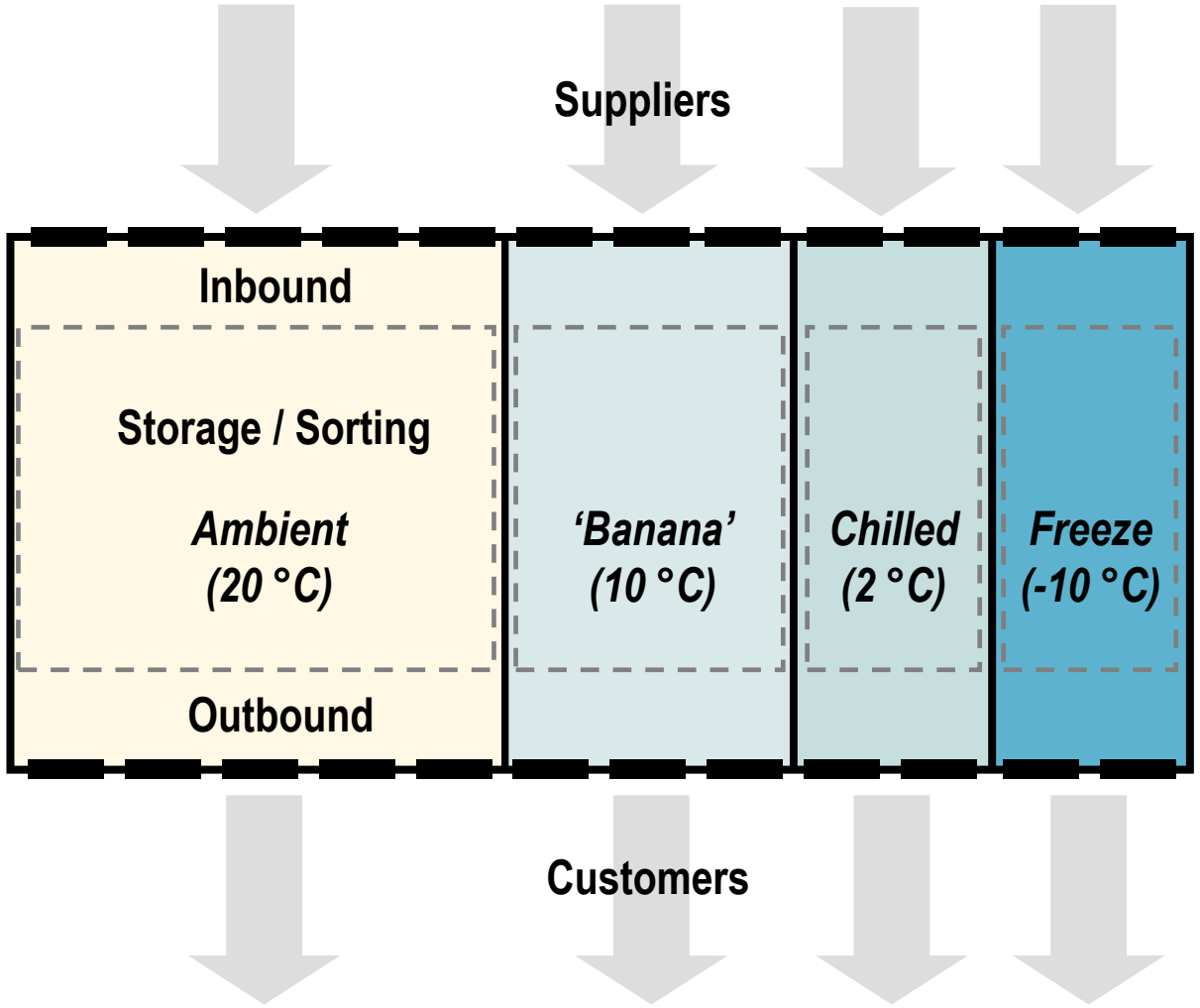
Containerization, Cold Chains and the Flexibility of Supply Chains



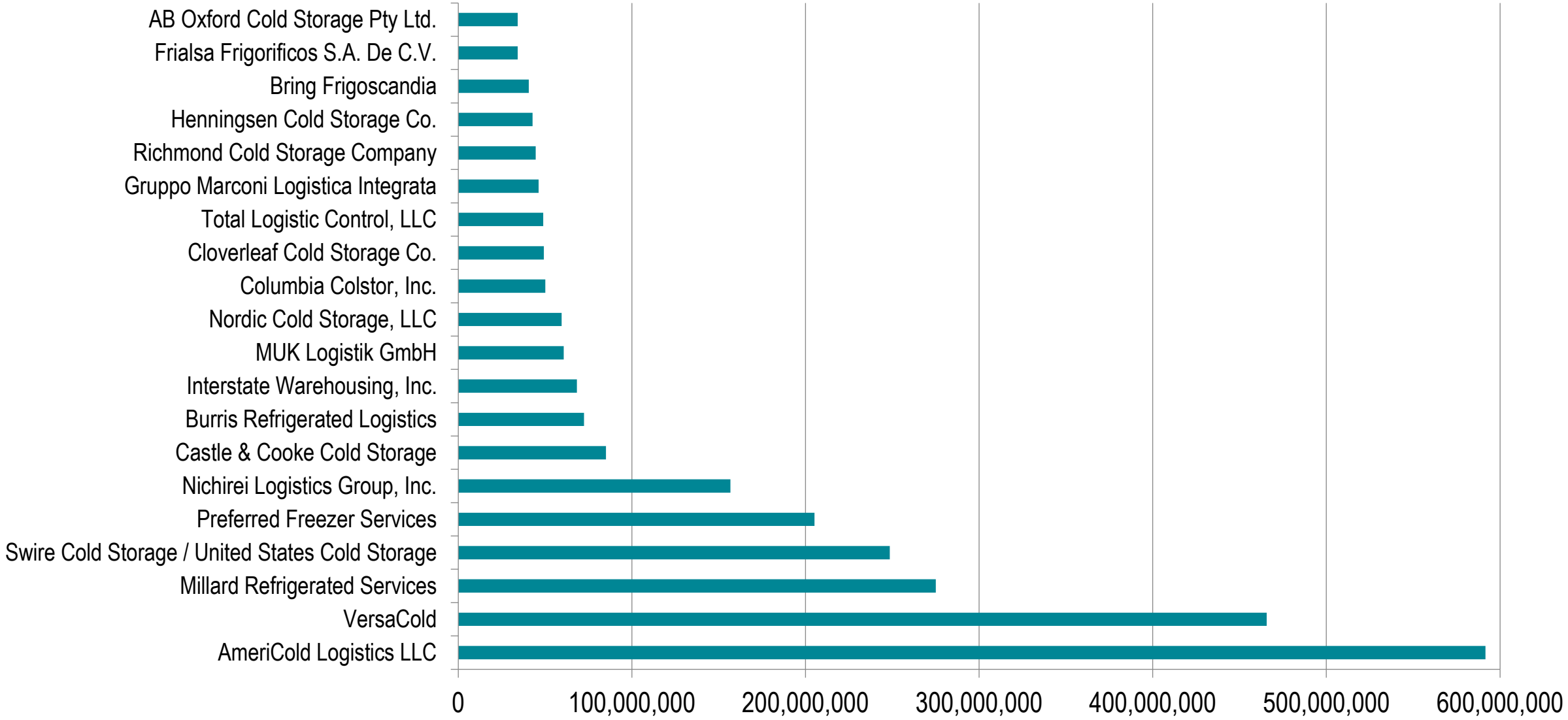
Fresh Flowers Cold Chain, Ecuador-United States

Process	Time	Quality Deterioration
Post-harvest on farm, Ecuador	4 - 8 hours	Medium
Storage on farm	12 - 72 hours	Low - Medium
Transportation to cargo agencies	1 - 6 hours	Medium
Storage at cargo agency	4 hours	Low
Palletizing, Quito	6 hours	Medium - High
Customs clearance, Quito	0.5 hour	Low
Loading to aircraft, Quito	1 - 2 hours	Medium – High
Flight UIO-MIA nonstop	4 hours	High
Customs clearance, Miami	4 - 12 hours	Low
De-palletizing, Miami	2 - 4 hours	High
Storage at cargo agency, Miami	4 - 72 hours	Low - Medium
Transportation to U.S. retailer	2 hours - 5 days	Medium

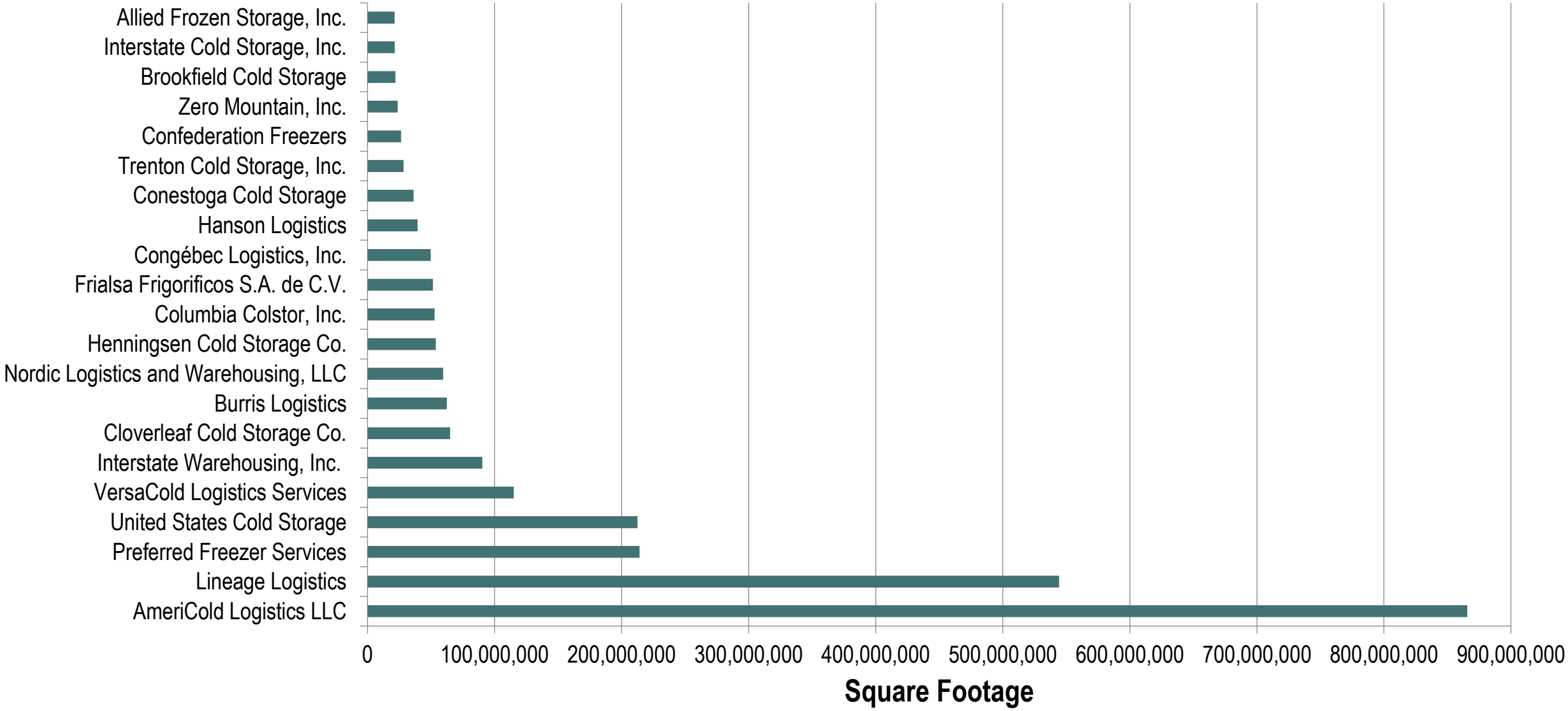
Large Scale Grocery Cold Chain Distribution Center



World's Largest Public Refrigerated Warehouse Operators, 2009



North America's Largest Public Refrigerated Warehouse Operators, 2014



Reefer Cold Chains: Import Channels

Transloading

- Typical for groceries.
- Reefer brought to refrigerated transloading facility.
- Contents placed on domestic reefers and brought to DC.
- Maritime reefers brought back to port terminal (or depot).
- Cross-docked at DC; orders built to specific grocery stores.

Direct Transit

- Reefer brought directly to DC by truck or rail (long distances and less common).
- Reefer repositioned to port terminal (more common) or directly to exporter (less common).

Reefer Cold Chains: Export Channels

Domestic Reefer Haul

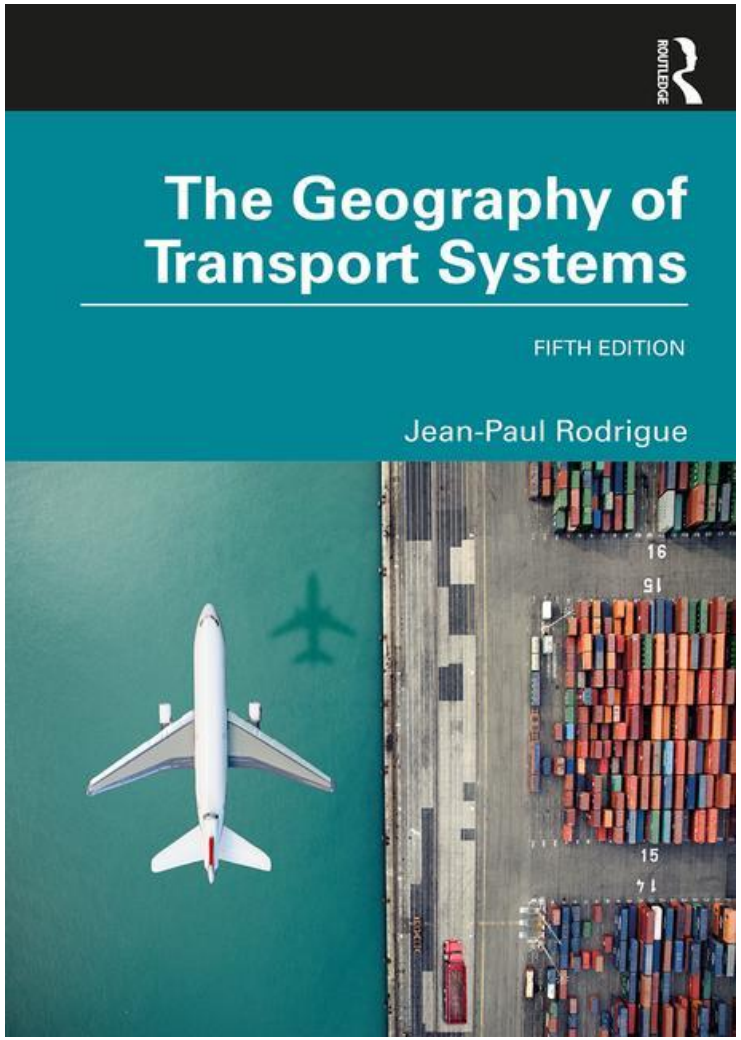
- Domestic reefer trucked to transloading facility near port.
- Contents loaded into reefers and brought to port.

Empty Haul/ Full Backhaul

- Empty reefer brought from port to exporter.
- Source loaded and brought back to port.
- Dominated by truck hauls.

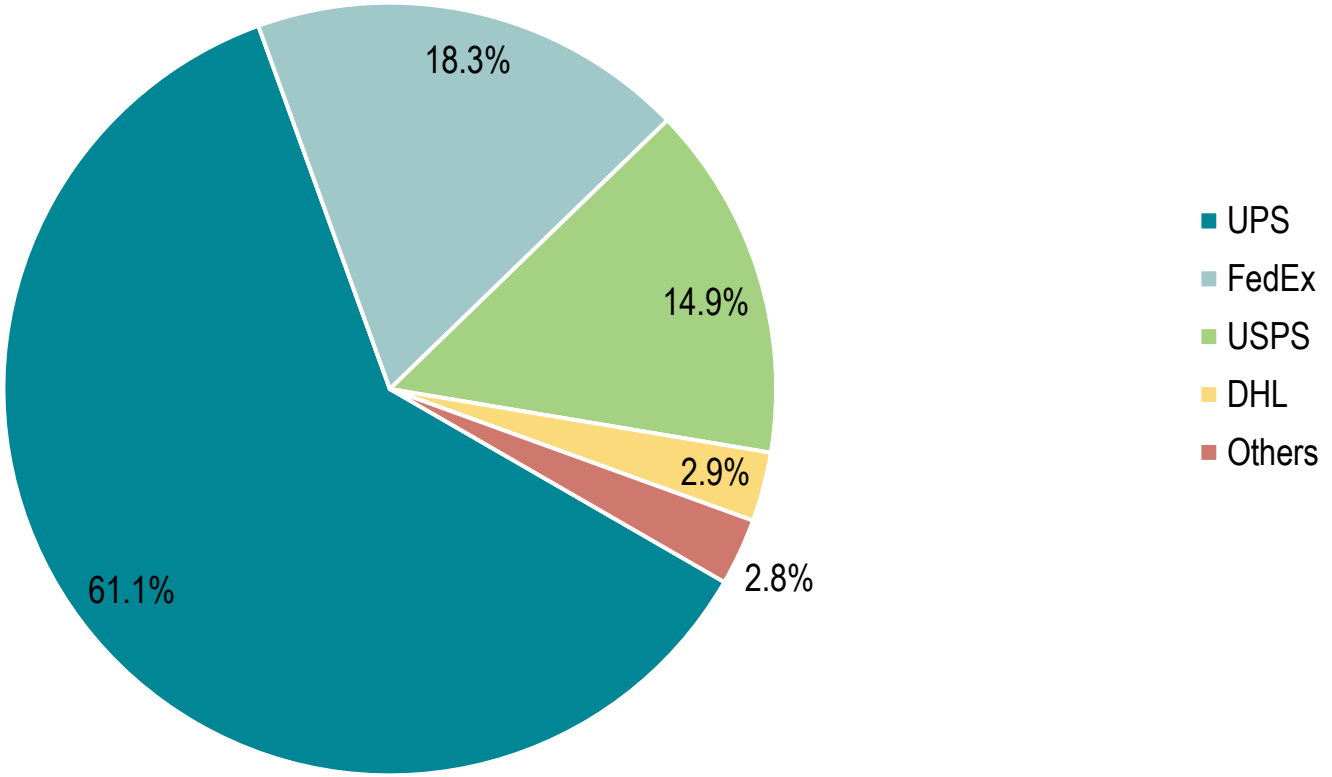
Repositioning Haul

- Empty reefer repositioned (local / regional) to exporter.
- Source loaded and brought back to port.

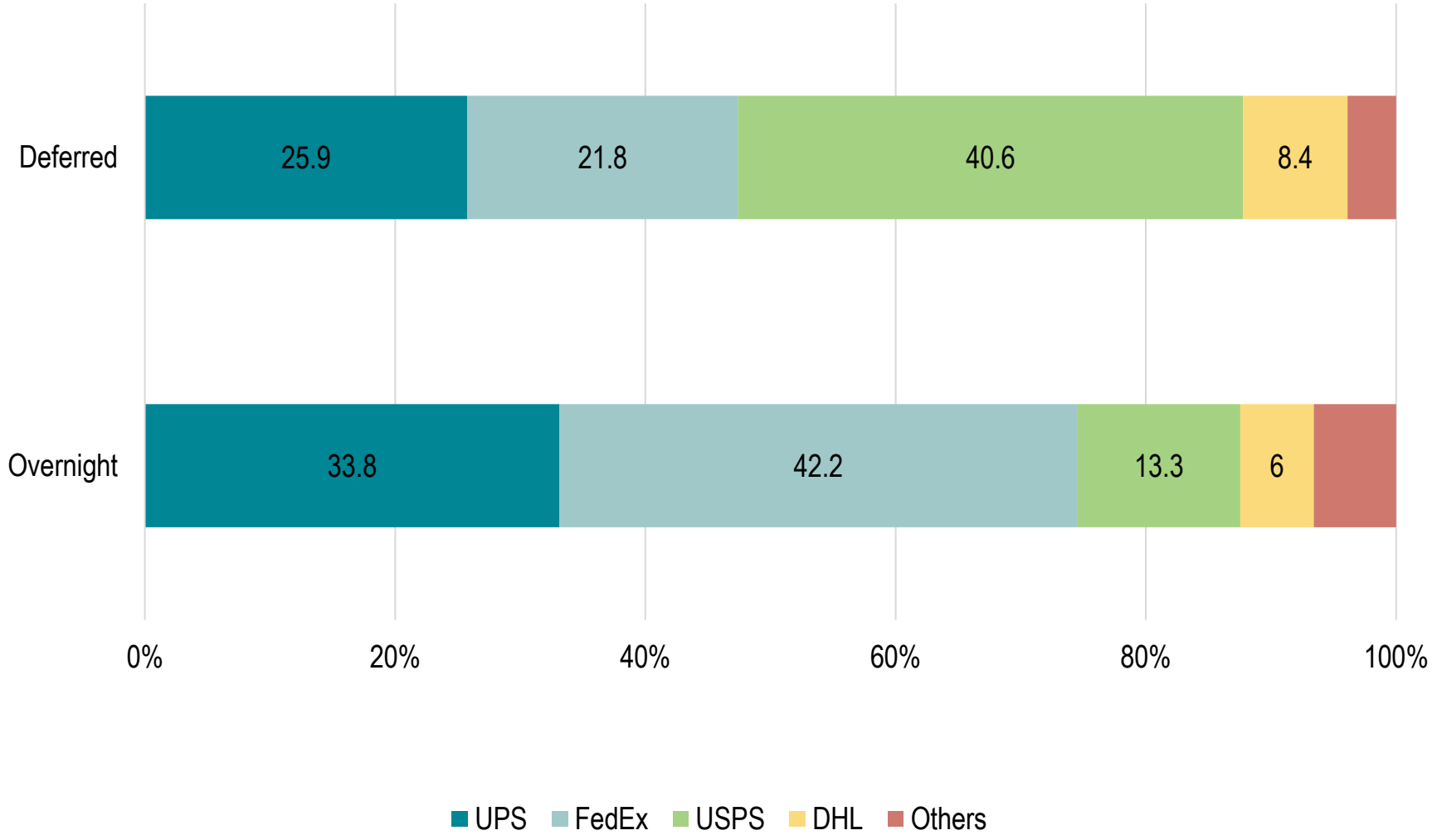


Third Party Logistics Services Providers

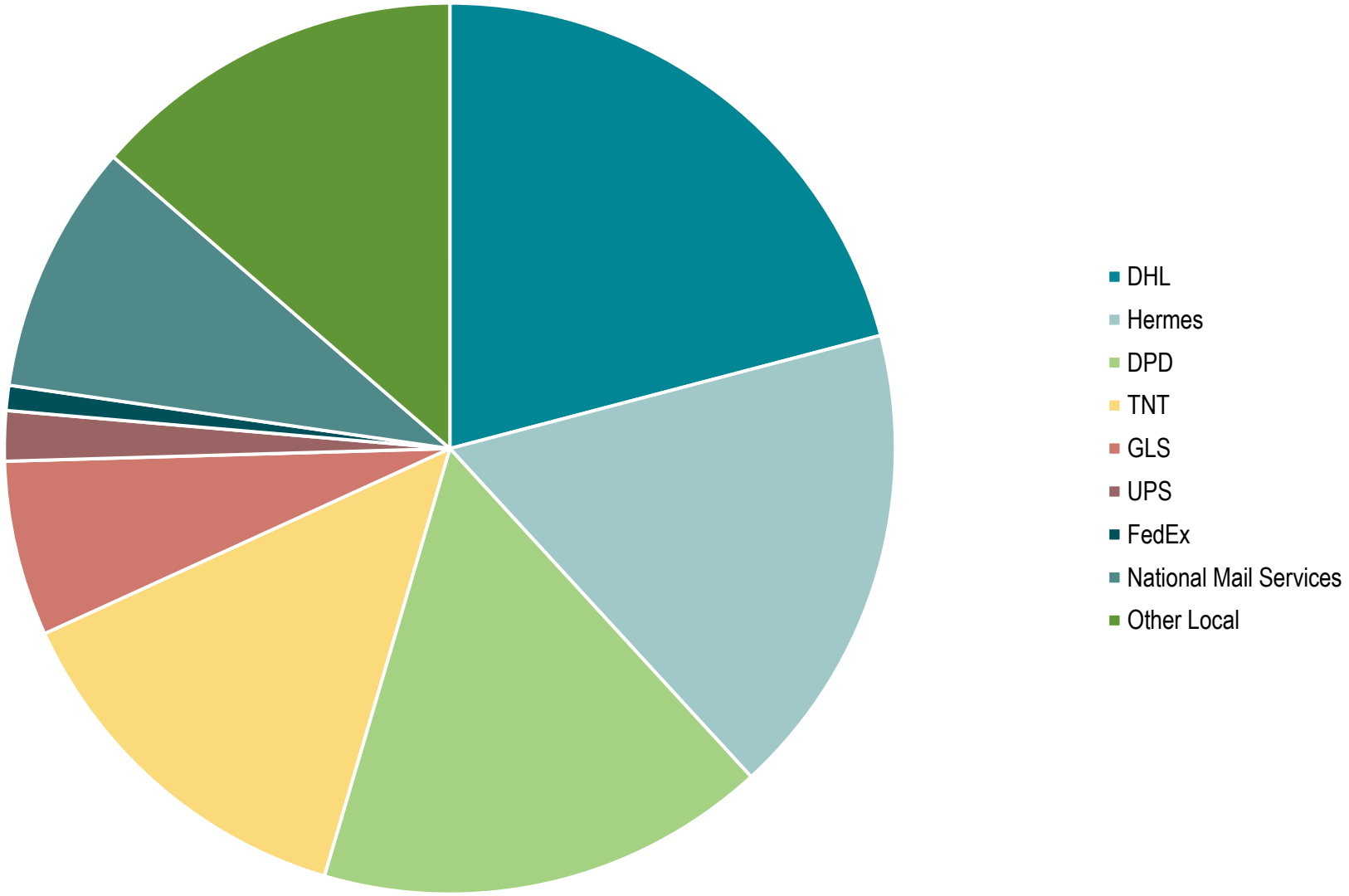
Market Share of Domestic US Ground Parcel Deliveries, 2006



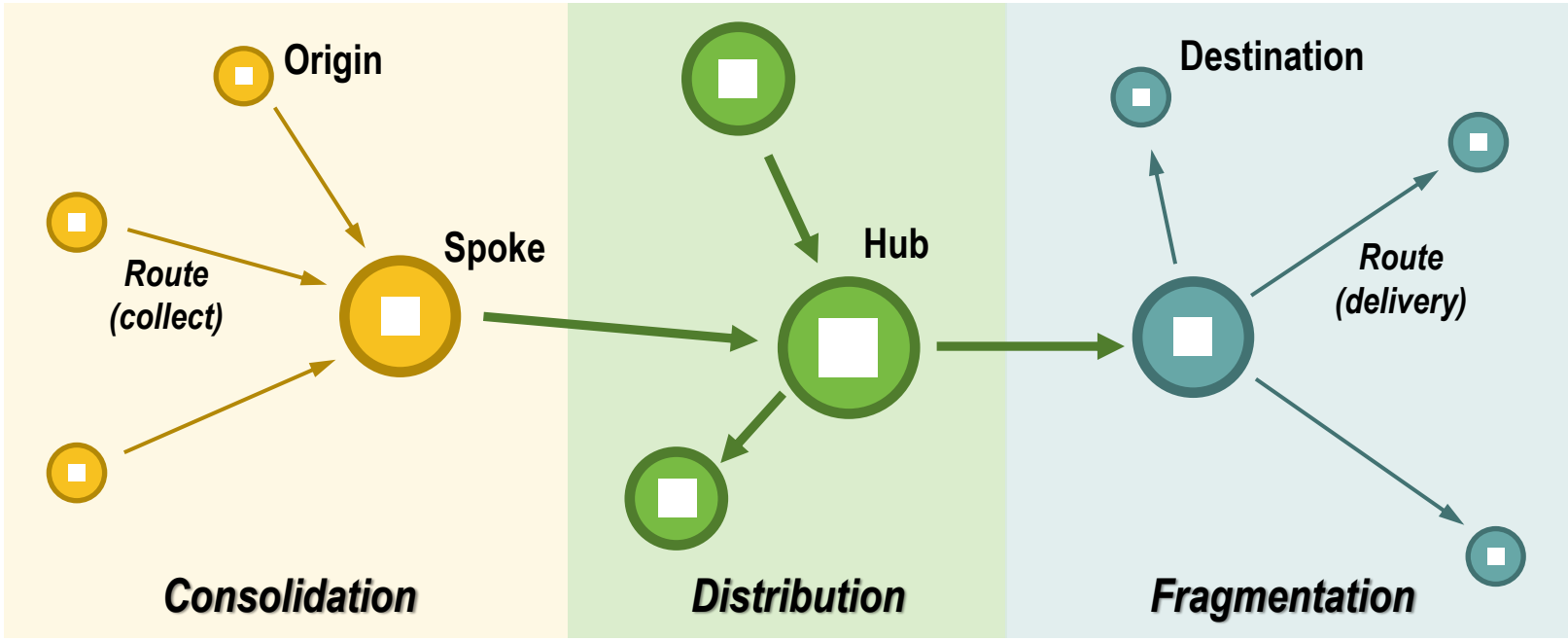
Market Share of Domestic US Air Parcel Deliveries, 2006



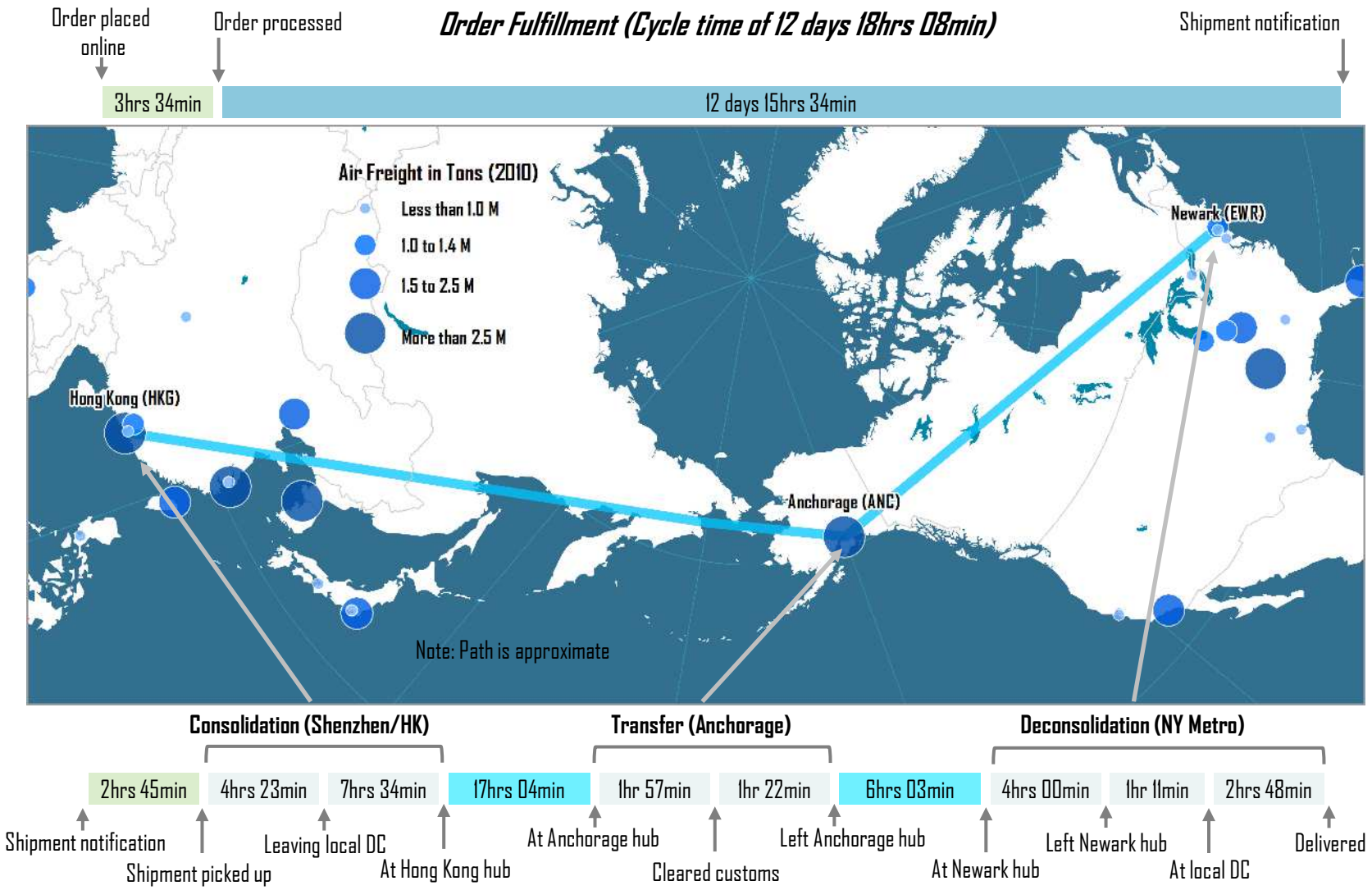
Market Share of Parcel Deliveries, Europe, 2011



The Hub-and-Spoke Structure of Parcel Carriers



Order-Delivery Sequence of an Apple iPad



Order-Delivery Sequence of an Apple iPad

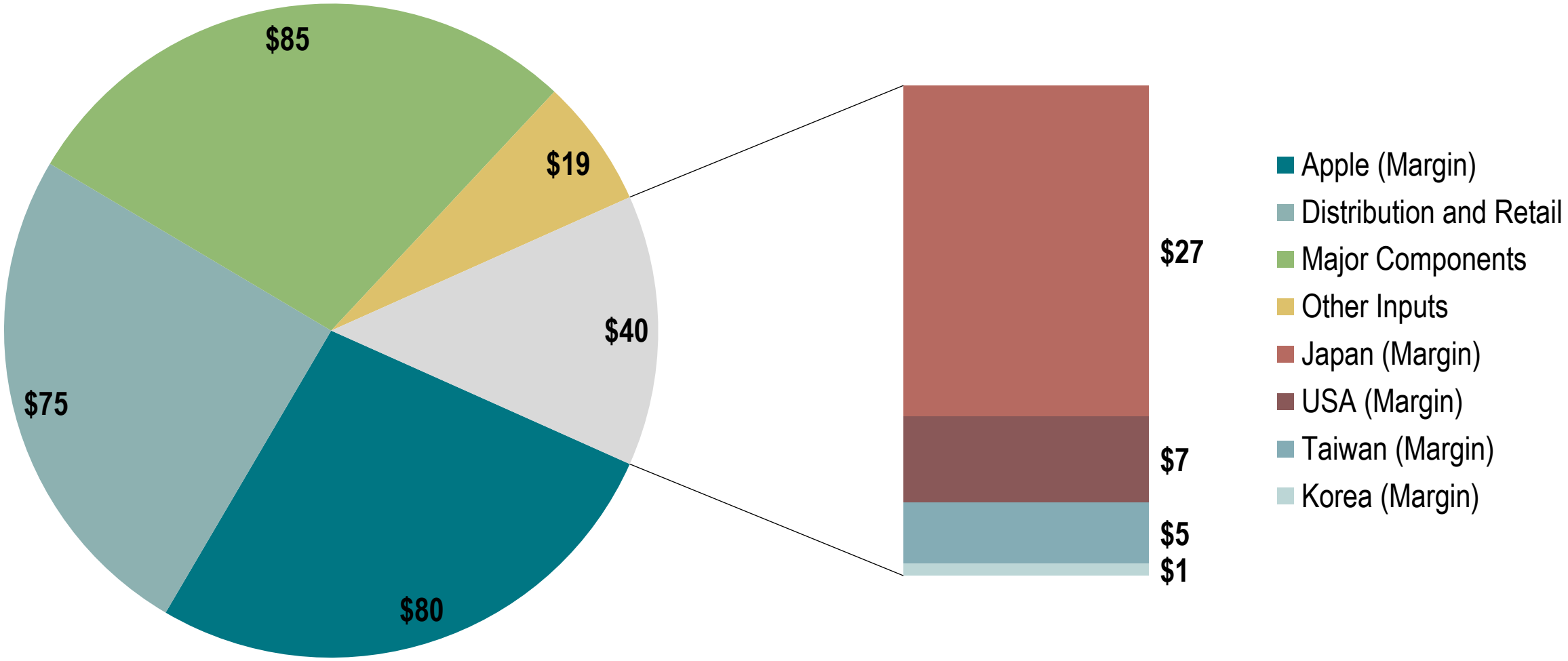
Action	Location	Date - Time (EST)	Duration
Order placed online	NA	25/07/10 – 11:52PM	
Order processed	NA	26/07/10 – 3:26AM	3hrs 34min
Shipment notification	NA	3/8/10 – 8:10PM	12days 15hrs 34min
Shipment picked up at supplier DC	Shenzhen, China	3/8/10 – 10:55PM	2hrs 45min
Left local FedEx DC	Shenzhen, China	4/8/10 – 3:18AM	4hrs 23min
At Hong Kong hub	Hong Kong, China	4/8/10 – 11:52AM	7hrs 34min
At Anchorage hub	Anchorage, AK, USA	5/8/10 – 4:56PM	17hrs 04min
Cleared customs	Anchorage, AK, USA	5/8/10 – 6:53PM	1hr 57min
Left Anchorage hub	Anchorage, AK, USA	5/8/10 – 8:15PM	1hr 22min
At Newark hub	Newark, NJ, USA	6/8/10 – 2:18AM	6hrs 3min
Left Newark hub	Newark, NJ, USA	8/8/10 – 6:18AM	4hrs 0min
At local FedEx DC	Moonachie, NJ, USA	8/8/10 – 7:29AM	1hr 11min
Delivered	Fort Lee, NJ, USA	8/8/10 – 10:17AM	2hr 48min

Demand-pull characteristics of major commodity groups

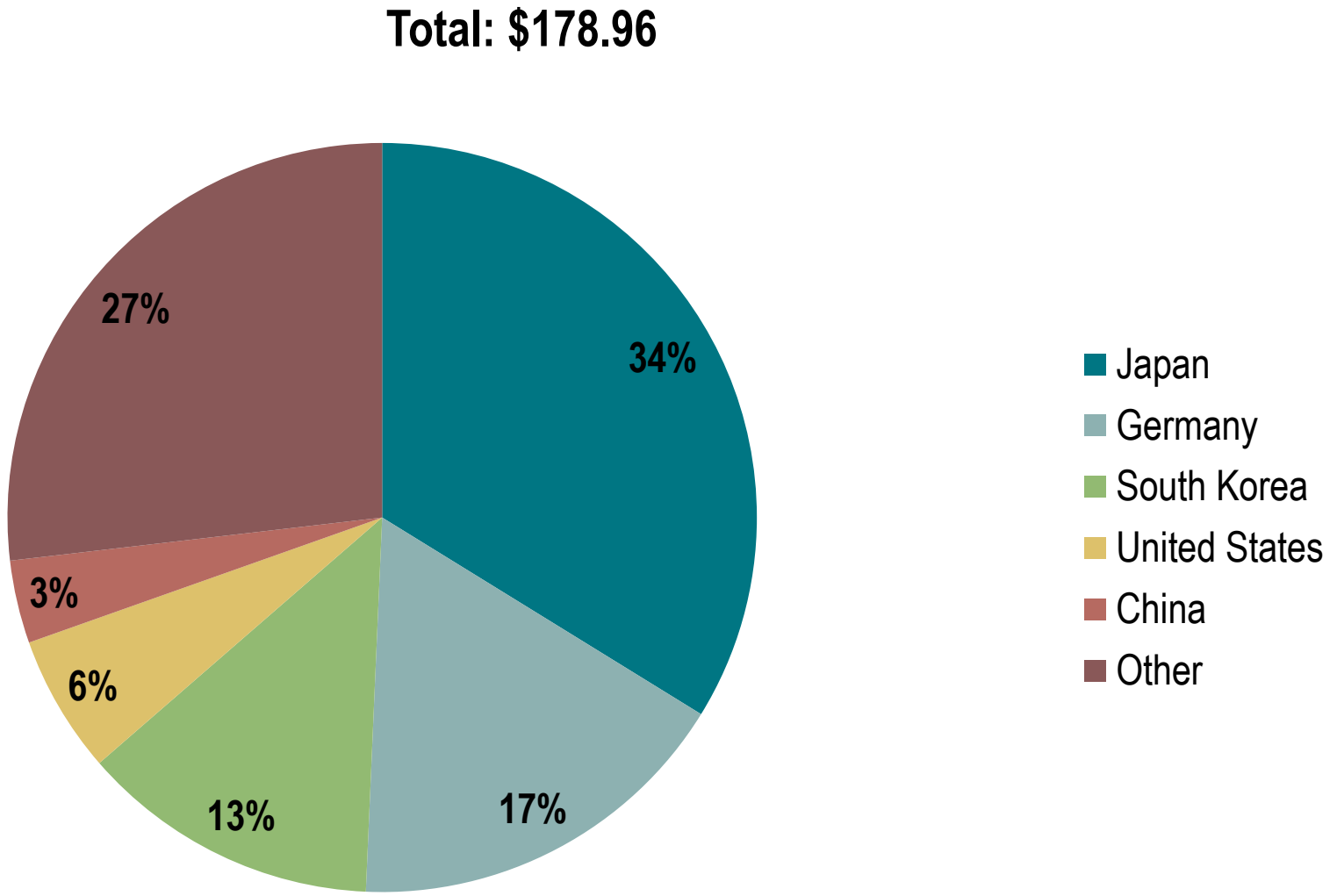
Import demand driver	Furniture	Apparel	Consumer electronics
1 End user demand in destination market	• Near-term growth slowing due to housing market slowdown • Long-term growth strong	• Volume growth in line with population growth • Demand growth in terms of value will stabilize and begin to rise slowly (vs. recent declines), as import saturation is reached and the deflationary effect of import substitution subsides.	• Unit price deflation is stimulating demand in all product categories • Customers upgrading to flat-panel TVs and other appliances
2 Business model share of end user demand	• Nontraditional manufacturers like Ashley and Rooms to Go taking share	• Bifurcated market with high price branded products and low cost private labels controlled by large retailers • High-end products	• Specialty big box retailers like Best Buy continue to take share from traditional channels
3 Import share of product sourcing	• Import sourcing increased significantly in last few years	• Already high, and will continue to rise	• Import sourcing has been 70% of total demand • Key change will be retailers taking control of inventory upstream
4 Origin country share of imports	• China is largest import source and furniture is single-largest commodity • Southeast Asia also continues to be key supplier market	• Quota sunset is causing dramatic shift in origin country shares where China has captured majority of incremental growth	• China, Malaysia, Korea
5 Shipment size and modal mix	• Primarily ocean FCL due to unit value and density characteristics	• Combination of ocean FCL and LCL; Air freight LCL used for both strategic and operating purposes	• Combination of ocean FCL and LCL; Air freight LCL used for both strategic and operating purposes
6 U.S. region destination mix (DC locations)	• DC footprint varies by competitor • Traditional manufacturers still clustered in the Carolinas	• Apparel is large user of deconsolidation on West and East coasts	• DC locations driven by population concentrations
7 Routing/service level share	• All-water to Gulf Coast, South Atlantic and North Atlantic port range preferred to avoid damage and high MLB prices	• Apparel will continue to flow to eastern DCs via MLB off West coast deconsolidation for large retailers	• Heavy flow through West coast ports • Products with high value density, such as iPods, will still move by expedited air, but medium value density products, like flat panel TVs are increasingly moving by ocean

Source: MergeGlobal primary research.

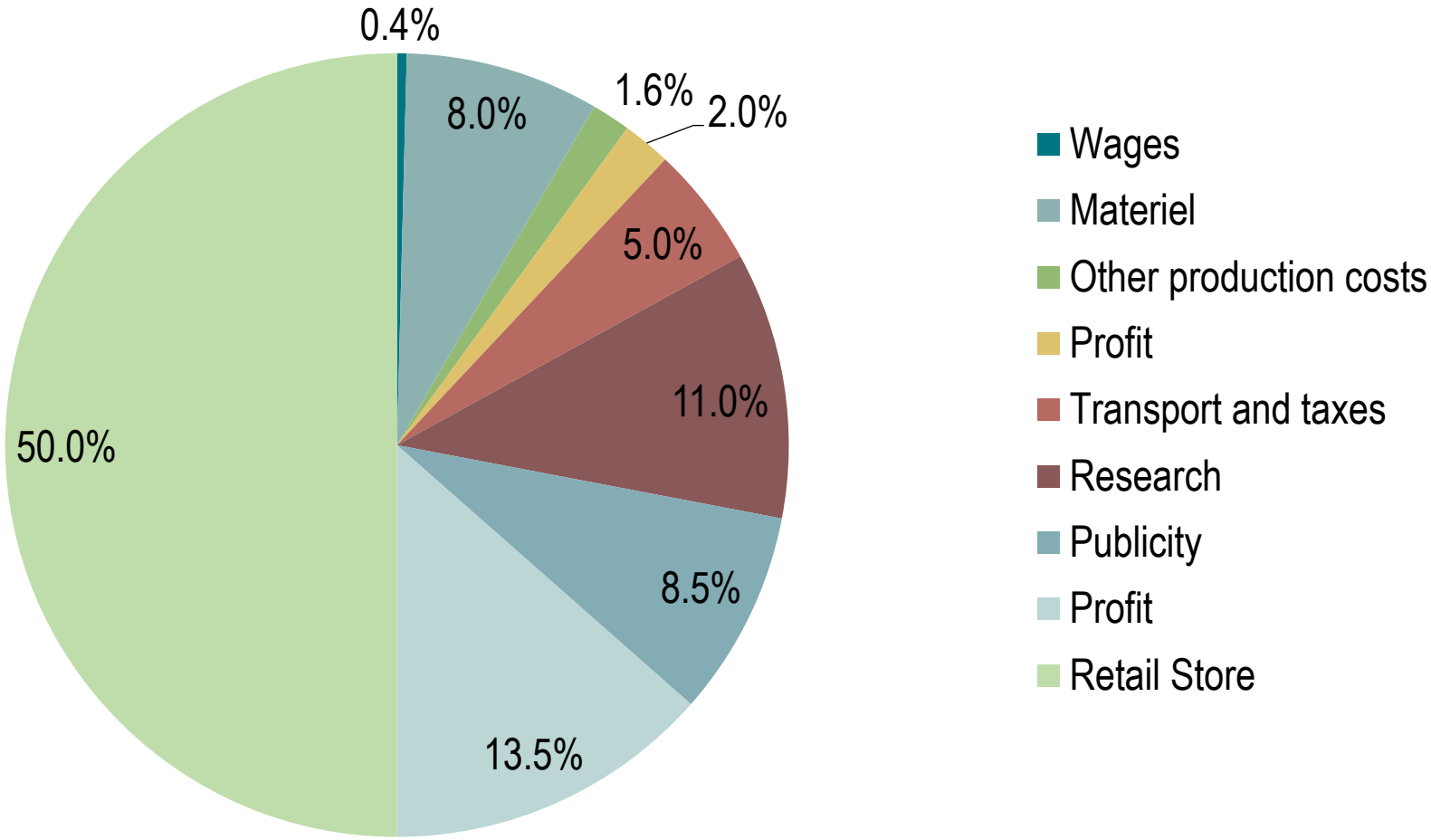
Breakdown of a $299 iPod US Retail Price, 2005



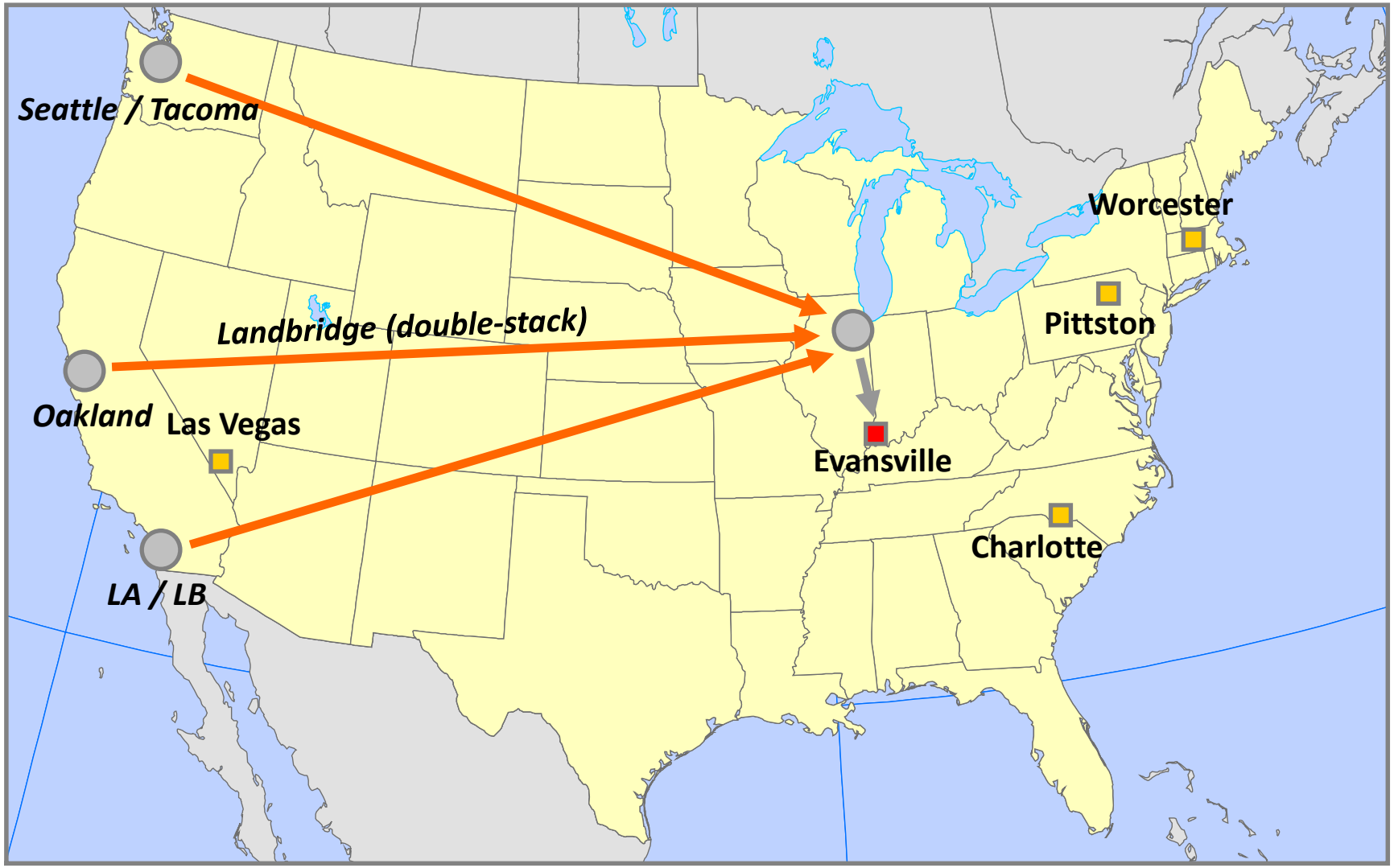
Value of an iPhone 3G Components and Labor, 2009

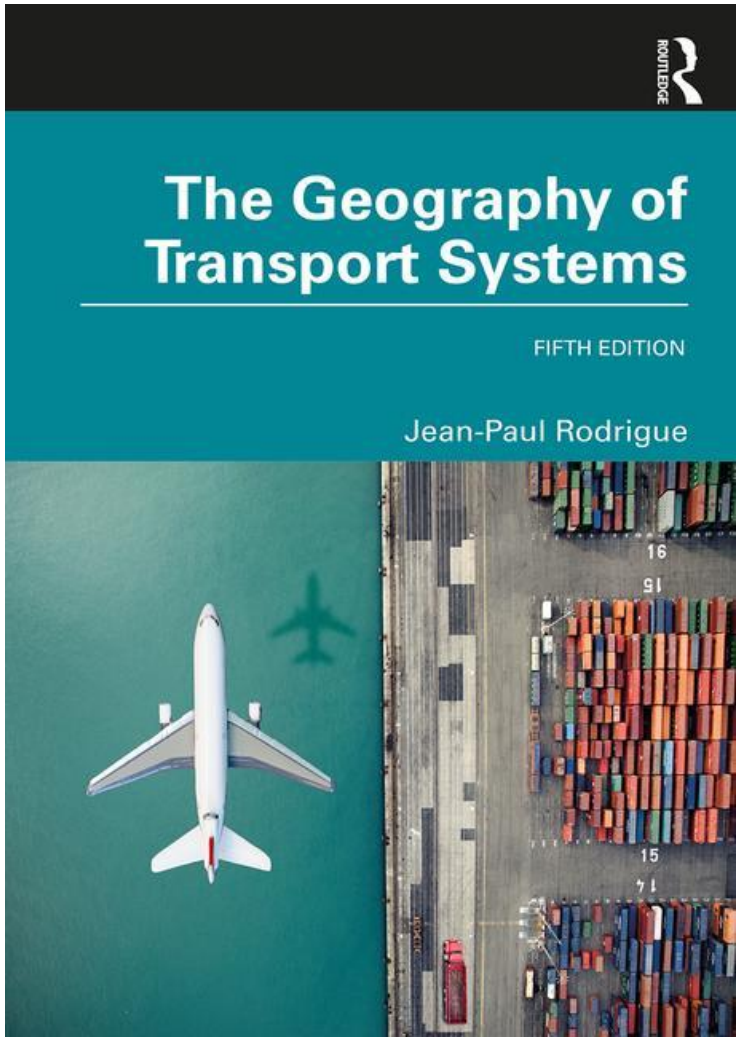


Costs of a Shoe Sold $100 in the United States and Made in China



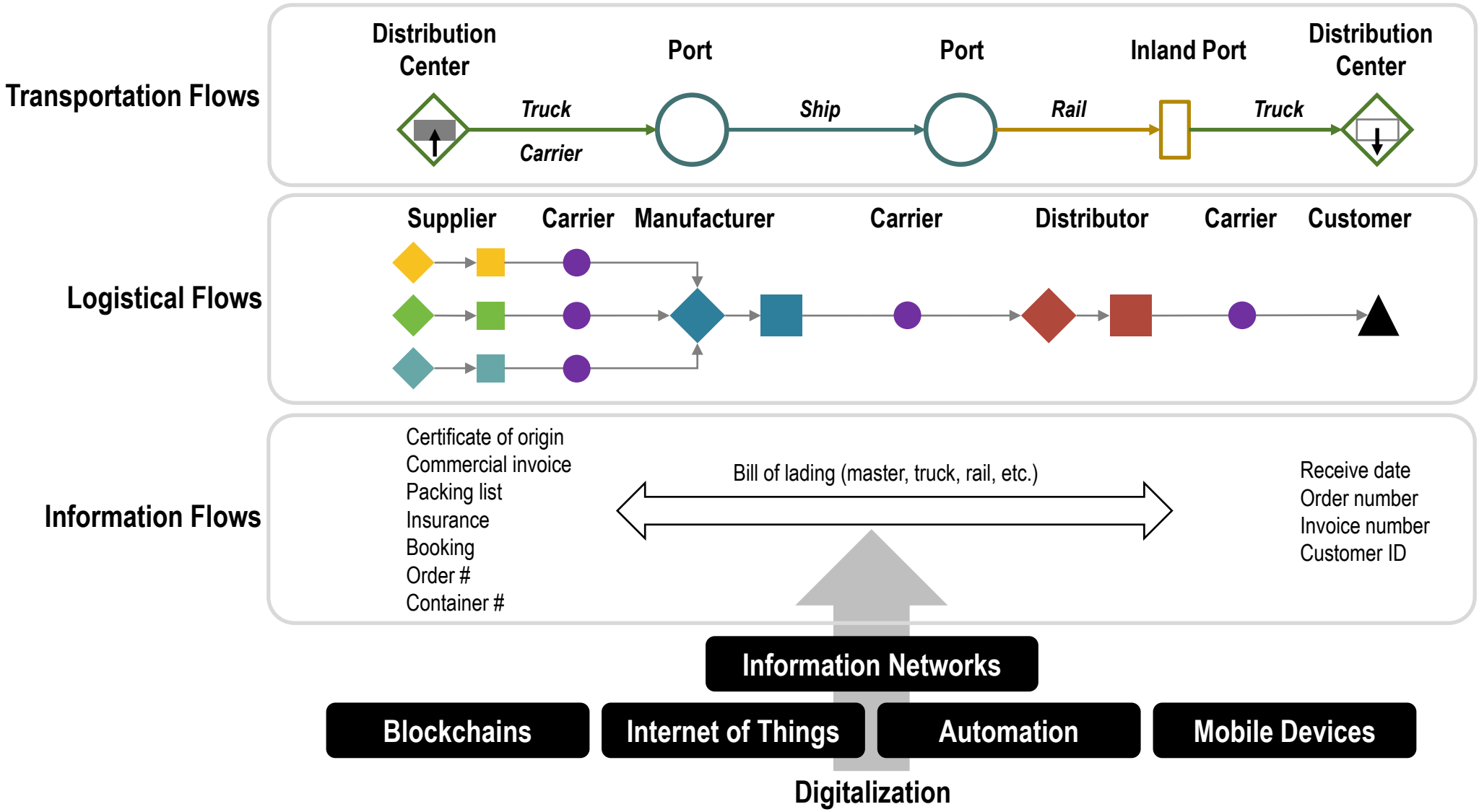
Main Distribution Centers of TJ Maxx in the United States





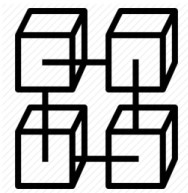
Transportation and Blockchains

The Digitalization of Supply Chains: Blockchains



The Core Principles of Blockchains

Distributed Digital Ledger



Sequence of Blocks

Creation and transfer of unique digital objects in a decentralized structure

Digital Trust

Encryption, transparency, verifiability and immutability

Smart Contracts

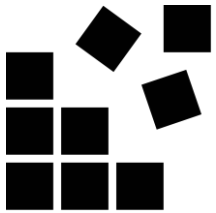
Programmable actions that can be traced

Open Source

Accessibility and inclusiveness

Main Types of Blockchain Uses

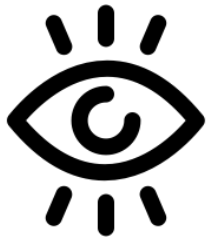
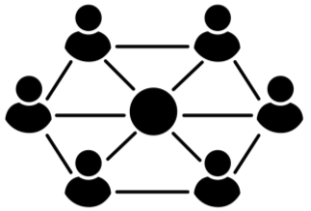
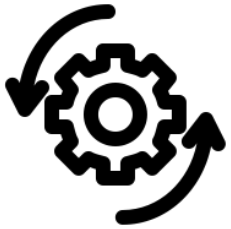
Static Registry	Smart Contracts	Dynamic Registry	Payment Infrastructure
• Distributed database for storing reference data. • Asset ownership and registration information.	• Recorded conditions triggering automated actions when met. • Transportation fares.	• Distributed database that is updated as assets are exchanged. • Supply chain management.	• Distributed database that is updated as cryptocurrencies are exchanged. • International contract settlements.

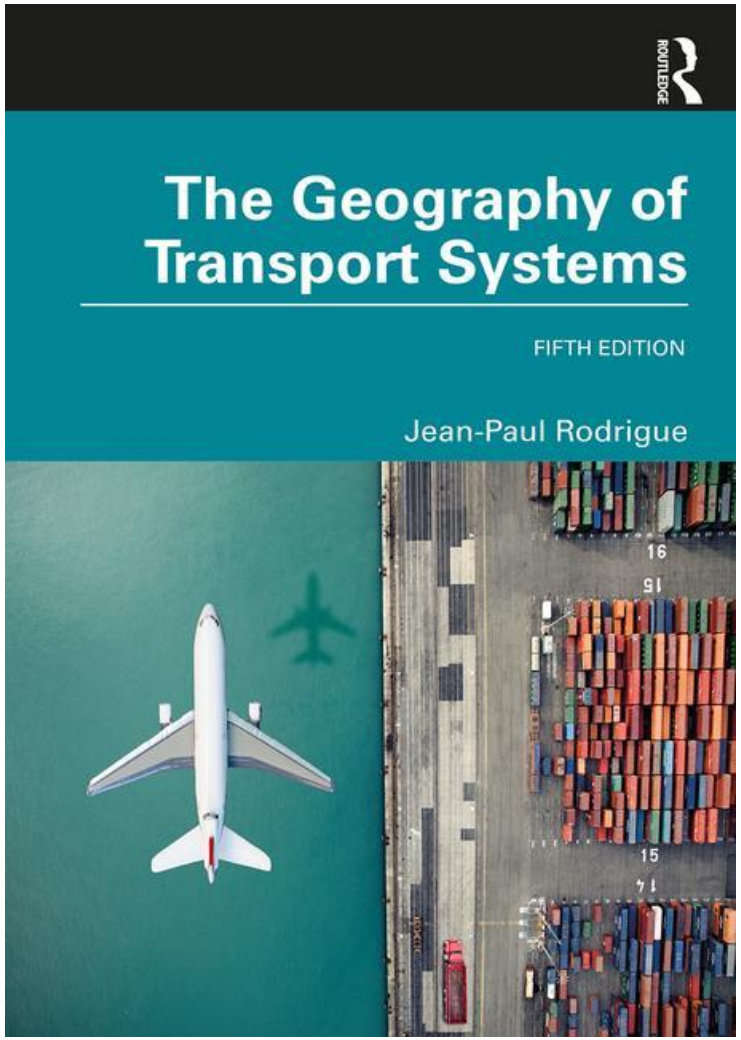


Blockchains and Value Creation

Principles	Functions	Information Use	Processes	Outcome
• Information blocks • Distributed • Encryption • Smart contracts	• Verifiability • Transparency • Immutability • Consistency	• Sharing • Visibility • Traceability	• Contract management • Coordination • Disintermediation	• Efficiency • Effectiveness • Resilience



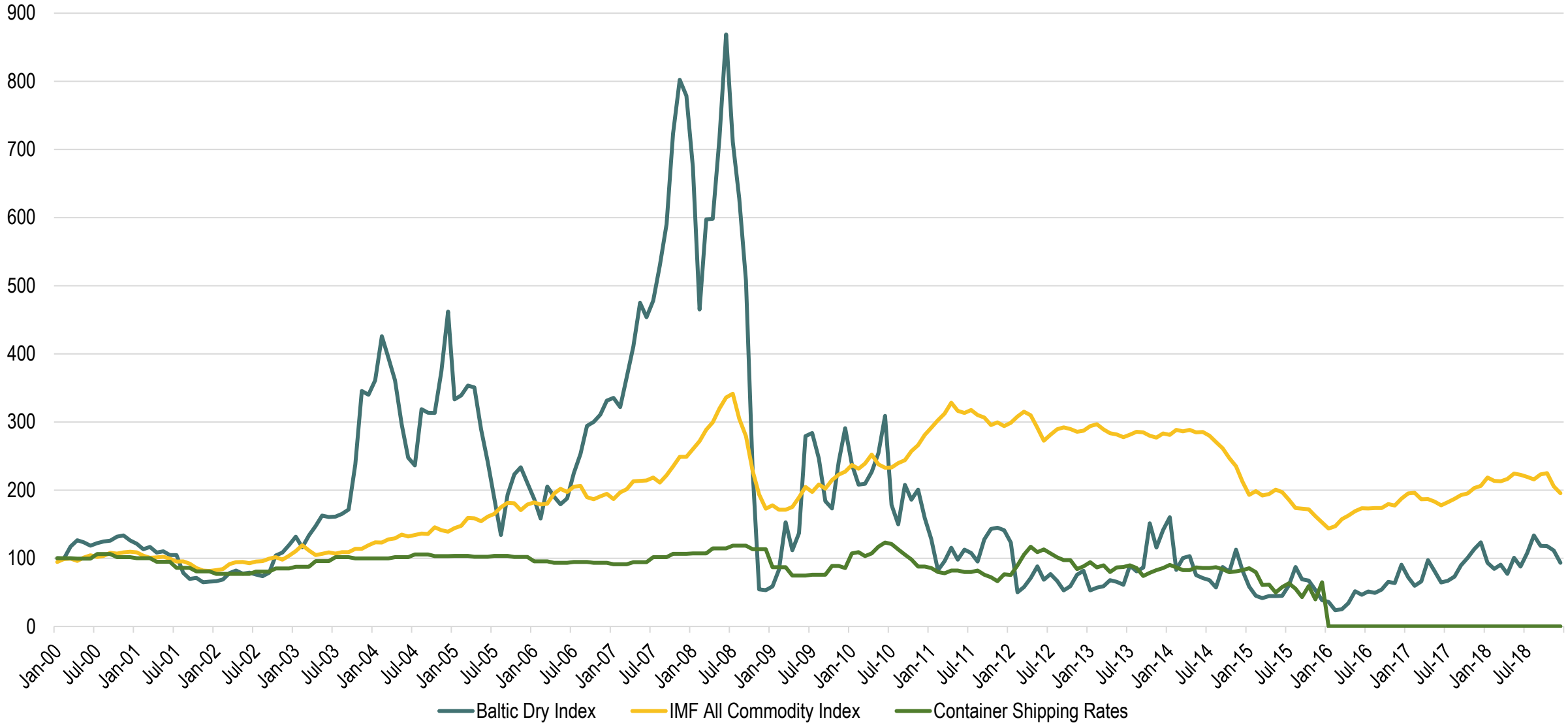


The Containerization of Commodities

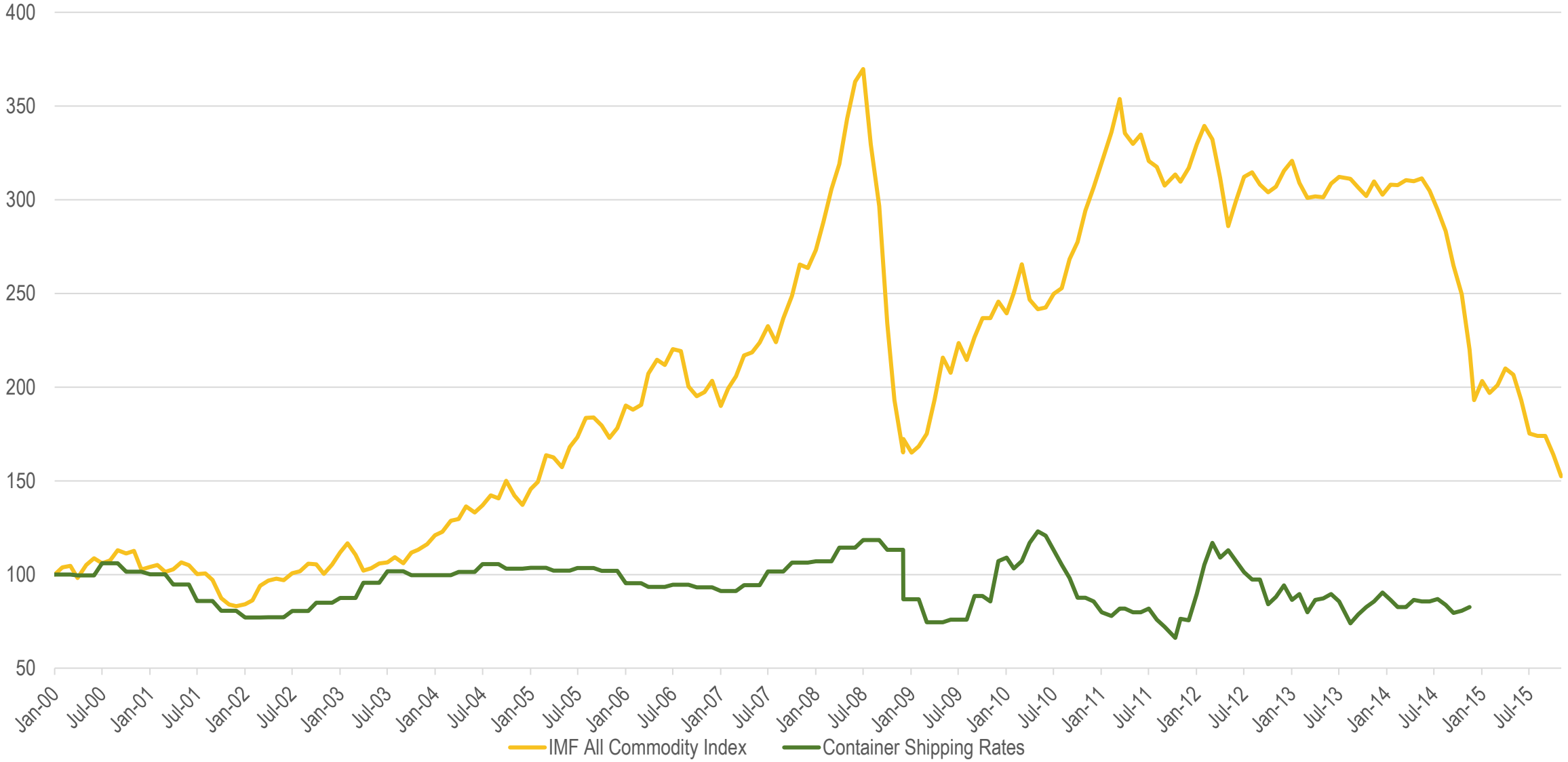
Growth Factors behind the Containerization of Commodities

Factor	Outcome
Growing availability of containers	More containers available on freight markets. Ubiquitous transport product.
Rising demand and commodity prices	More commodities in circulation (usage of containerization to accommodate growth). New producers and consumers (marginal markets penetration).
Fluctuations and rises in bulk shipping rates	Decrease in the ratio cargo value per ton shipping rate for commodities. Volatility (rates) and risk (hedging). Search for options to bulk shipping.
Low container shipping rates	Increase in the ratio cargo value per TEU shipping rate for commodities. Relative rate stability. Containerization more attractive as an option.
Imbalances in container shipping rates	Export subsidy for return cargo.
Empty containers repositioning	Pools of containers available for backhauls.
Processing	Processing close to production shifts from bulk to containerized shipping.

IMF All Commodity Index, Baltic Dry Index and Container Shipping Rates, 2000-2018 (2000=100)



IMF All Commodity Index and Average Container Shipping Rates, 2000-2015 (2000=100)



Comparison Between Bulk and Containerized Commodity Transportation

	Bulk (Grain, Minerals, Oil)	Containerized
Sectors	Primary / Transformation	Manufacturing / Retailing
Driving force	Cost / Volume	Time / Flexibility
Mode of shipment	Large batches	Small shipments
Frequency	Low	High
Flows	One way	More balanced
Terminals	Dedicated by commodity	General container
Seasonality	From low (energy) to high (agriculture)	Low (retail cycles)
Exchange Markets	Mass (futures / forward)	Niche (spot)

From Bulk to Containers: Breaking Economies of Scale

Entry Barriers

- Container as an independent load unit.
- Minimal load unit; one TEU container.

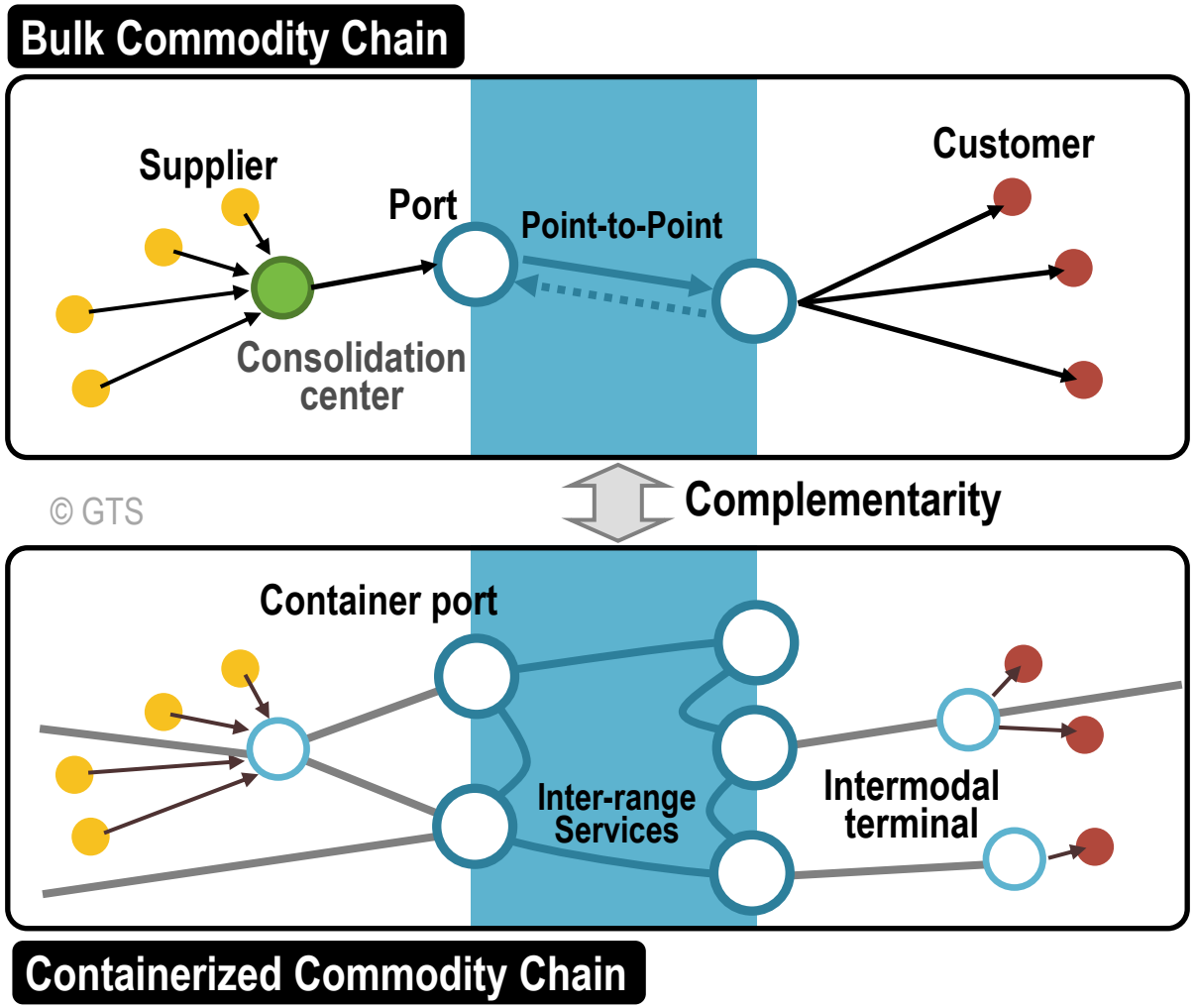
Required Volumes

- Limited differences in scale economies for a producer.
- Incremental / linear cost-volume function.

Market Potential

- New producers (smaller).
- Product differentiation (more variety).

Bulk and Containerized Commodity Chains

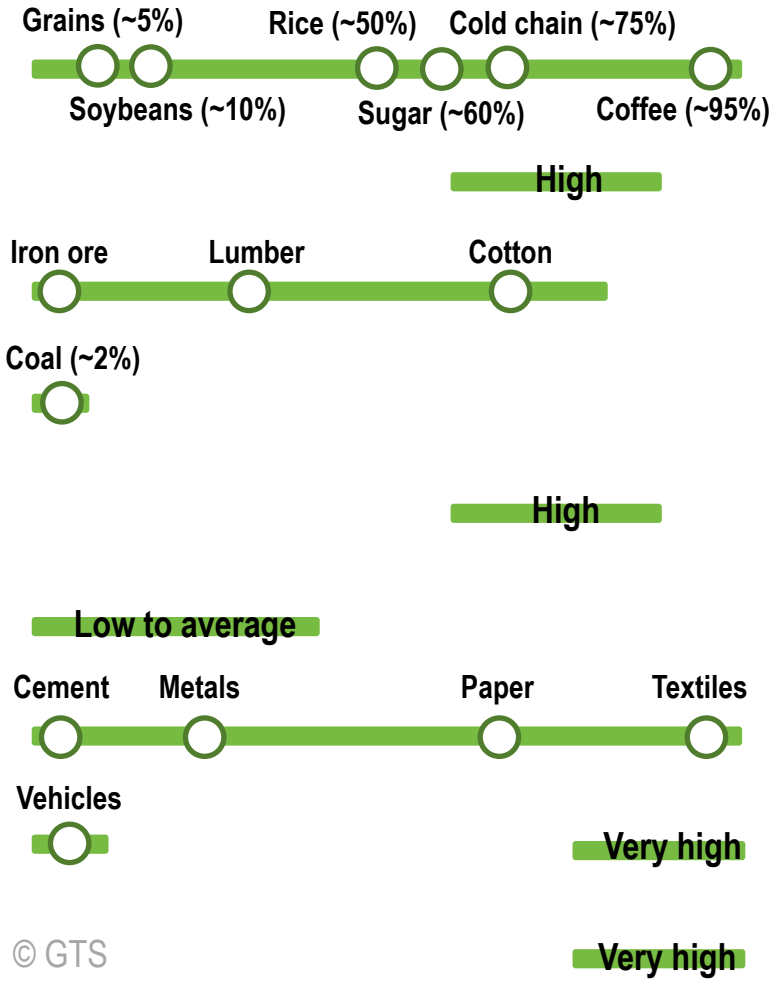


Commodity Group and Containerization Potential

Category (SITC)	Examples	Containerization (Existing or Potential)
Food & Live Animals	Meat, Fish, Wheat, Rice, Corn, Sugar, Coffee, Cocoa, Tea	Low (grains) to high (cold chain products)
Beverages & Tobacco	Wine, Beer, Tobacco	High
Raw Materials	Lumber, Rubber, Cotton, Iron ore	Commodity specific
Fuels & Lubricants	Coal, Crude oil, Kerosene, Natural gas	Very limited
Animal & Vegetable Oils	Olive oil, Corn oil	High
Chemicals	Salt, Fertilizers, Plastics	Low to average
Manufactured Goods	Paper, Textiles, Cement, Iron & Steel, Copper	Commodity specific
Machinery & Transport Equipment	Computer equipment, Televisions, Cars	Very high (already containerized)
Miscellaneous Manufactures	Furniture, Clothes, Footwear, Cameras, Books, Toys	Very high (already containerized)

Commodity Group and Containerization Level

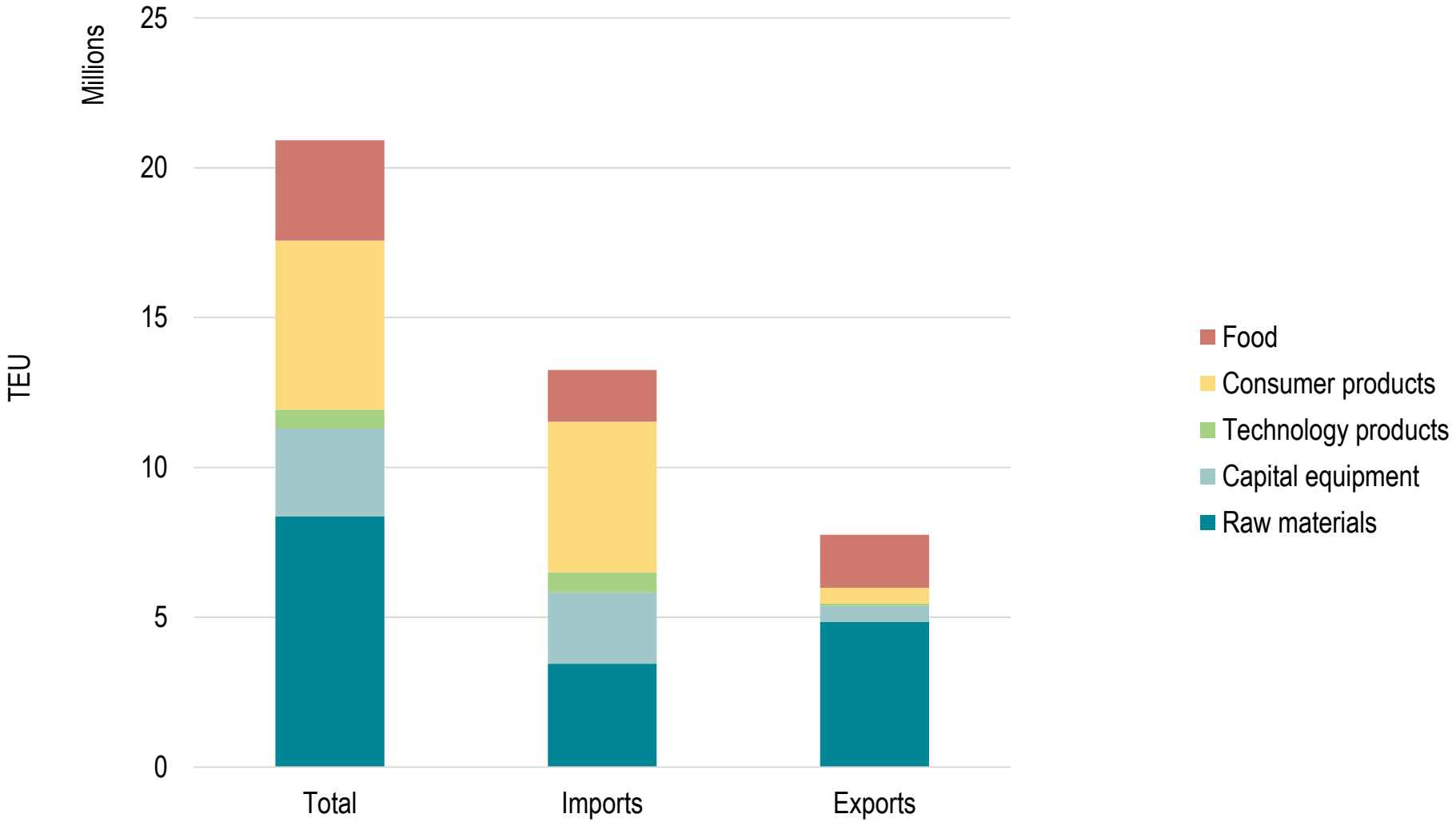
Category (SITC)	Examples	Containerization
0. Food & Live Animals	Meat, Fish, Wheat, Rice, Soybeans, Corn, Sugar, Coffee, Cocoa, Tea	
1. Beverages & Tobacco	Wine, Beer, Tobacco	
2. Raw Materials	Lumber, Rubber, Cotton, Iron ore	
3. Fuels & Lubricants	Coal, Crude oil, Kerosene, Natural gas	
4. Animal & Vegetable Oils	Olive oil, Corn oil	
5. Chemicals	Salt, Fertilizers, Plastics	
6. Manufactured Goods	Paper, Textiles, Cement, Iron & Steel, Copper	
7. Machinery & Transport Equipment	Computer equipment, Televisions, Cars	
8. Miscellaneous Manufactures	Furniture, Clothes, Footwear, Cameras, Books, Toys	



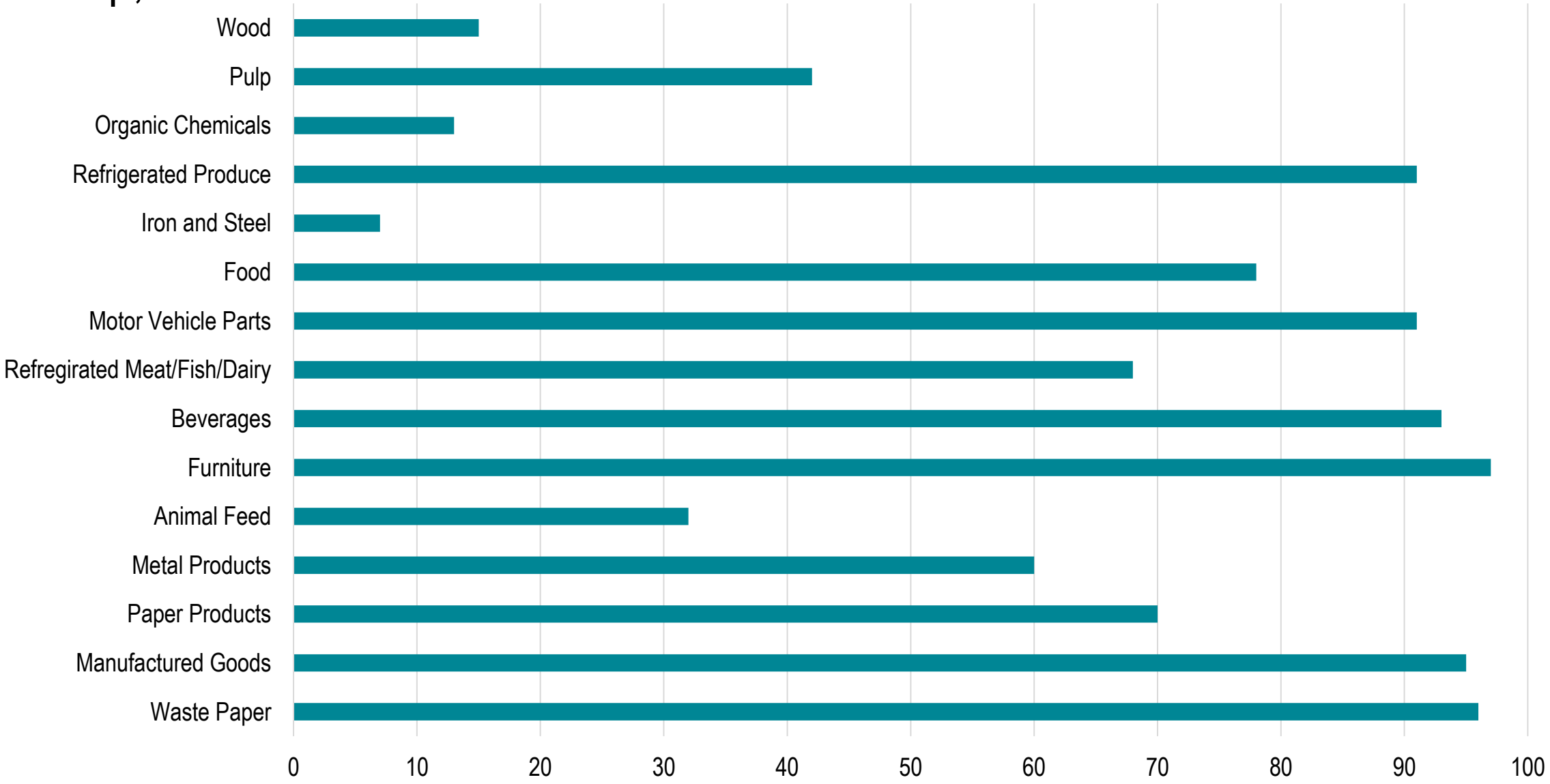
Containerized Weight for Selected Commodities

Commodity	Pounds per cubic foot	Weight in a 20 foot container
Wheat	48	28 tons
Corn	45	26 tons
Dry peas, beans and lentils	37	22 tons
Vegetable oil (e.g. canola)	60	30 tons (35 tons)
Coffee (fresh beans)	35	21 tons
Lumber (2x4s)	45	26 tons
Hay (e.g. alfalfa)	14	8 tons
Potash	80	30 tons (46 tons)
Coal (Anthracite)	70	30 tons (41 tons)
Paper or wood pulp	75	30 tons (44 tons)

American Containerized Trade, 2003



Share of Main American International Trade Commodities Transported by Containership, 2000



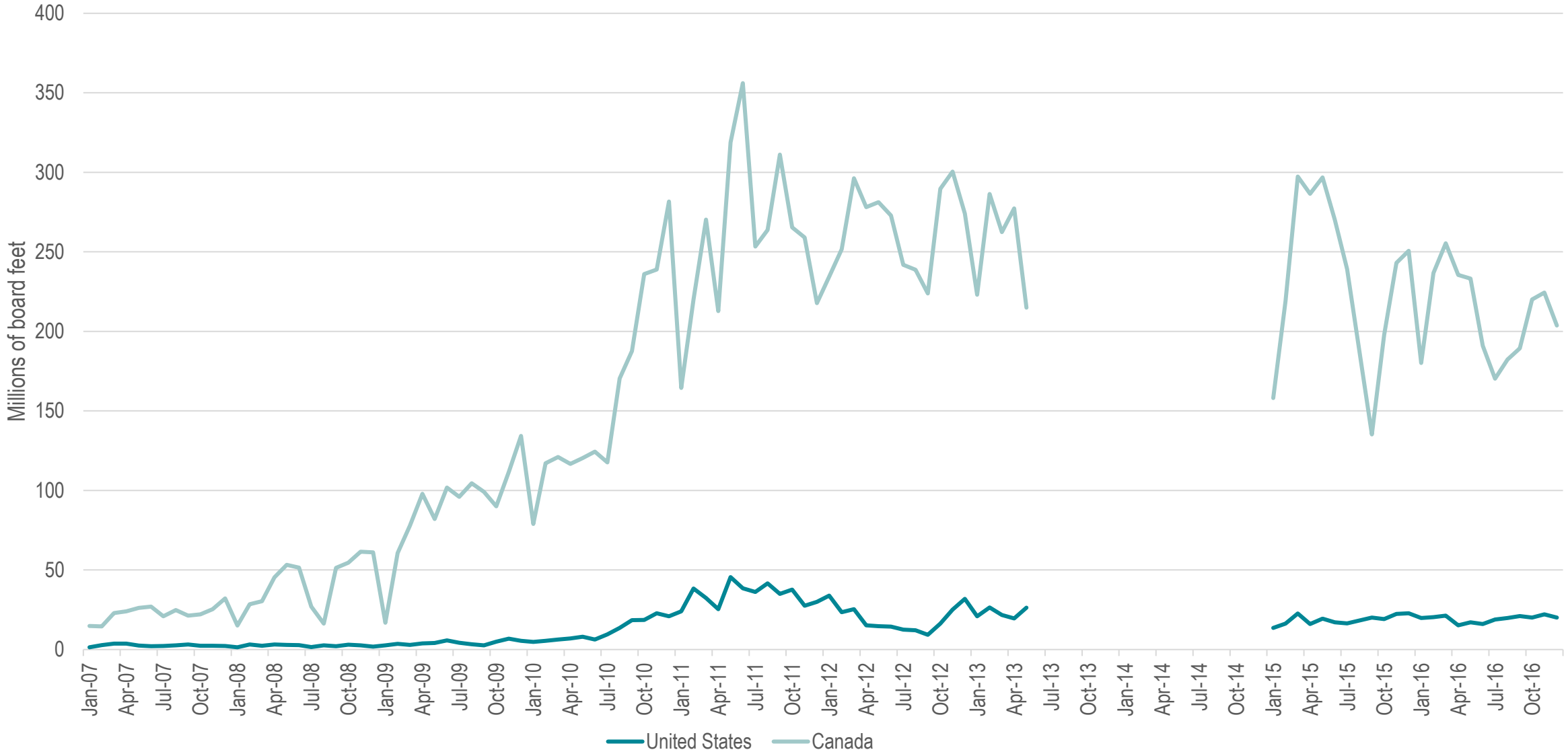
Shipping Time between Bulk Handling and Containerization (Canadian Wheat)

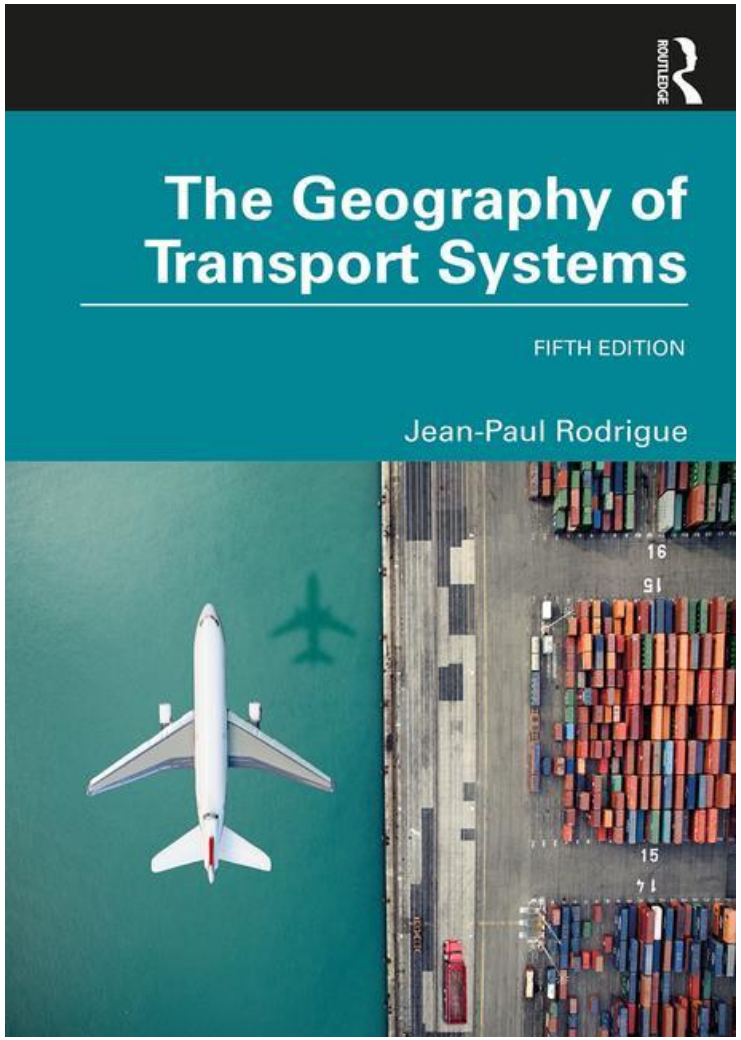
Bulk Handling System	Days	Container System	Days
Farm storage	Start	Farm storage	Start
Local delivery	1	Local delivery	1
Primary elevator	40	Intermodal terminal	2
Rail hopper cars	11	Double stack train	2
Export terminal	19	Container port	2
Bulk ship	15	Containership	11
Import terminal	10	Container port	2
Local delivery	1	Local delivery	1
Final customer	End	Final customer	End
Total	**97**	**Total**	**21**

Challenges for the Containerization of Commodities

Challenge	Issues
Container availability	Locational and load unit availability.
Weight	Limitations to about 30 tons (40 footer). 20 footer the preferable load unit (26-28 tons).
Container preparation	Pre-use and post-use cleaning (avoid contamination). Dedicated containers?
Container loading, unloading and transloading	Bulks difficult to load horizontally. Vertical loading / unloading (equipment). Transloading issues. Source loading.
Weight distribution	Containership load (10-14 tons per TEU). Trade imbalances create mitigation strategies.
Land consumption at port terminals	Space consumption (4 times more than bulk) mitigated by velocity.
Existing distribution channels	Considerable accumulated investments (modes & terminals). Established distribution practices. Modal shift inertia.

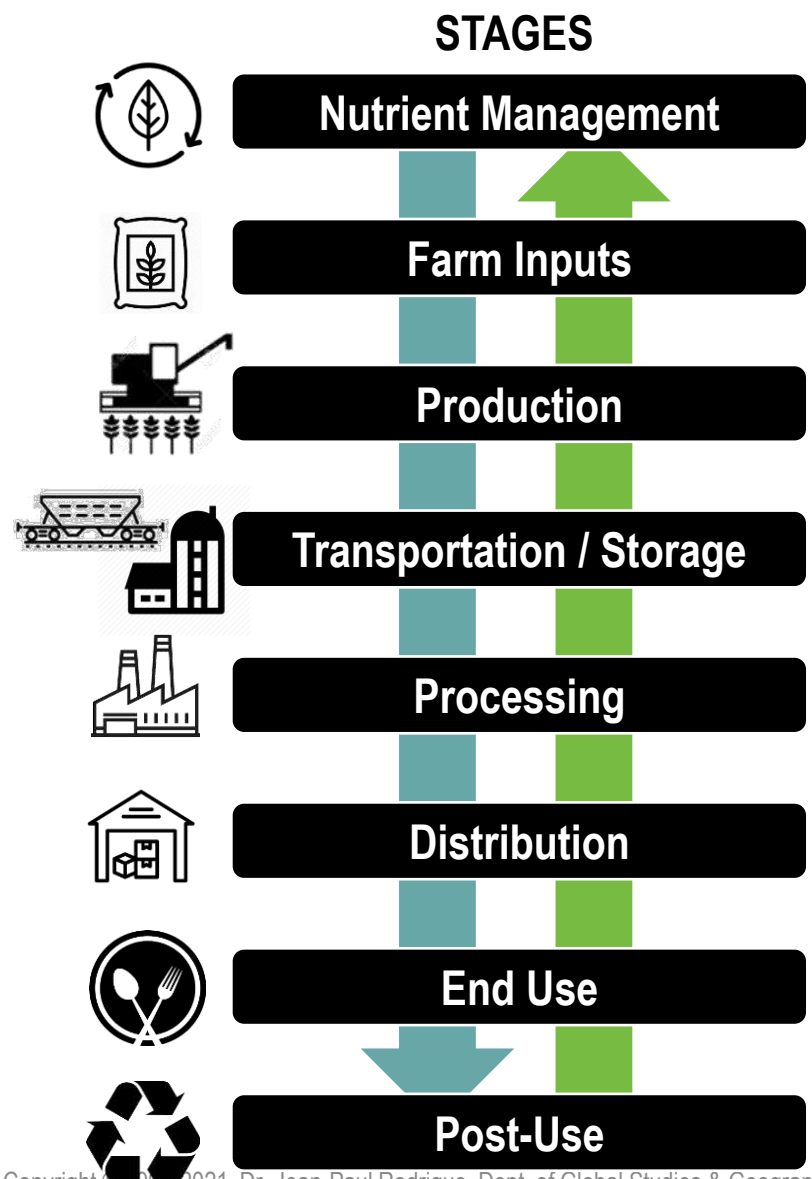
Monthly Softwood Lumber Shipments to China, 2007-2017





The Logistics of Global Food Systems

The Food System



BIOLOGICAL SYSTEM
- Soil conditions
- Temperature
- Precipitation

ECONOMIC SYSTEM
- Irrigation
- Seeds
- Fertilizers
- Equipment
- Labor
- Capital
- Infrastructure
- Facilities
- Terminals
- Wholesalers
- Grocers
- Restaurants
- Individuals

POLITICAL SYSTEM
- Regulation
- Duties
- Subsidies
- Taxes
- Ownership

RISKS

BIOLOGICAL
- Biocapacity
- Weeds
- Pests and pathogens

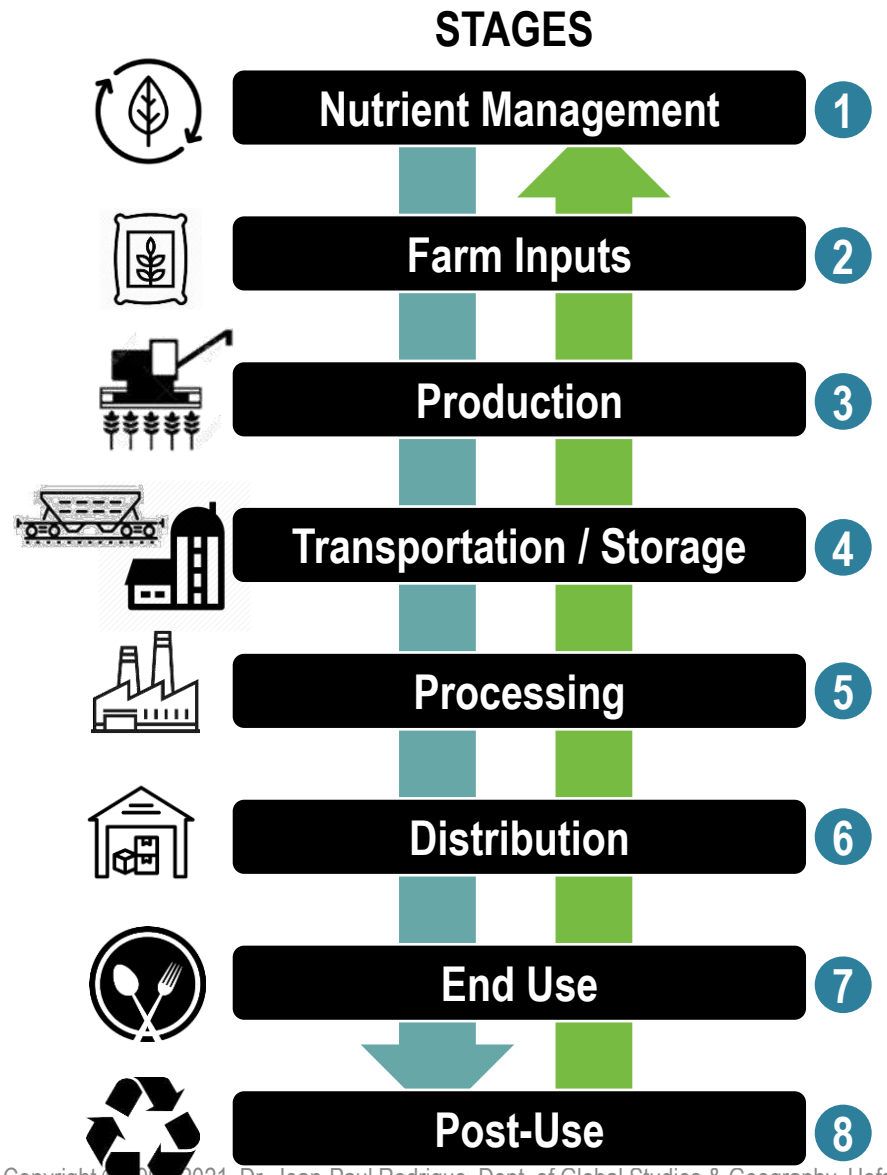
NATURAL
- Natural disasters
- Floods & storms
- Droughts

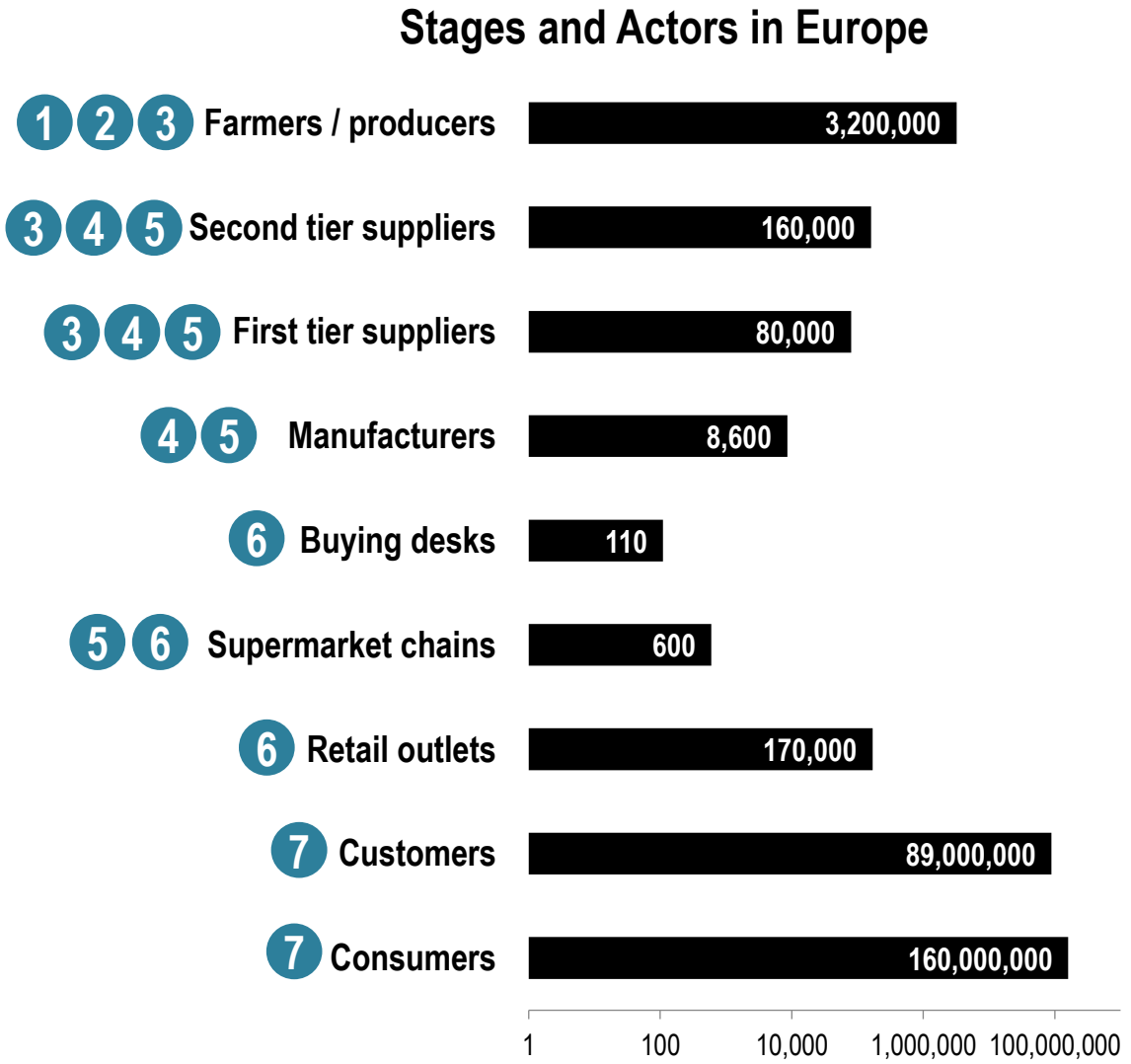
TECHNOLOGICAL
- ICT disruptions
- Infrastructure failures

POLITICAL
- Instability
- Conflicts
- Corruption
- Trade restrictions
- Theft and illicit trade

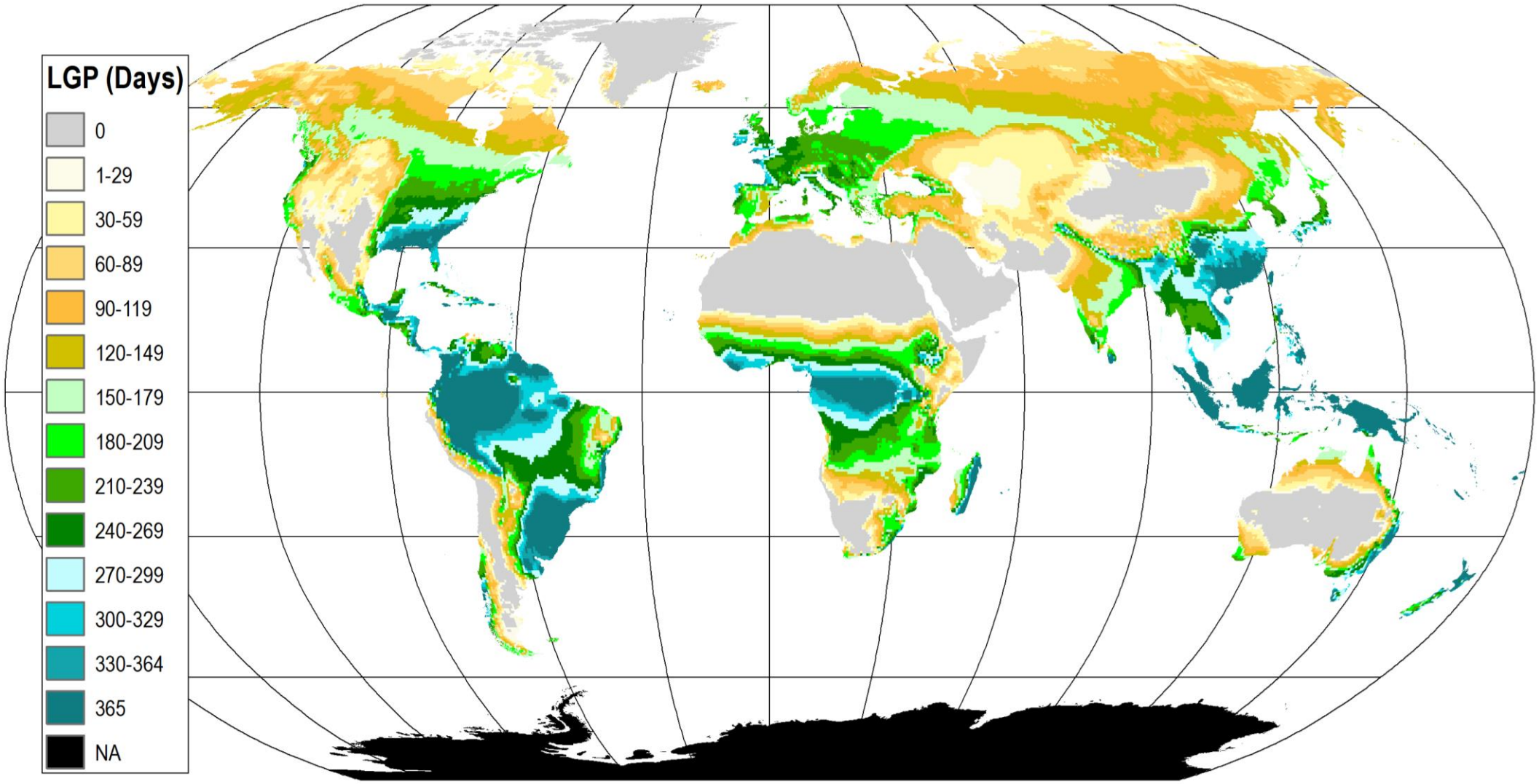
ECONOMIC
- Price volatility
- Commodity shortages
- Demand shocks

The Agri-food Supply Chain

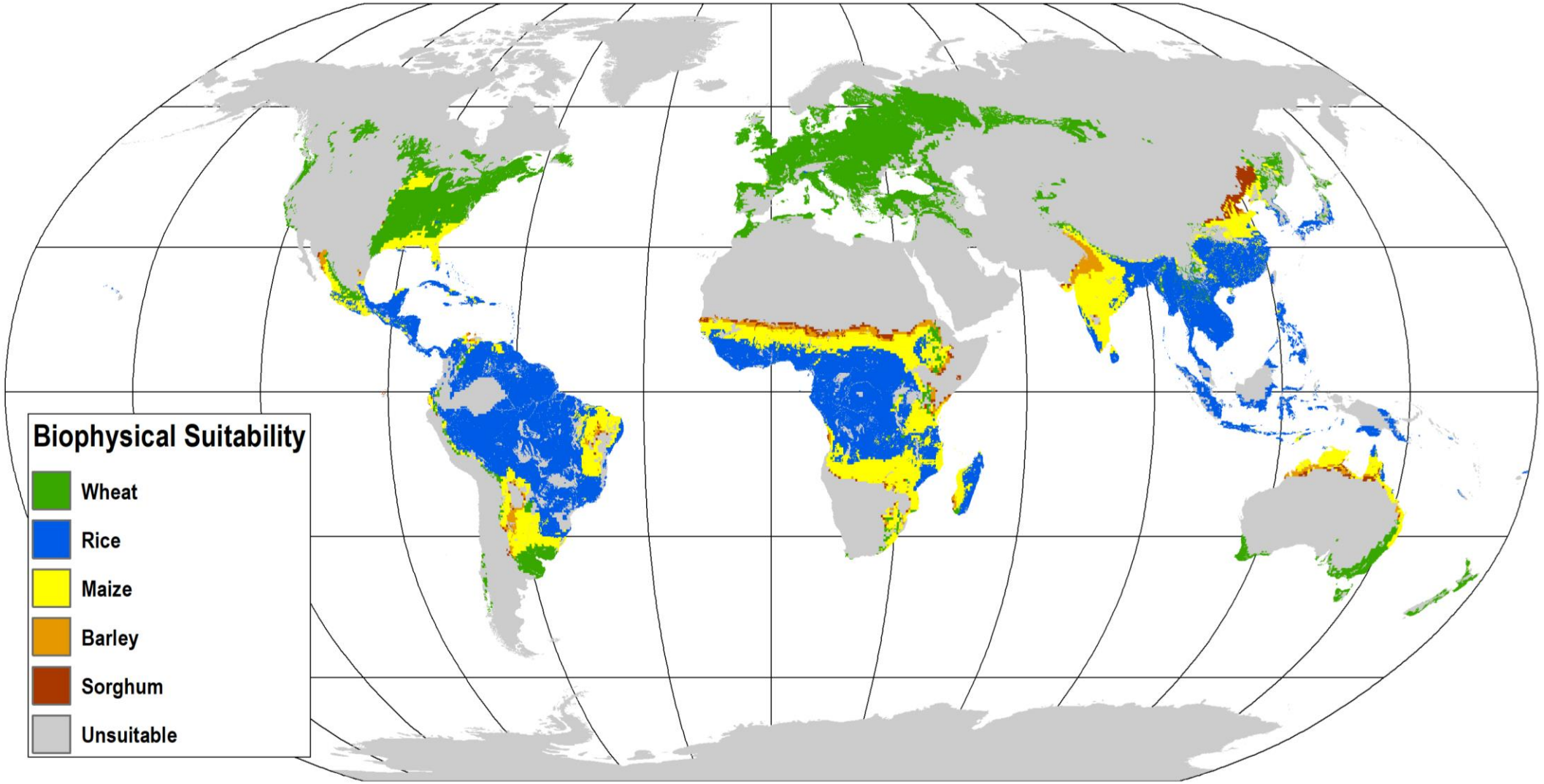




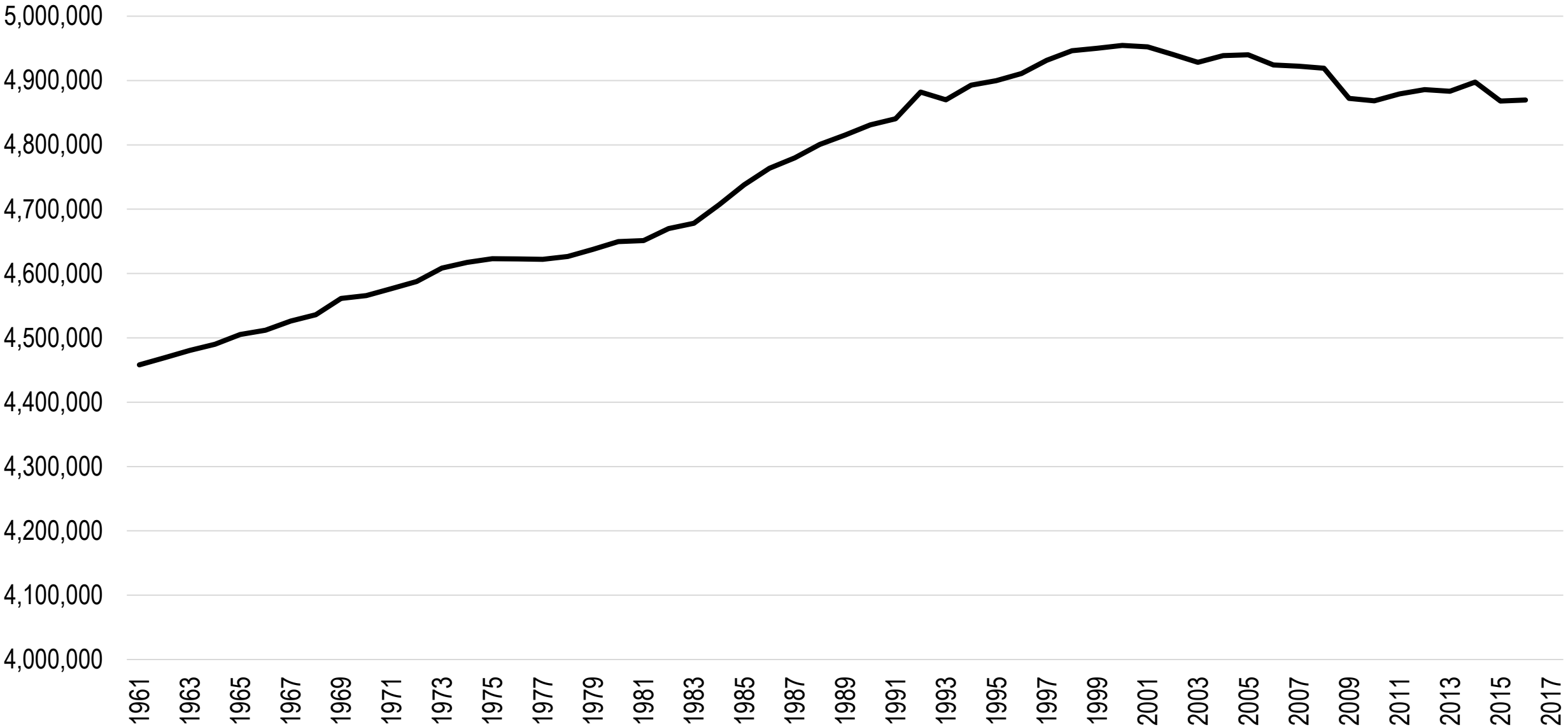
Length of Growing Period (LGP), in Days



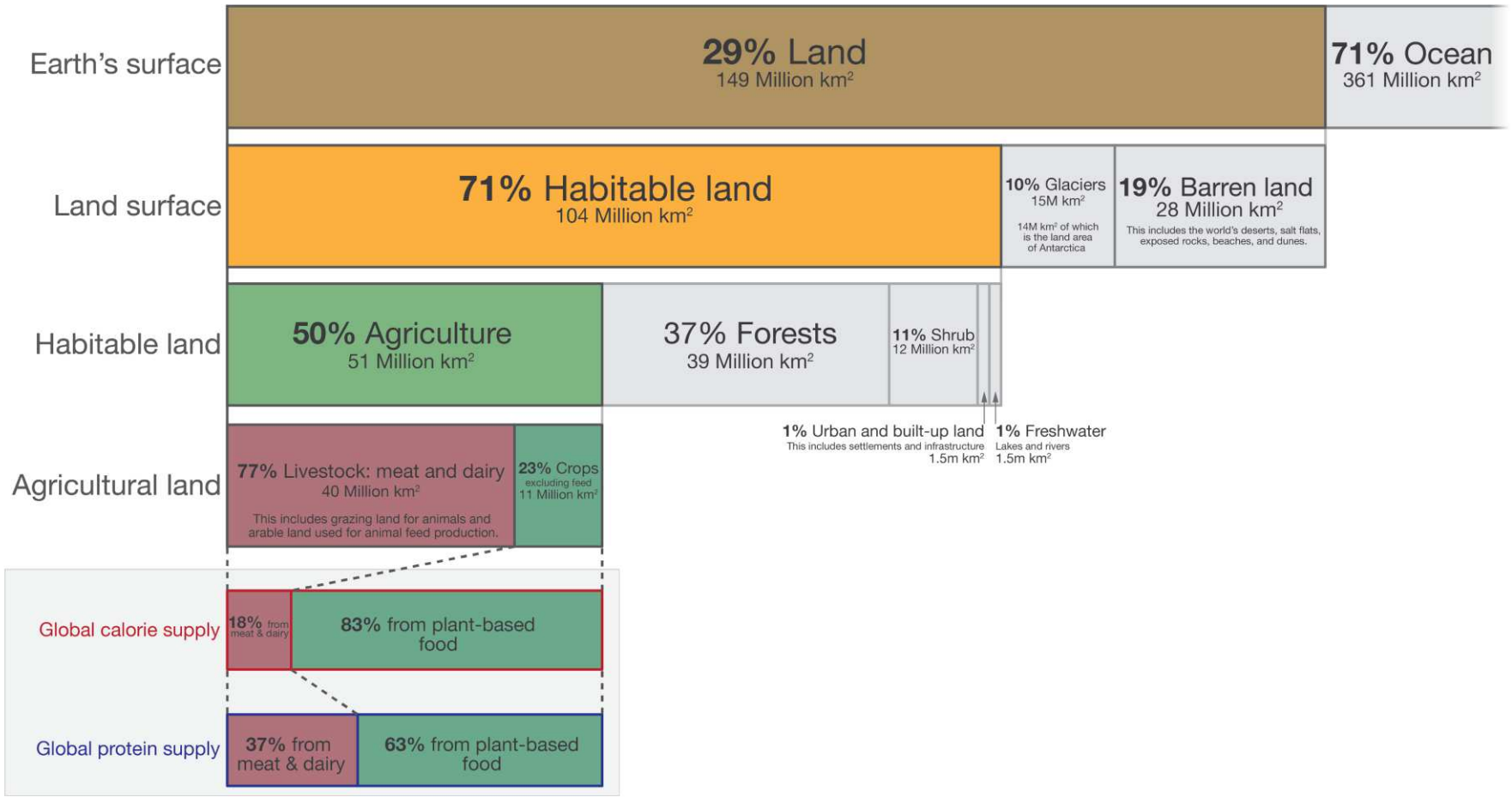
Most Suitable Cereal



World Agricultural Area, 1961-2016 (in 1,000 hectares)

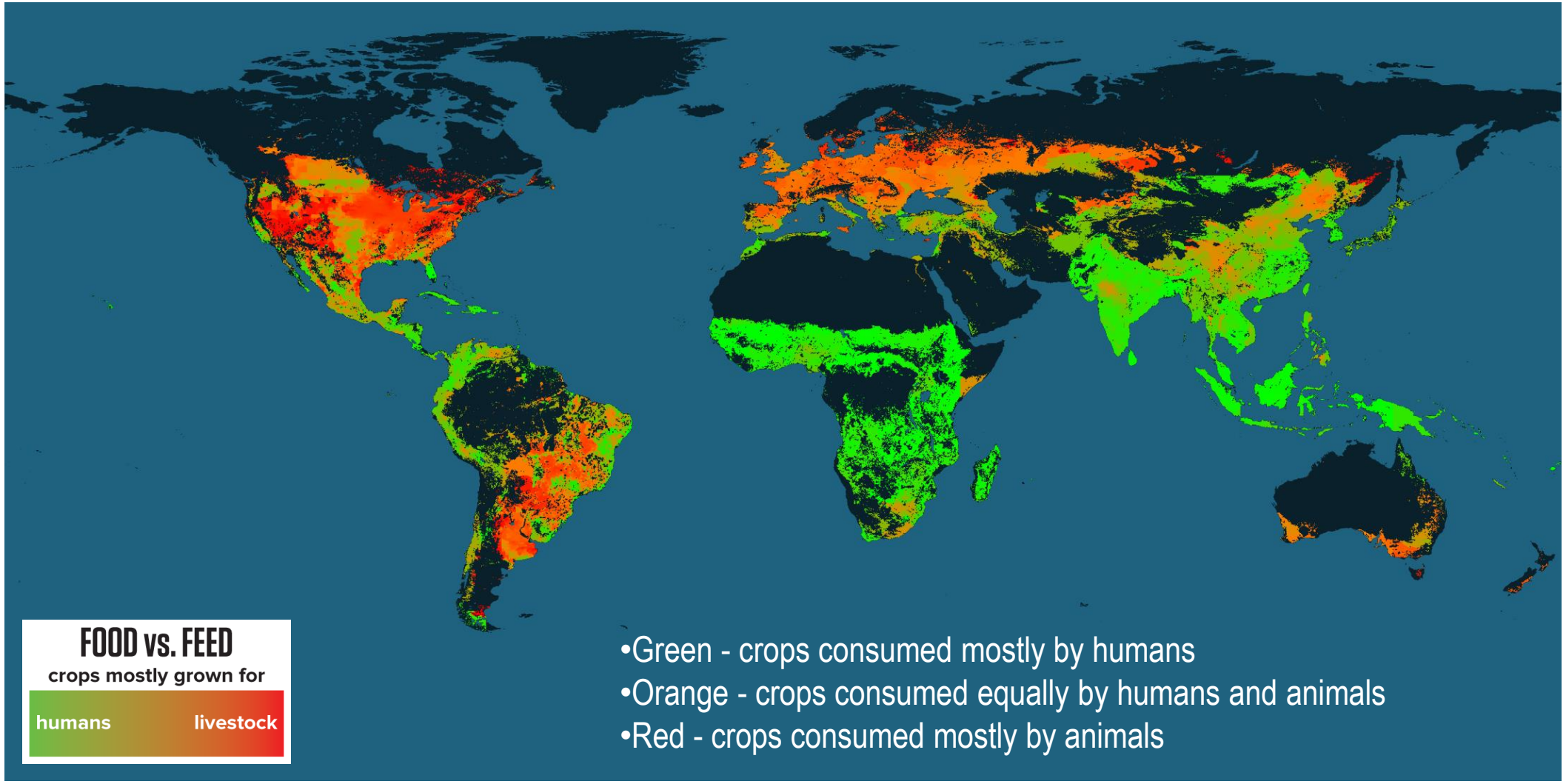


Global land use for food production

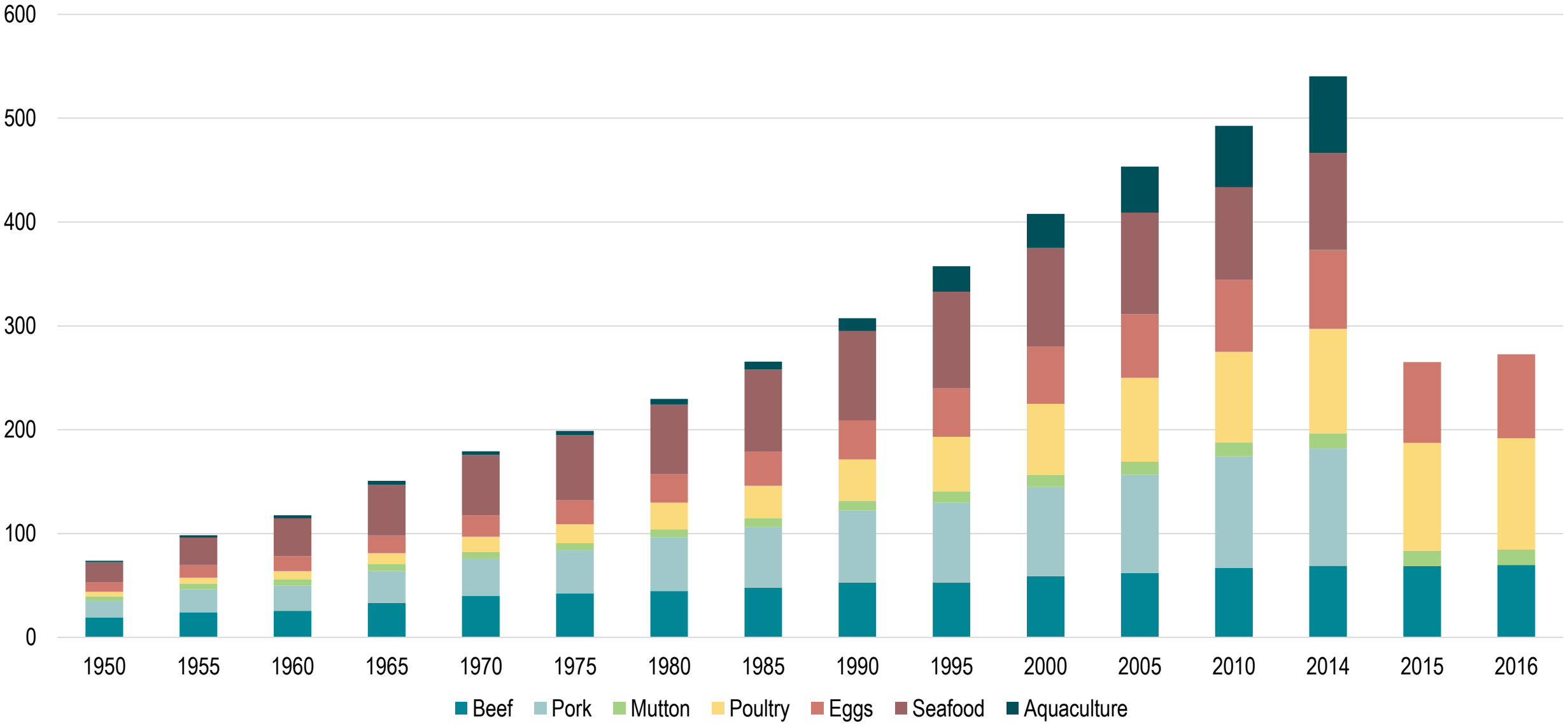


Data source: UN Food and Agriculture Organization (FAO)
OurWorldinData.org – Research and data to make progress against the world's largest problems.

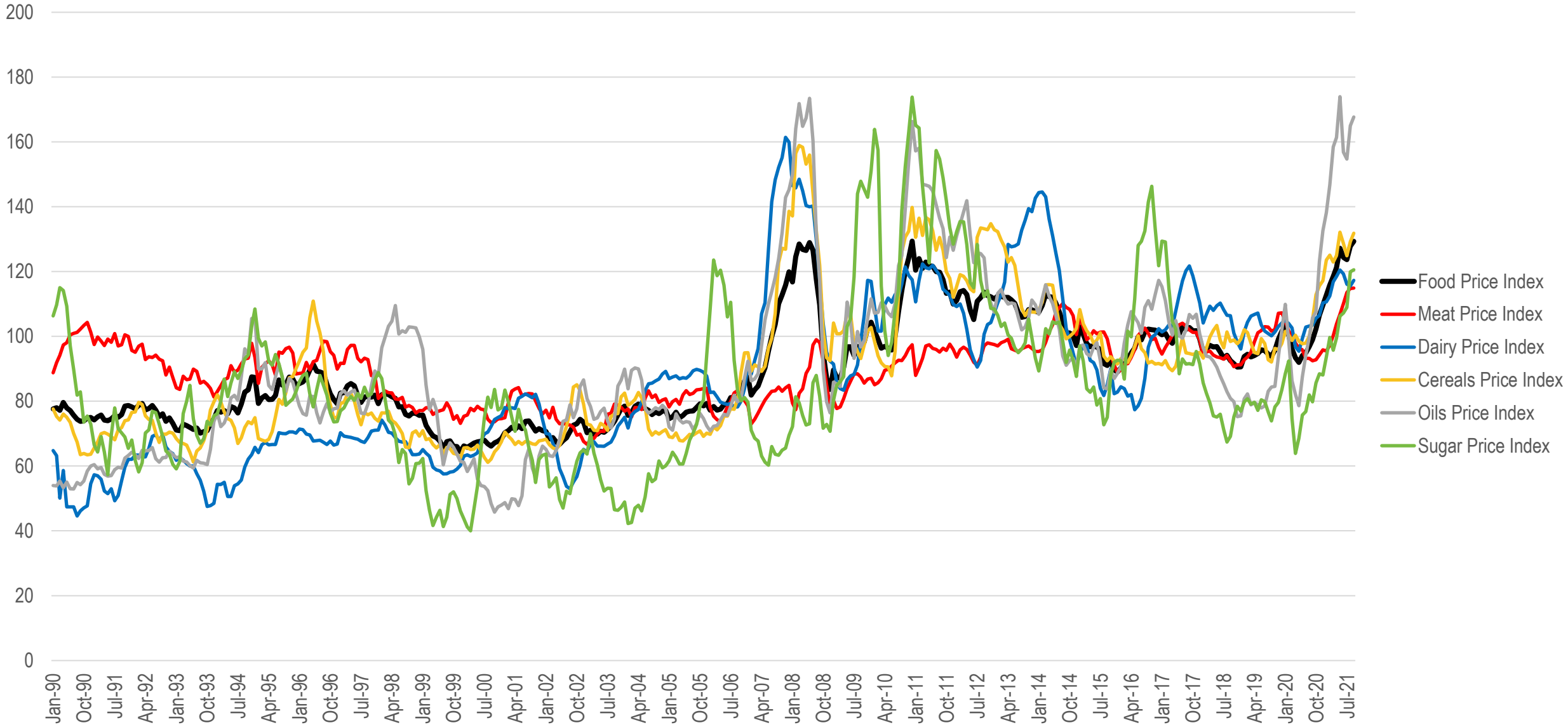
Dominance of Food versus Feed Agriculture



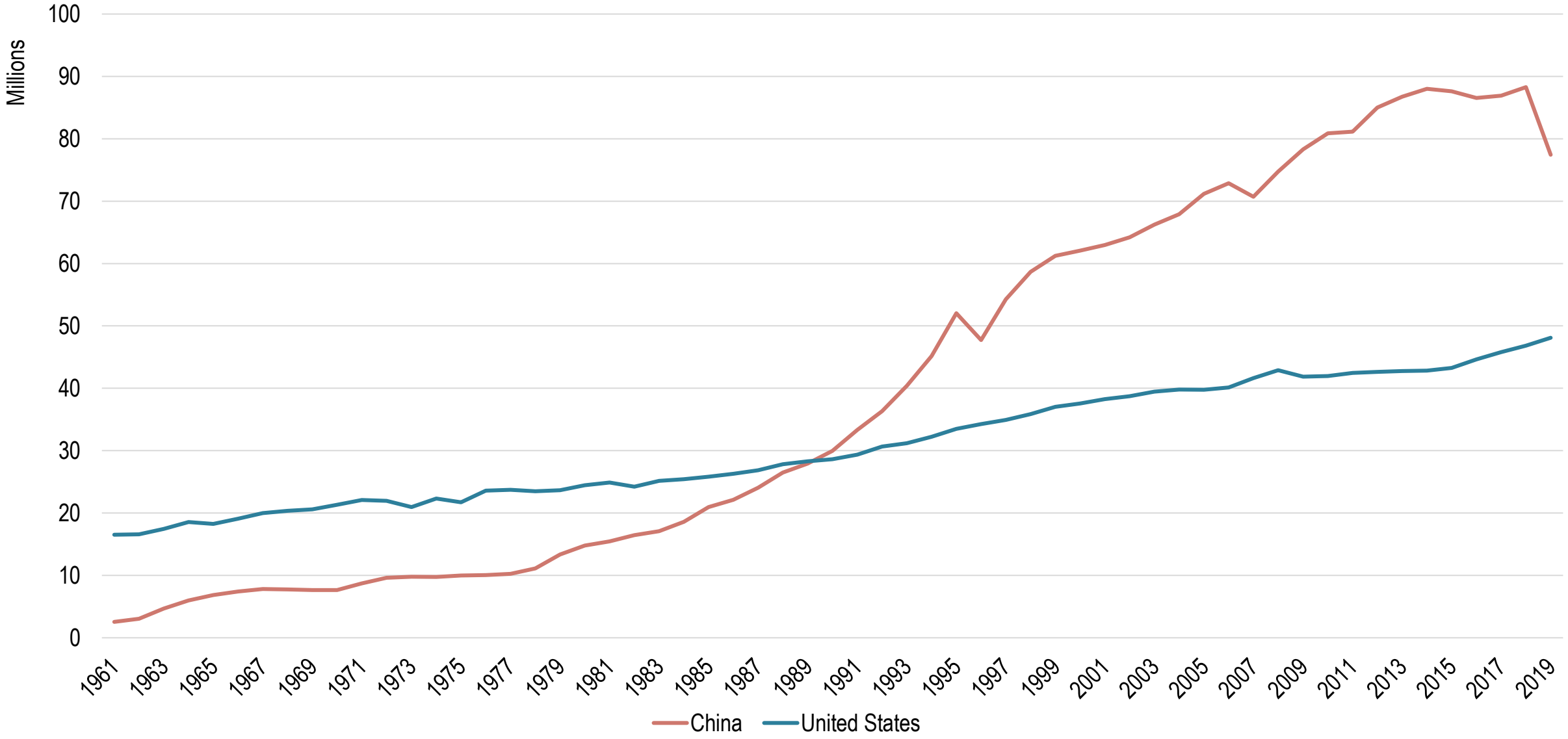
World Protein Production by Source, 1950-2014



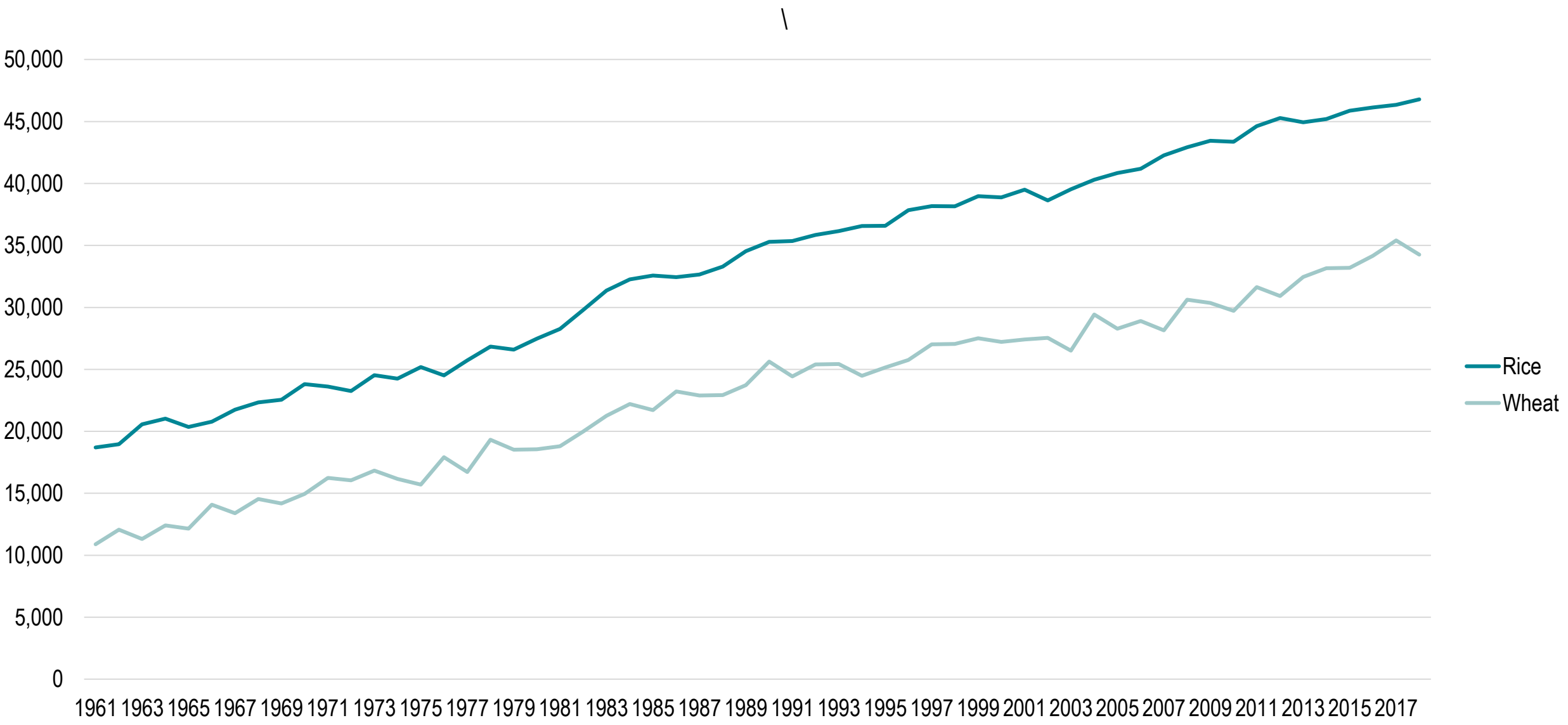
FAO Food Price Index, 1990-2021 (real, 2016=100)



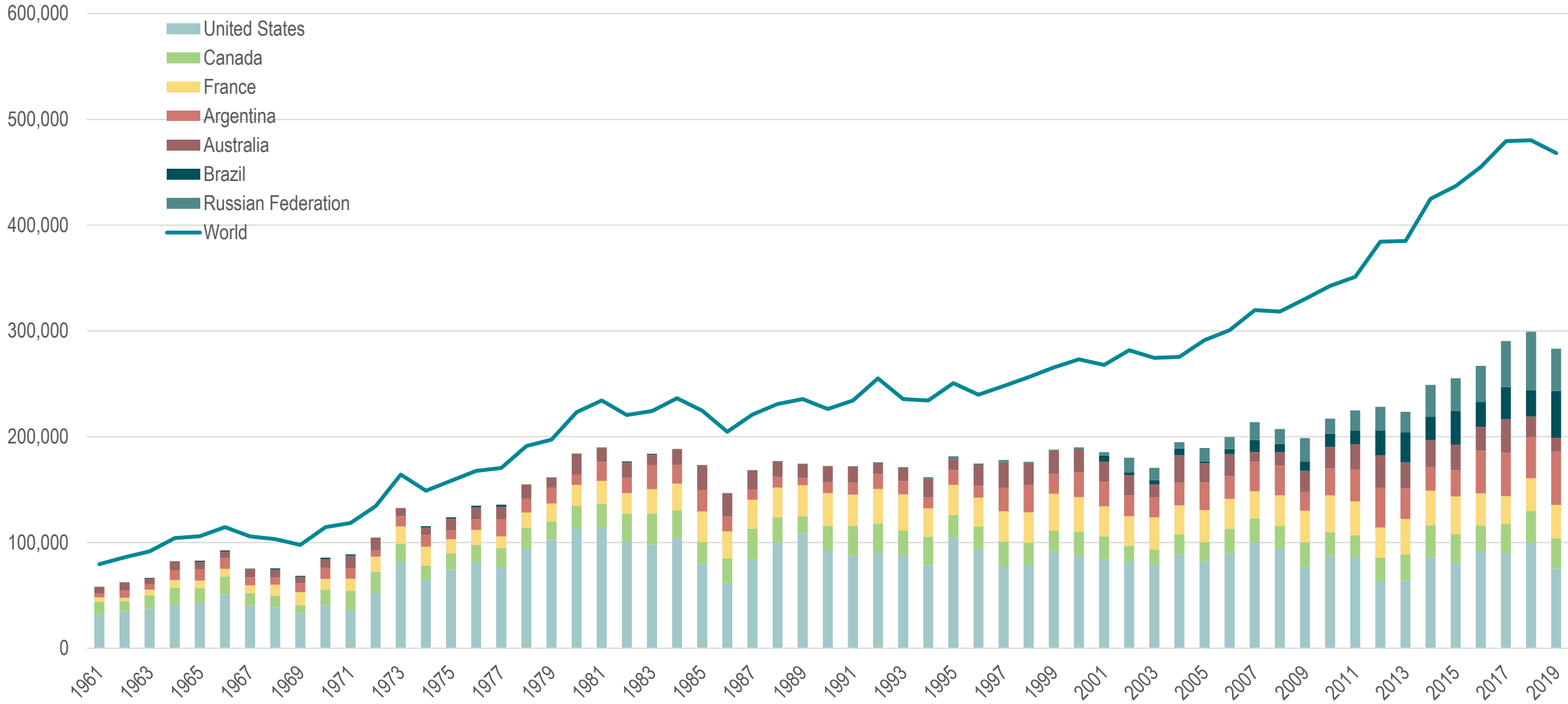
Meat Production, United States and China 1961-2019 (in tons)



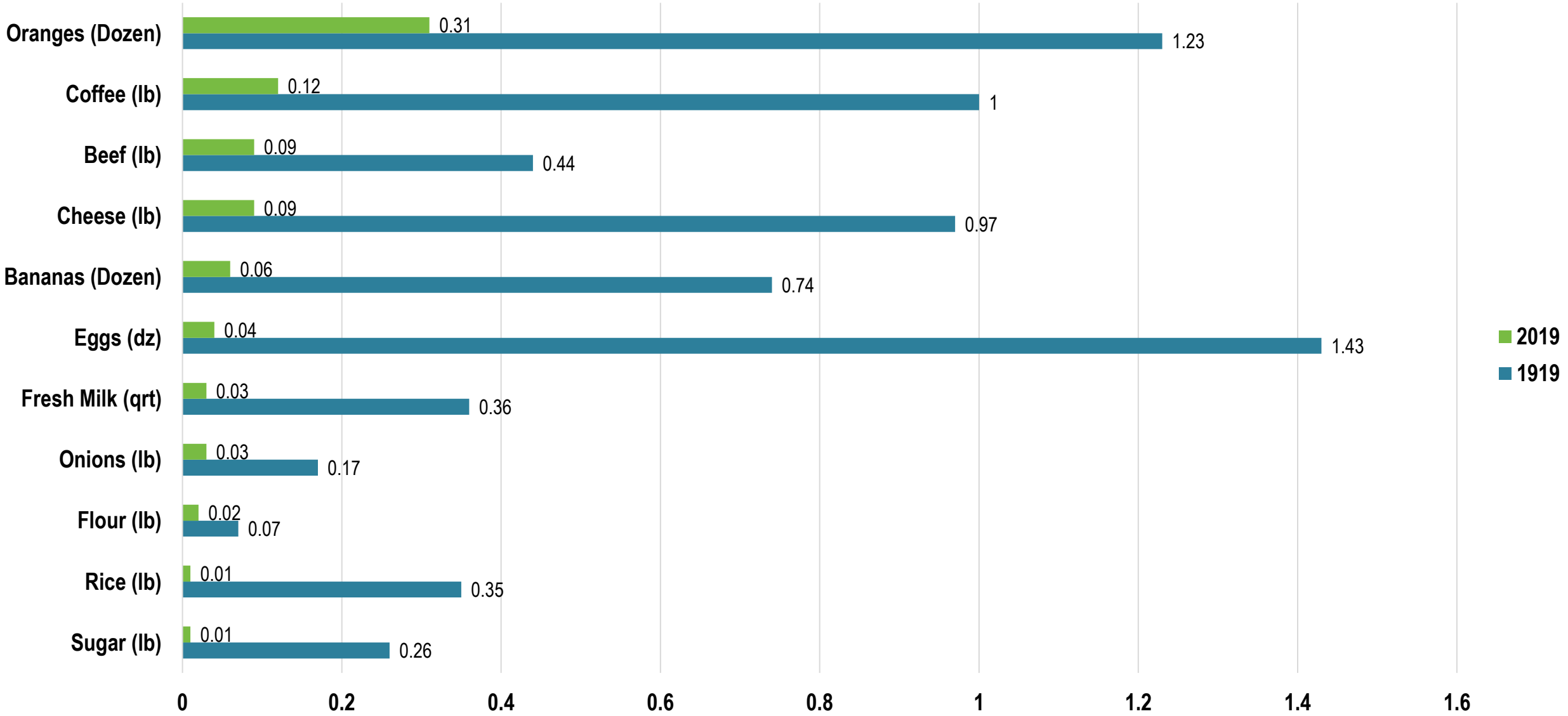
Yield of Rice (Paddy) and Wheat, 1960-2018 (kg per hectare)



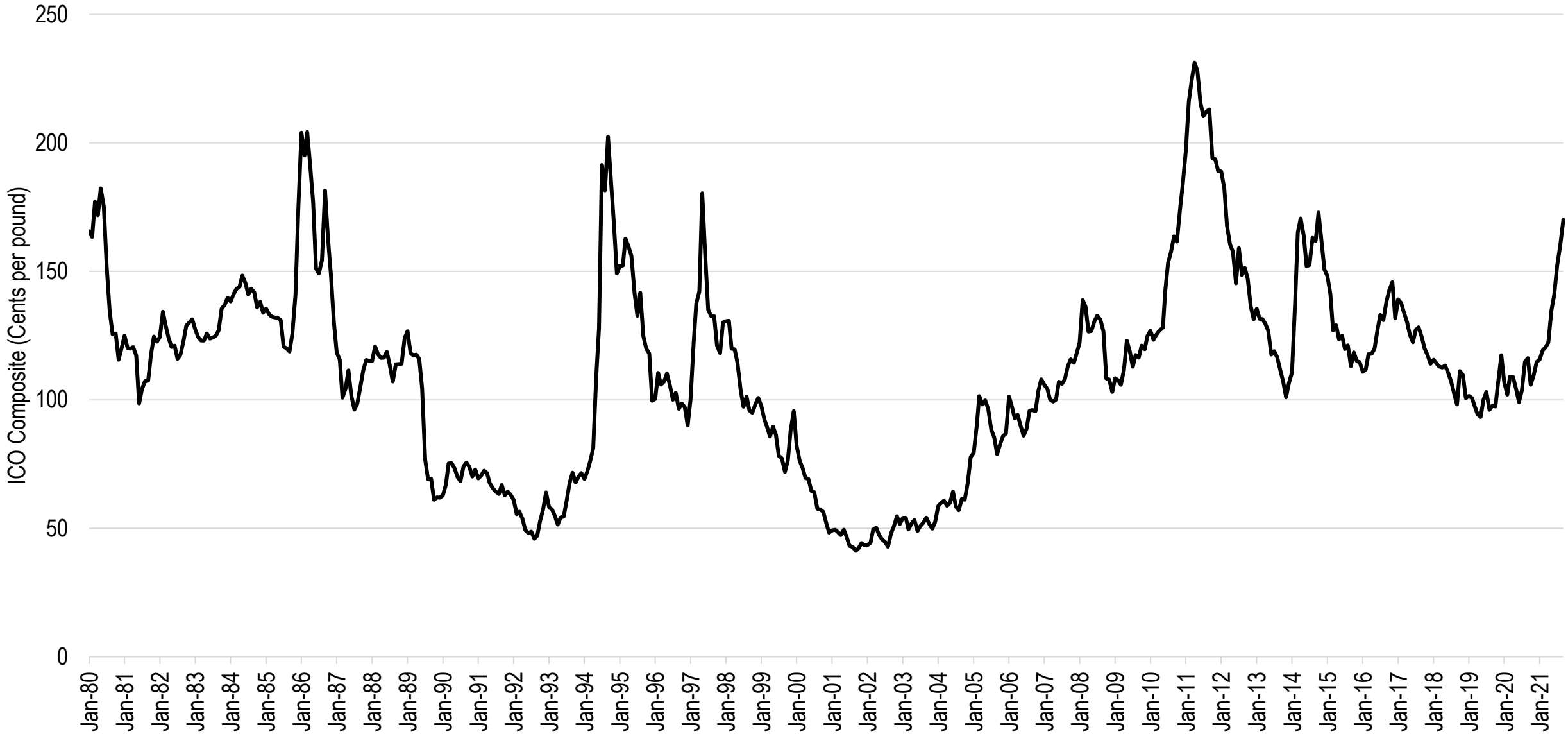
Exports of Cereals, 1960-2019 (in 1000s of tons)



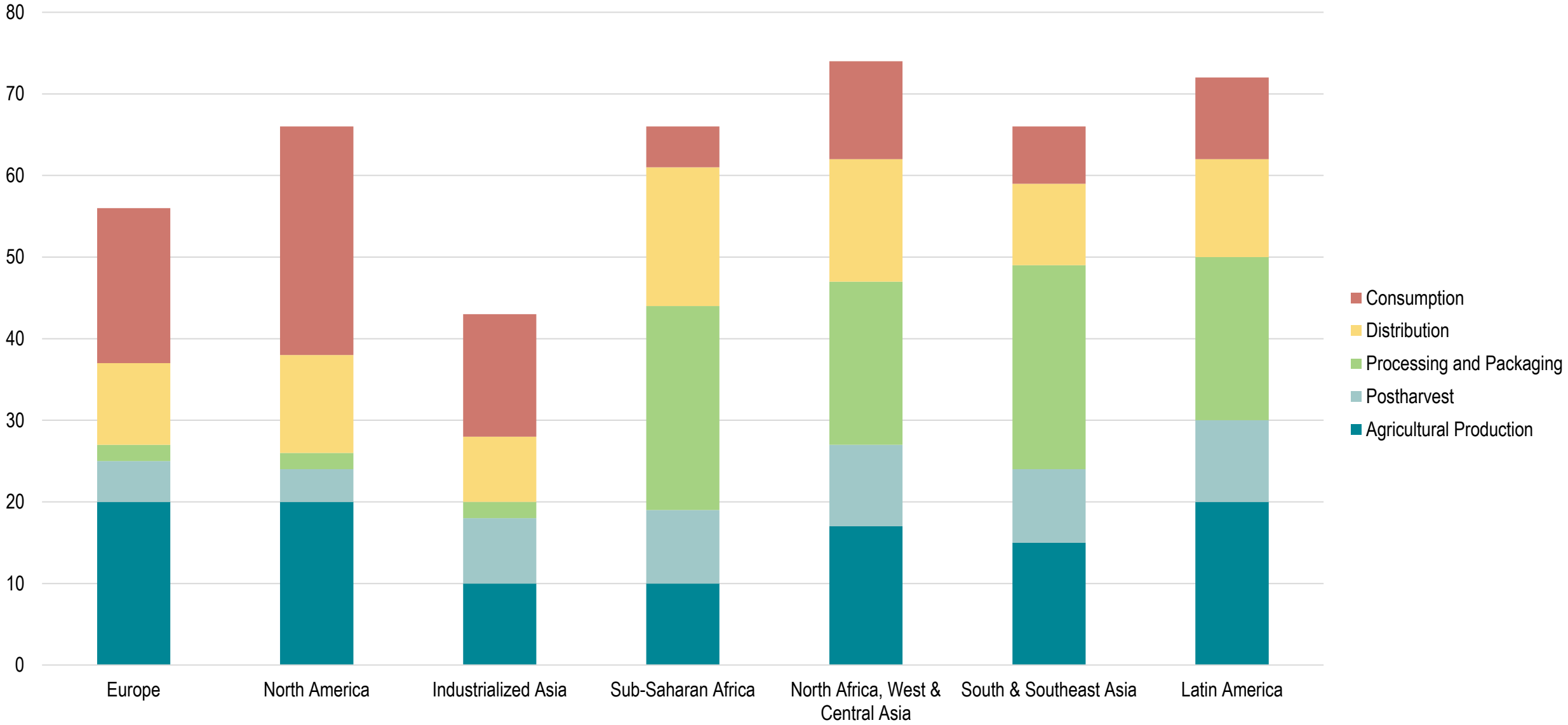
Food Prices Relative to Average Hourly Wages, United States, 1919-2019



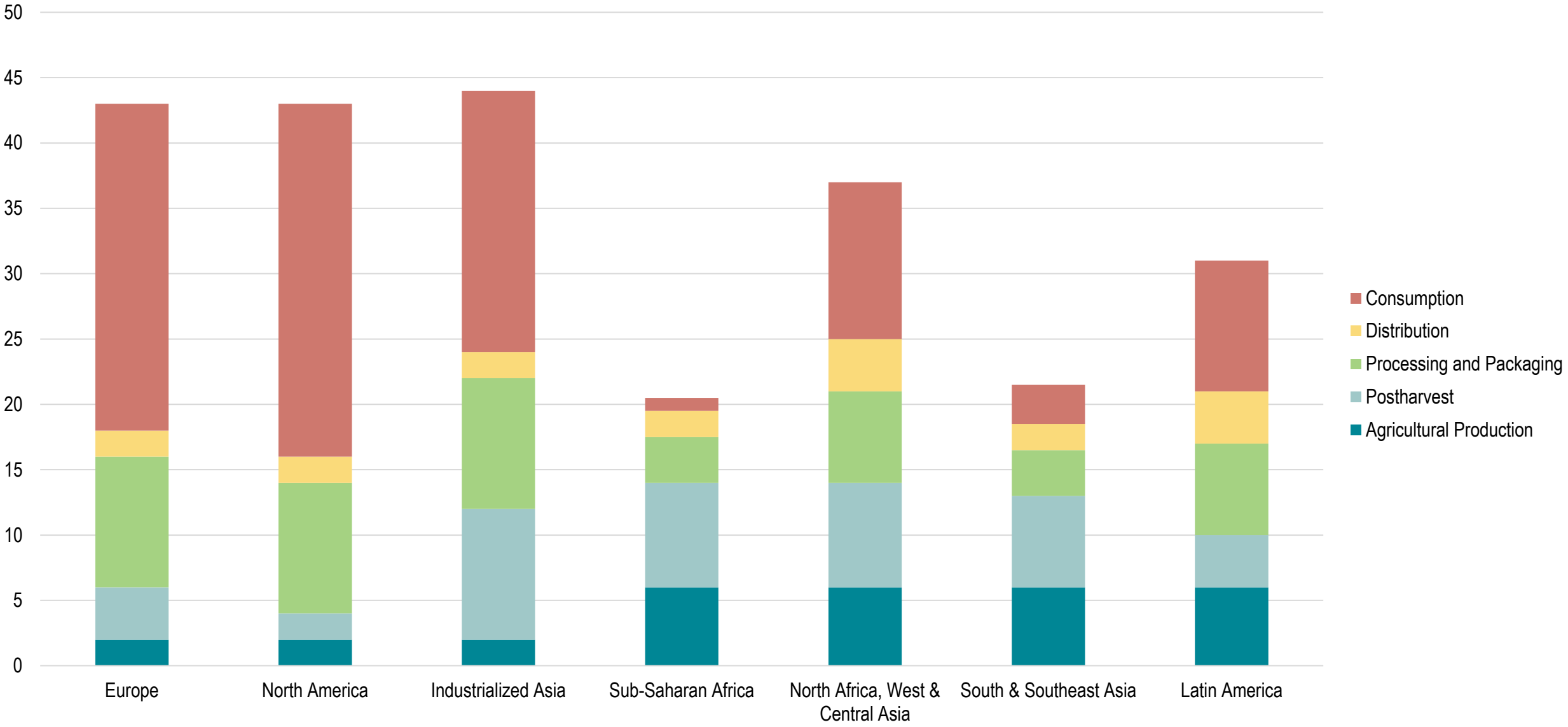
Retail Price of Coffee, 1980-2021



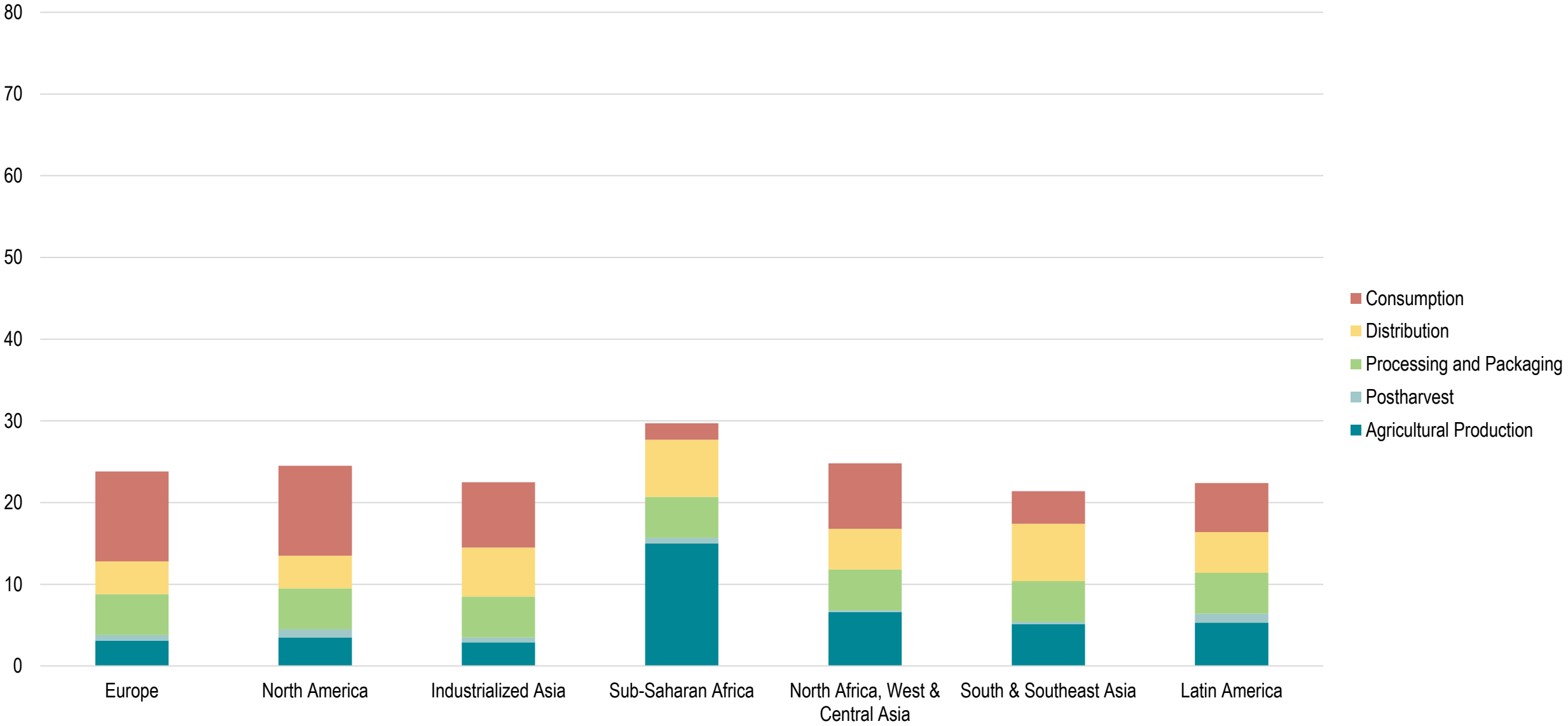
Food Losses, Fruits and Vegetables, 2010



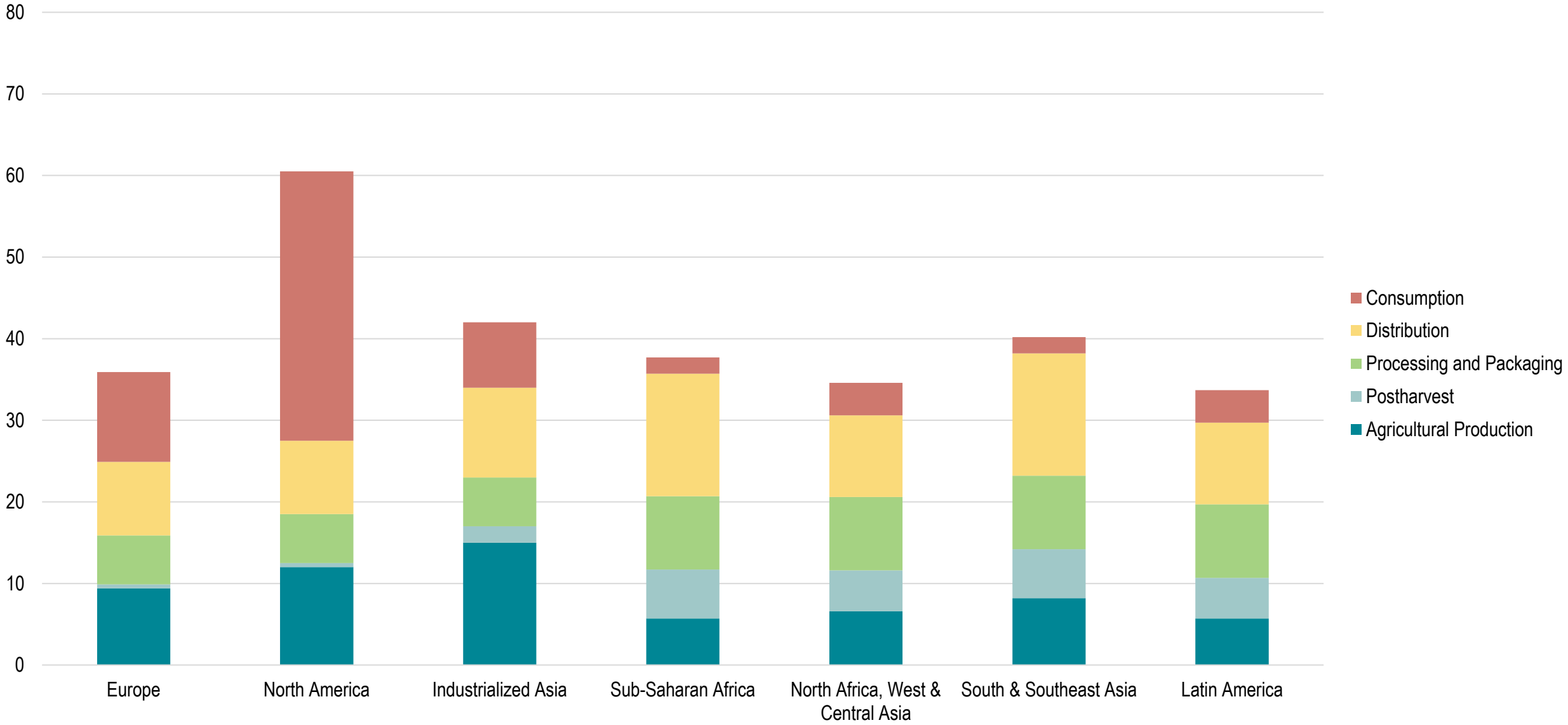
Food Losses, Cereals, 2010



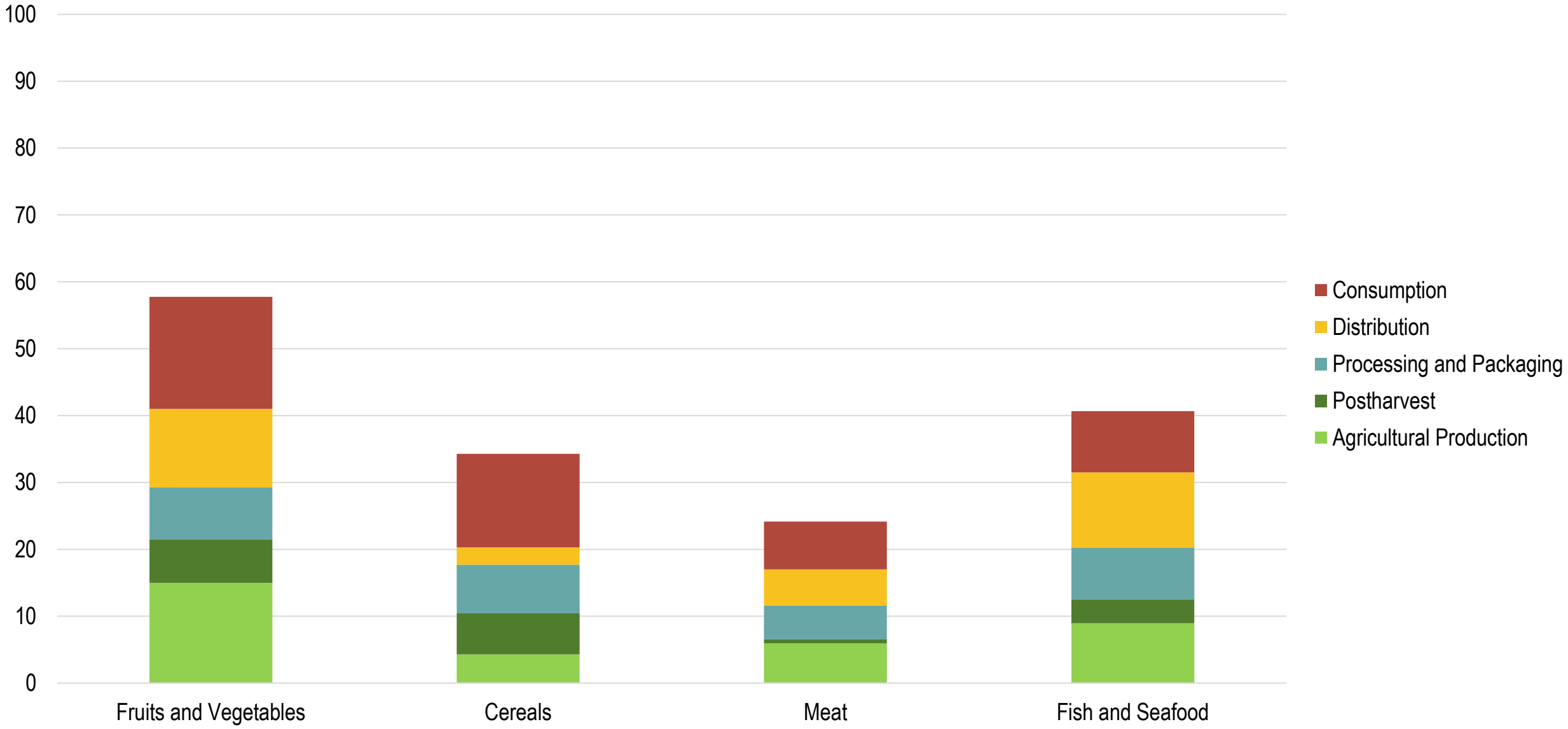
Food Losses, Meat, 2010



Food Losses, Fish and Seafood, 2010



Global Average Food Losses by Food Type, 2010



Harvesting and Field Transport

- Lack of cushioning during (manual) harvesting
- Rough and muddy field tracks
- Damaged or misplaced cushioning in field trailers
- Unsecured bunches during field transport

Pack House Operation

- Manual cutting and splitting of clusters
- Rough (worn out) conveyer belts
- Level drops and obstacles in conveyers
- Over-fillinf/under-filling of cartons
- Improper use of liners
- Misaligned stacking of packages during palletizing

Ripening and Storage

- Exposure of packages to high relative humidity (RH)
- Weakening and failure of the cartons at high RH
- Collapsing of the pallets (due to improper stacking)

Transport (Interstate and DC to Retail)

- Vibration Transmissibility
- Location of the pallet on the trailer of the truck
- Height of the package in a stacked pallet
- Unsecured pallets

DC Storage and Dispatch

- Rough handling of packages
- Forklift and Layer-Picker handling
- Order consolidation
- Unstable and unsecured pallets
- Misaligned packages in pallets

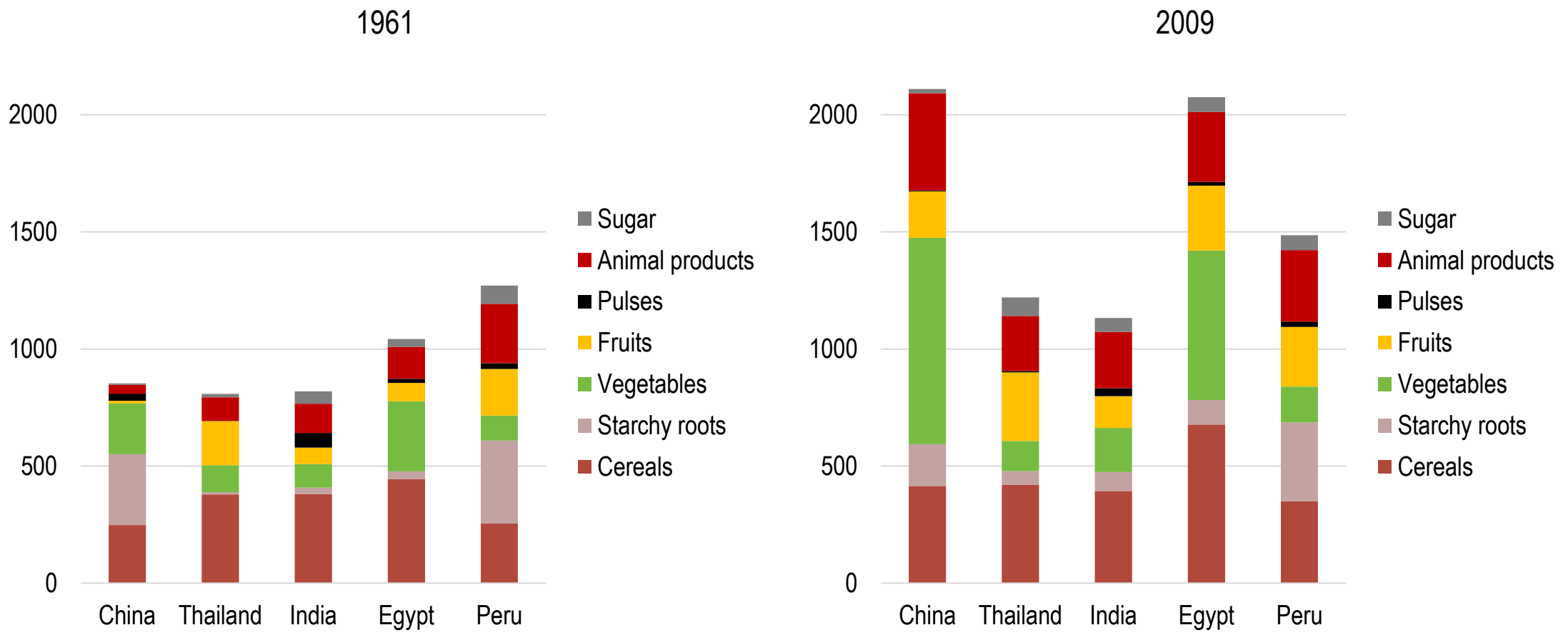
Retail

- Improper storage
- Unpacking of packages
- Lack of cushioning on shelves
- Over-stacking the shelves
- Handling by consumers

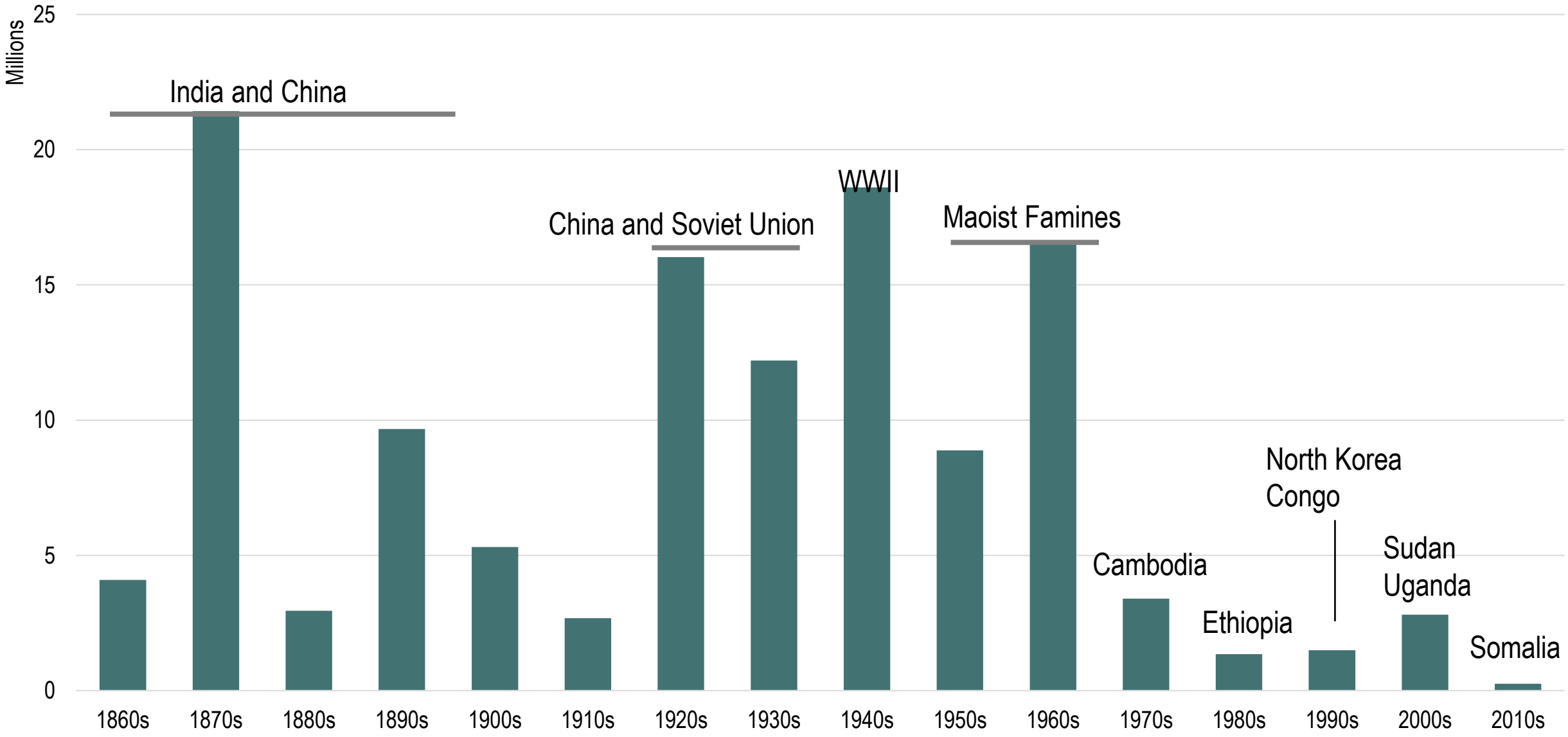
Types of Mechanical Damage on Fruits

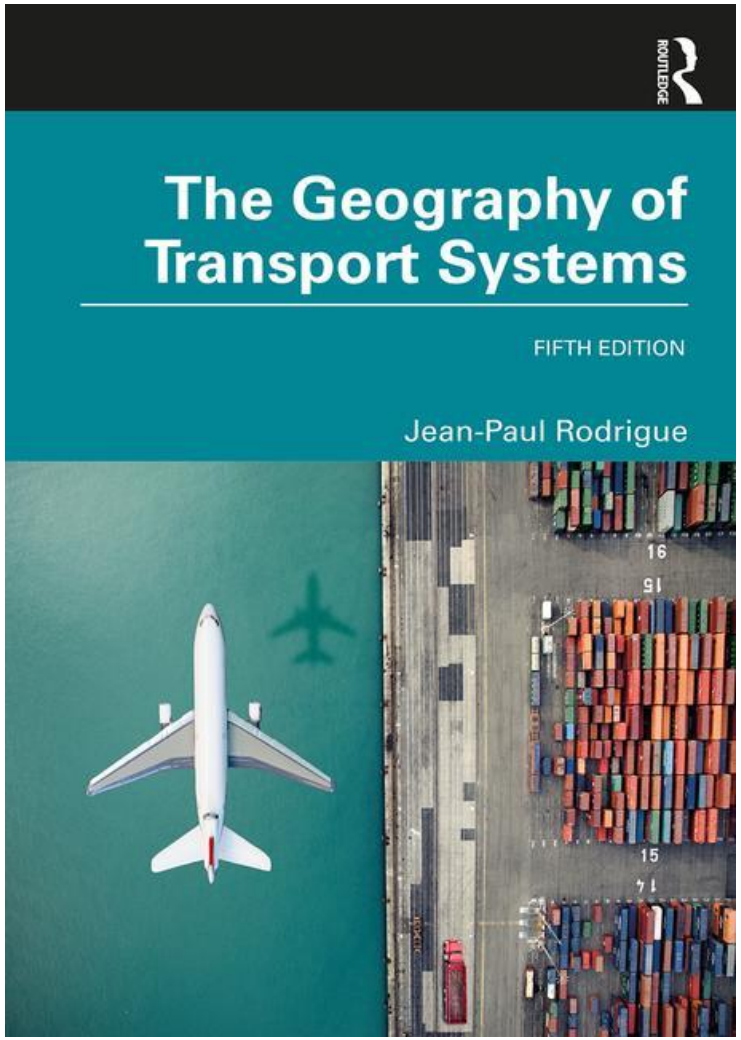
Damage Type	Damage Mechanism	Nature of Damage
Bruising	Sudden impact forces or compression (pressure) on body	Deformation of the fruit; grey/ brown area on the peel without clear edges
Scars	Friction between fruit and hard surfaces	Moderate to severe wet scar marks (sap oozing) with clear edges and appear as dried out black scar marks upon ripening
Fruit Rubs	Rubbing against other fruit	Creates a dark brown or black patch mark with clear edges mostly in the top or the basal end on the fruit body
Scuffing	Superficial (light) widespread rubbing of the fruit against contact surfaces such as other fruit and carton box	Light brown skin marks in the body of the fruit without clear edges
Blacked Rubs	Rubbing of the edges of the fruit from top to bottom against hard surfaces such as corrugated box	Thin black or grey line along the edges (mostly back) of the fruit
Neck Damages	Movement of individual fruits in a cluster with respect to the stem	Neck breaks lead to detachment of the fruit from its cluster

Food Consumed, Selected Countries (in grams per capita per day)



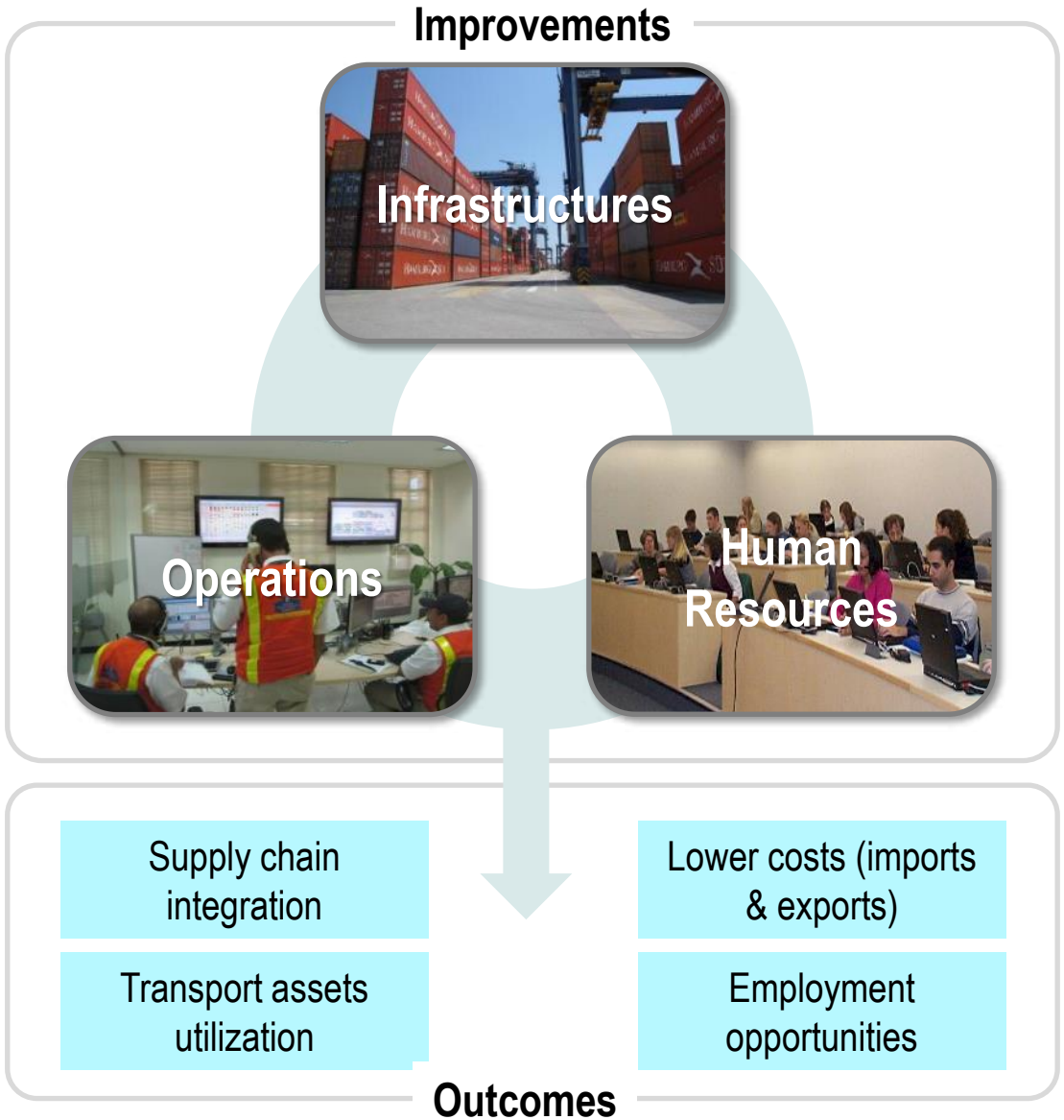
Estimated Famine Victims since the Mid 19th Century





Logistics Zones

The Benefits of Logistics Improvements

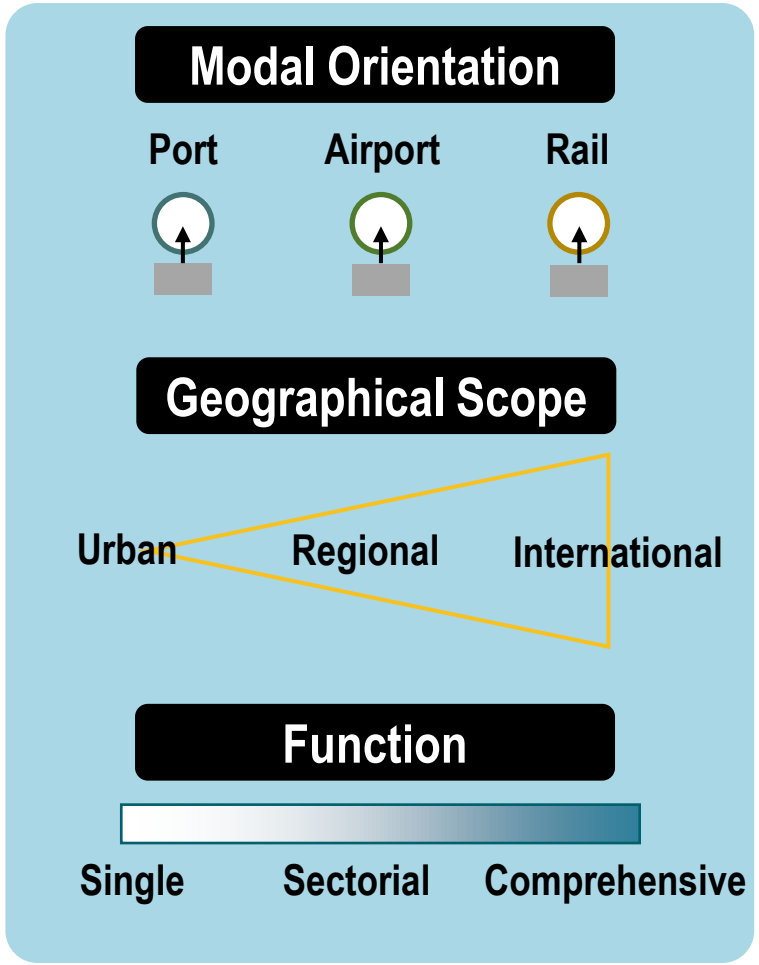


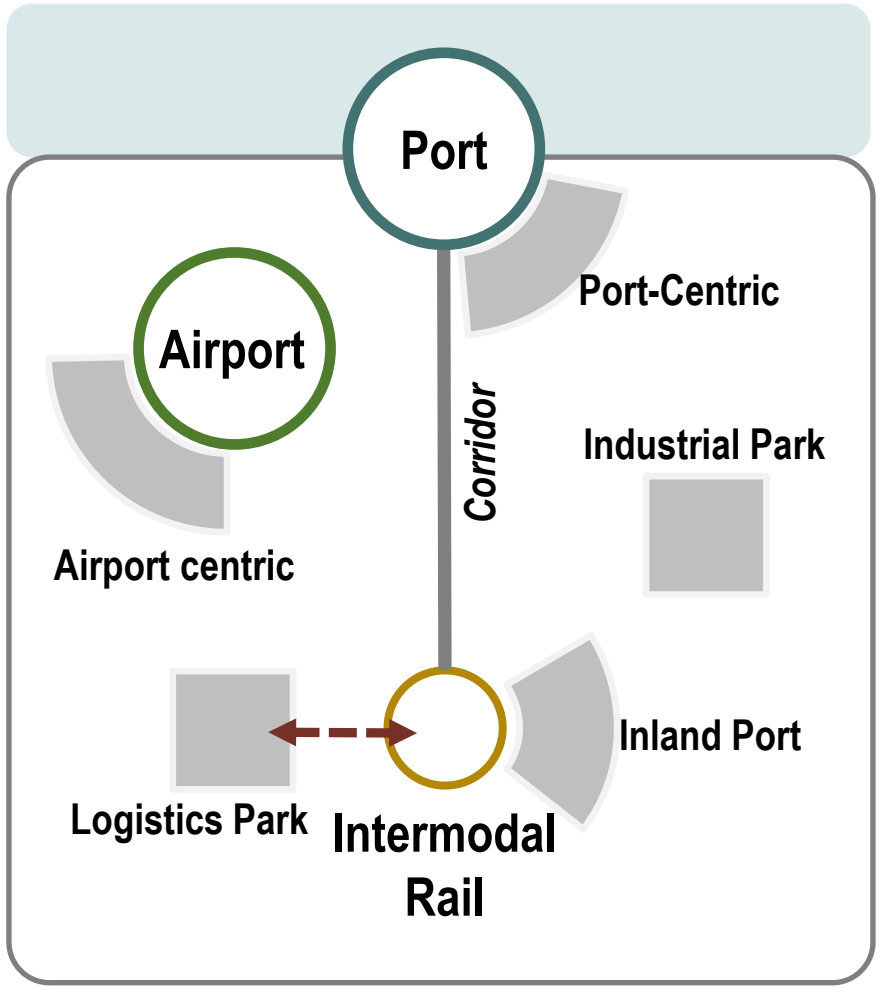
Logistic Zone	Acreage	Ownership	Notes
CentrePort Canada	20,000	Public	Rail-airport co-location
Global Transportation Hub	3,250	Public	
CN Calgary Logistics Park	580	Private	Opened in 2013
Alliance Texas	17,000	Private	Opened in 1994
CenterPoint Intermodal Center - Elmwood	2,200	Private	
CenterPoint Intermodal Center - Joliet	3,600	Private	Opened in 2004; BNSF
CenterPoint Intermodal Center - Houston Metro	630	Private	Opened in 2011
CenterPoint Intermodal Center - Suffolk	921	Private	Opened in 2009
CenterPoint Intermodal Center - Crete	1,000	Private	Opened in 2010; CSX
CenterPoint Intermodal Center - Kansas City	1,340	Private	KCS
Dallas Logistics Hub	6,360	Private	
Huntsville International Intermodal Center	1,470	Public	Opened in 1986
Rickenbacker Global Logistics Park	1,300	PPP	Opened in 2008
Raritan Center	2,350	Private	Rail link planned
Terminal Intermodal Logistica de Hidalgo	400	Private	Opened in 2012

Components of a Logistics Cluster

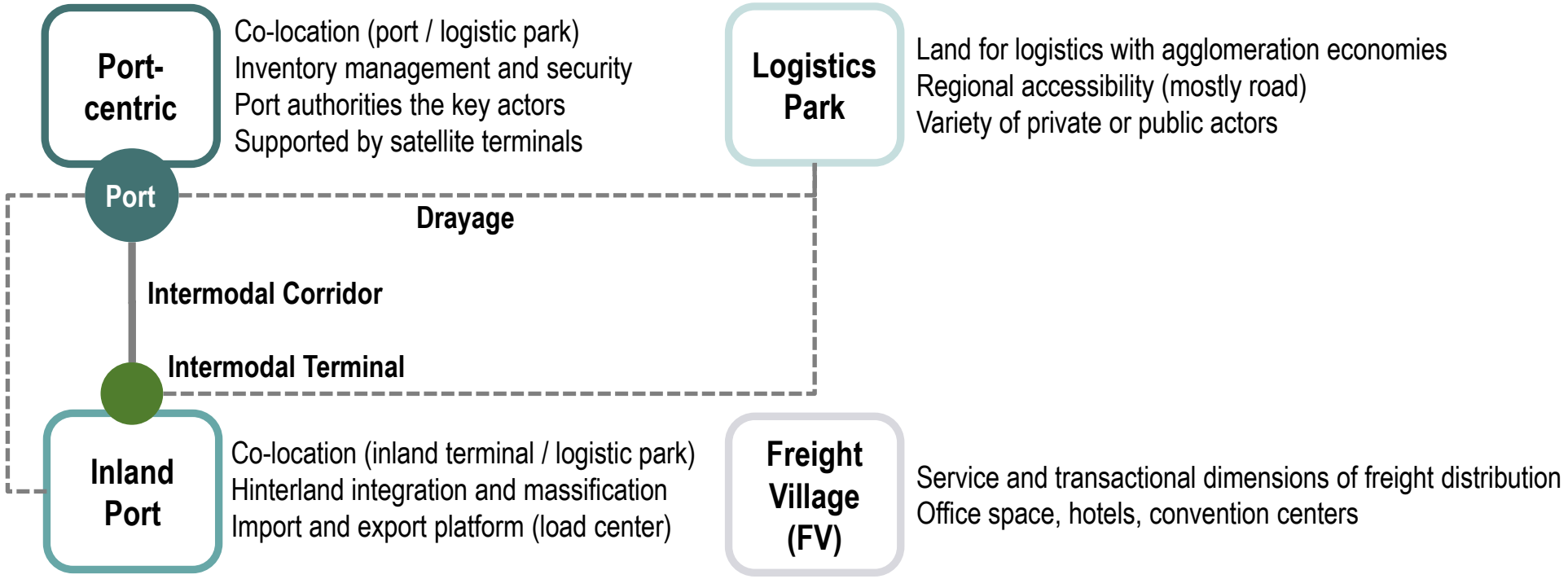
- **Core Activities**
  - **Transportation Services**
  - **Logistics Services**
  - **Infrastructure Operators**
- **Related Activities**
- **Institutional Setting**

Taxonomy of Logistics Clusters

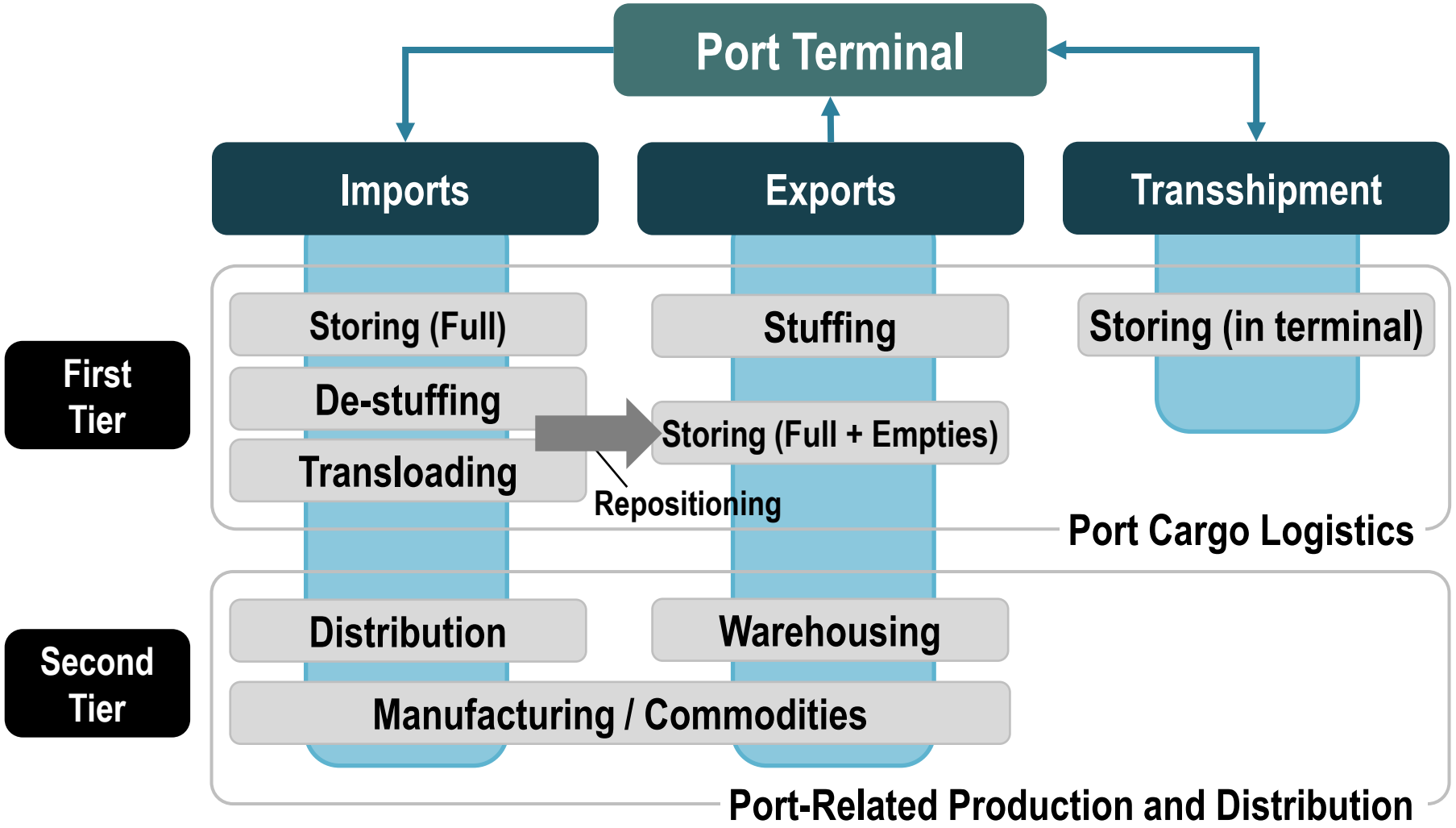




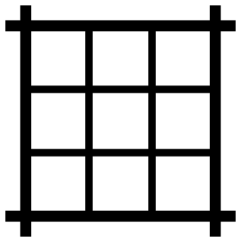
A Typology of Logistics Zones



Port Centric Logistics

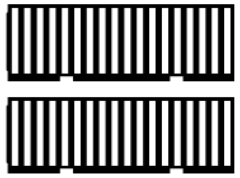


Main Advantages of Port-Centric Logistics Zones



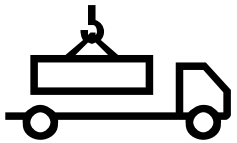
Land

Availability of land and labor.
Co-location.



Container Assets

Direct transloading.
Limited dwell time.
Fast repositioning of empties.
Mitigate land weight restrictions.



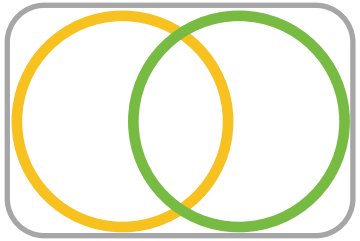
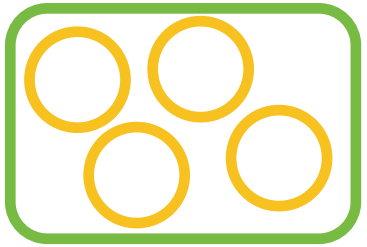
Drayage

Direct access to terminal gates.
Little / no congestion.
Short distances.

Supply Chain Management

Lower lead times.
Less inventory.
Direct deliveries to customers.

Main Governance Models for Inland Ports and Logistic Zones

	Characteristics	*Implications*
Single Ownership 	Public or a private actor entirely responsible for development and operations. Single vision and specific role.	Potential lack of adaptability to changes (single mandate). High level of risk.
Public-Private Partnership 	Combine public planning of infrastructures with private operational expertise. Public (local) interests represented.	Tendency to prioritize public interests over private interests.
Landlord Model 	Public ownership and private operations (a form of PPP). Long term concession agreements.	Managerial flexibility between the owner, the site manager and the operators. Most of the risk assumed by private operators.

Economic Benefits and Costs of Logistic Zones

Economic Benefits	Economic Costs
• Employment creation (direct, indirect, induced). • Attracting capital investment. • Increased distribution efficiency and lower costs to consumers. • Innovation in industry (practices). • Increased trade and cross-border traffic. • Reduced congestion and emissions.	• Opportunity cost of public fund usage. • Potential duplication of services. • Loss of public land. • Additional burden on taxpayers. • Negative community impacts.

Operational Advantages of Foreign Trade Zones

Custom Clearance	Done inland instead of at the gateway port. Simpler and faster. Higher security level (lower insurance rates). Consignment can stay for an unlimited amount of time in the FTZ. Consignee gets further advance notice that shipment is ready. Quotas can be managed through postponement.
Duties	Duties and merchandise processing fee not paid until the consignment is released and moved out of the FTZ (storage). Not paid if goods are exported or re-exported. Deferred if goods moved to another FTZ. Not paid for damaged, defective or obsolete goods. Lower insurance rates since no duties. If transformation is performed in the FTZ, the duty class may change (Select the taxation regime).
Settlement	Vendors often not paid until consignments leave the facility for delivery (Delay settlement). Remove damaged or defective products from the settlement.

Logistics Zones: Freight Services

Type of Service	Description
Rail services	Long distance rail transportation for suppliers and customers. Commonly involve a co-located intermodal terminal.
Trucking services	Drayage and long distance truck services for suppliers and customers. Shuttles to nearby rail and maritime terminals.
Loading / consolidation	Packing, palletizing, stuffing of cargo into containers or trailers. Cargo consolidation from multiple suppliers. Mostly linked to exports.
Unloading / deconsolidation	Unpacking, de-palletizing, and de-stuffing of cargo in distribution centers. Mostly linked to imports.
Transloading / crossdocking	Transfer from one cargo unit to another, such as a maritime container into a domestic container (or vice-versa). Crossdocking implies the transfer of truckloads, including changes in the composition of loads of each transport unit with minimal and short duration warehousing.
Warehousing	Standard function protecting the integrity of cargo units (e.g. damage, theft) while waiting to be released to customers.
Bonded warehousing	Cargo waiting to be released by customs. If part of a free trade zone, cargo can be transformed for re-export.
Container and chassis depot	Empty container storage waiting to be used. Transfer custody of containers between shippers. Consolidation center for containers used by maritime and rail terminals. Chassis pools.
Container and chassis maintenance	Container preparation and inspection before usage. Container cleaning and repair. Chassis inspection and repair. Important for the container and chassis location industry.
Equipment maintenance	Maintenance of vehicles and intermodal equipment.
Fabrication	Light manufacturing activities often undertaken at the distribution center. Include labeling, assembly, testing and quality control. Can also include the bagging of bulk cargo. Provides added value.
Cold chain	Activities maintaining the thermal integrity of cargo. Includes temperature-controlled warehousing but also preparation, transformation and inspection.
Recycling	“Green logistics” activities. Returns of defective or discarded merchandises. Recycling of components used in freight distribution, such as boxes.

Logistics Zones: Corporate Services

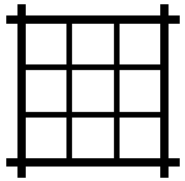
Type of Service	Description
Office space	Provision and location of office space to fill the management needs of logistics activities, such as the activities below.
Customs clearance	Availability of custom officers to support the custom clearance process. Services supporting compliance to custom procedures for imports and exports.
Security	Site integrity (e.g. access). Important if there is a free trade zone or custom activities.
Site maintenance	General activities related to cleaning, garbage collection as well as technical maintenance such as utilities.
Parcel services	Support the high transactional level of logistical activities.
Certification and quality control	Certifying and benchmarking agencies to insure that users meet recognized criteria.
Cargo inspection	Expert assessment in cargo losses and damages. Specialized laboratories.
Logistics equipment location	Sale and location of logistical equipment, such as racks, fork lifts, conveyors, etc. Maintenance of this equipment.
Container and chassis location	Availability of maritime and domestic containers for export and import activities. Availability of chassis.
Export facilitation	Activities promoting exports such as certification, financing and marketing.
Work supplies	Uniforms, work equipment (e.g. gloves), wraps, labels, boxes, security equipment (fire extinguishers), etc.
Temporary workers agencies	Supplying temporary workers to cope with fluctuations in the demand.
Office supplies	Sale and rental of office equipment and supplies.
IT equipment	Sale and rental of computers, telecommunication equipment and software. IT network setting and management.
Human resources	Personnel management from recruiting to payroll. Labor training and certification.
Accounting	Management of transactions and finances.
Insurance and financial services	Variety of insurance products for people and merchandises. Activities facilitating commercial transactions at the national and international levels (e.g. letters of credit).
Legal services	Expertise for contract redaction and commercial dispute resolution.

Logistics Zones: Personal Services

Type of Service	Description
Hospitality	Availability of hotel and meeting facilities to support the transactional intensity of logistics zones. Extended stay facilities. Overnight facilities for truckers.
Restoration	Availability of restaurants for workers and truckers. Lounges for short term relaxation and informal meetings.
Personal services	Array of services for workers (e.g. convenience store, hair salon, sports club, daycare, clinic, postal services, etc.)

Advantages of Logistic Zones

Geographical Advantages



Land

Availability (ownership or zoning).
Lower acquisition (or renting) costs.
Preferential taxation.

Accessibility and Connectivity

Proximity to terminals, suppliers and customers.
Lower distribution costs (distance).
Site accessibly 24/7.

Infrastructures

Provision of utilities and roads.
Leasing of warehousing space and equipment.

Operational Advantages

Planning and Regulations

“Fast track” (construction and operation).
Incremental infrastructure (development phases).
Compliance to safety, security and environmental regulations.
Foreign trade zone status.

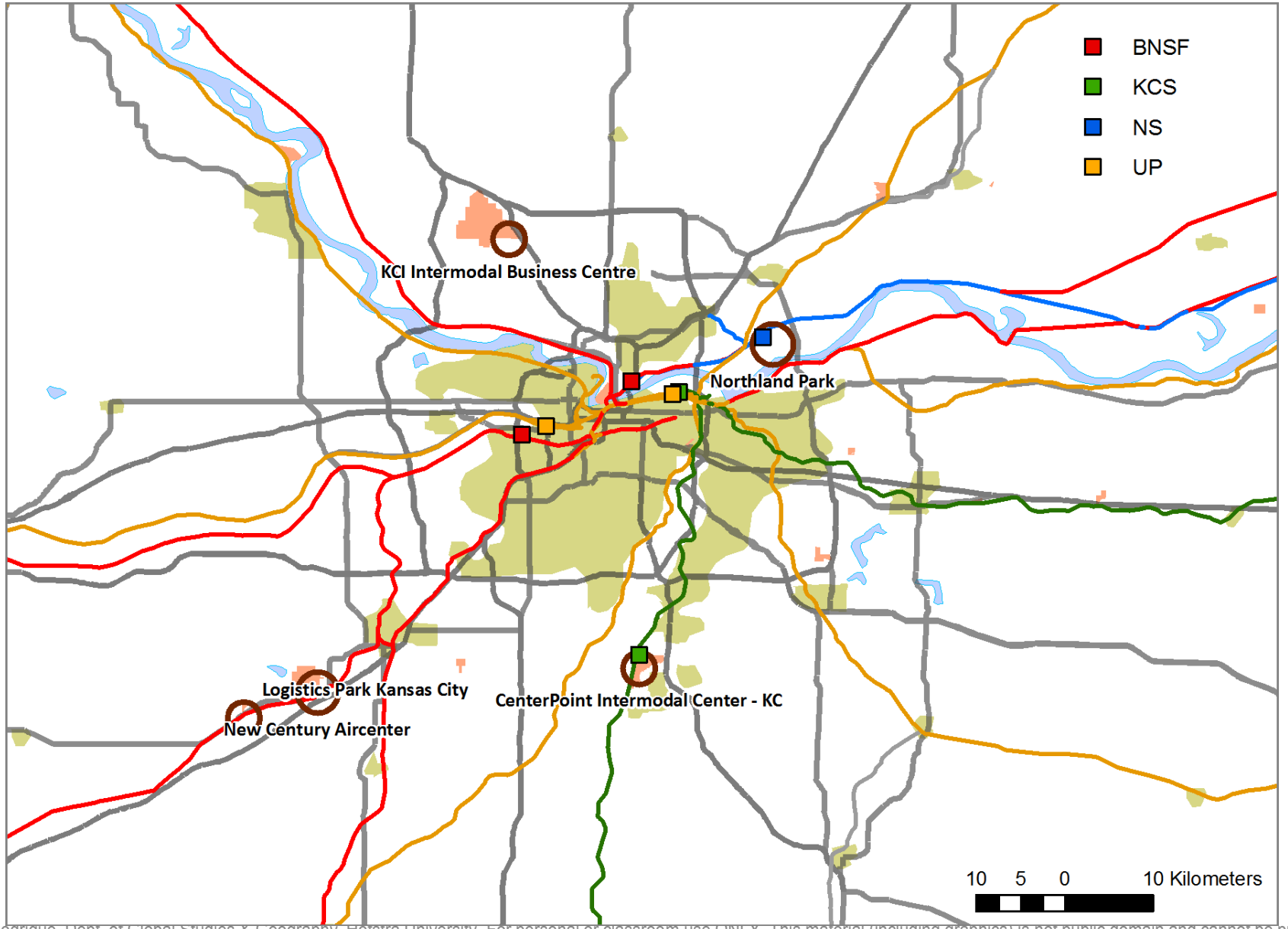
Economies of Agglomeration

Lower distribution costs (scale); shuttles to terminals.
More full truck loads.
Shared services (labor, transloading, telecommunications).

Multiplying Factors

Anchor tenants (major actors in logistics).
Diffusion of best practices (managerial, technical).
Service industries.

Kansas City Smartport: The Regionalization of Logistics



Distribution of the Size of Logistics Zones