## Market access and food access: Two sides of the same coin



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#### The Big Rig: Trucking and the Decline of the American Dream

Viscelli, S. (2016) University of California Press

#### Public Markets and Municipal Reform in the Progressive Era

Tangires, H. (1997) Prologue,Vol. 29, No. 1

#### **Concentration and Power** in the Food System

Howard, P. (2017) London: Bloomsbury Academic

#### Climate Change Adaptation and Food Supply Chain Management

Paloviita, A., Jarvela, M. (2016) Routledge

## Moving food to people and moving people to food

- 1960s distribution heyday
- 1970s fuel price volatility
- 1980s shake up in the labor market; privatizing supply chains
- 1990s Big Box and the rise of logistics
- 2000s consolidation and access issues
- 2010s climate volatility

#### A Framework for Assessing Effects of the Food System

Institute of Medicine and the National Research Council (2015) Washington, D.C. The National Academies Press

Food Supply Chain Management: Economic, Social and Environmental Perspectives

Pullman, M., Wu, Z. (2012) Routledge

#### The Dynamics of Change in the US Food Marketing Environment

Tropp, D. (2008) USDA-AMS Agriculture Handbook 728-3 The Food System as a Complex Adaptive System: the food supply chain & the biophysical, social institutional context



# The state of methods and tools for social systems change

Parsons B. (2007) American Journal of Community Psychology. Springer DOI 10.1007/s10464-007-9118-z

## CAS: The role of certainty (volatility mgt) and agreement (trust/control) in a dynamic system



#### Design of Complex Adaptive Systems

Monostori, L. and Ueda, K. (2006) Advanced Engineering Informatics DOI 10.1016/j.oei2006.05.009 CAS: System Characteristics Necessary for Adaptation and Evolution

- Diversity
- Flow
- Non-linearity
- Aggregation

#### **Crop Species Diversity Changes in the United States: 1978–2012**

Aguilar, J., Gramig, G. G., Hendrickson, J. R., Archer, D. W., Forcella, F., & Liebig, M. A. (2015) *PloS one, 10*(8), e0136580.

#### **Resilient Agriculture: Cultivating Food Systems for a Changing Climate**

Lengnick, L. (2014). New Society: British Columbia

#### A Framework for Assessing Effects of the Food System

Institute of Medicine and the National Research Council (2015) Washington, D.C. The National Academies Press

## Metropolitan foodsheds: a resilient response to the climate change challenge?

Lengnick, L., Miller, M., Marten, G. G. (2015). *Journal of Environmental Studies and Sciences*, *5*(4), 573-592.

### **Diversity** Flow Non-linearity Aggregation

- To lessen seasonal volatility, fruit and vegetable production moved to "Fruitful Rim"
- Oversimplified, highly efficient production & distribution systems are creating unintended environmental disruptions
- Optimizing diversity in products and ownership is critical for resiliency at multiple scales and parts of the food system

#### Quantifying economic sustainability: Implications for free-enterprise theory, policy and practice

Goerner, S. J., Lietaer, B., Ulanowicz, R.
E. (2009). Quantifying economic
sustainability: Implications for freeenterprise theory, policy and practice. *Ecological Economics*, 69(1)

## Optimizing two narratives: efficiency and diversity



Systemic Analysis of Food Supply and Distribution Systems in City-Region Systems

Armendariz, V., Armenia, S. and Atzori, S.A., (2016) Agriculture; doi:10.3390/agriculture6040065

#### A Network Analysis of Food Flows within the United States of America

Lin, X., Dang, Q., Konar, M. (2014). Environmental Science and Technology doi:10.1021/es500471d

#### Five Borough Food Flow: 2016 NYC Food Distribution and resiliency study results

Economic Development Corporation (EDC) (2016) New York City EDC.

#### Logistics Best Practices for Regional Food Systems: A Review

Mittal, A., and Krejci, C. (2018). Sustainability 2018, 10, 168; doi:10.3390/su10010168

## Diversity Food Flow Nonlinearity Aggregation

- Regional flow is insufficiently organized
- Chicago is the epicenter for private food warehousing
- Last-mile public terminal is critical for smaller supply chains
- Logistics for small supply chains underdeveloped, lacks analytics

Environmental and economic impacts of localizing food systems: the case of dairy supply chains in the Northeastern US

Nicholson, C., He, X., Gomez, M., Gao, HO, Hill, E. (2015) Environ. Sci. Technol. 2015, 49, 12005–12014 DOI: 10.1021/acs.est.5b02892

#### Optimal size and location planning of public logistics terminals

Taniguchi, E., Noritake, M., Yamada, T., Izumitani, T. (1999) Transportation Research Part E 35. Pergamon, Elsevier Science

Design of a Logistics Nonlinear System for a Complex, Multiechelon, Supply Chain Network with Uncertain Demands

Campanur, A., Olivares-Benitez, E., Miranda, P., Perez-Loaiza, R., Ablanedo-Rosas, J. (2018) Complexity doi 10.1155/2018/4139601

### Diversity Flow Non-linear supply chains Aggregation

- Temporal -- seasonal production
- Geographic route
- Longer chains = bullwhip effect = need for higher "agreement"
- Accomplished through trust, communication, reduced risk, vertical integration (ownership of supply chain capital), blockchain

#### Regional Food Freight: Lessons from the Chicago Region

Miller, M., Holloway, W., Perry, E., Zietlow, B., Kokjohn, S., Lukszys, P., Chachula, N. Reynolds, A., and Morales, A. (2016). Project report for USDA-AMS, Transportation Division. DOI: 10.13140/RG.2.2.21422.51522

#### Is local enough? Some arguments for regional food systems

Clancy, K., Ruhf, K. (2010) Choices. Agricultural and Applied Economics Assoc.<u>http://www.choicesmagazine.or</u> g/magazine/article.php?article=114

#### **Diversity Flow Non-linearity Aggregation critical thresholds**

First mile

- Distance to market
- Truck efficiencies
- Access to transportation
- Sufficient single product load (interregional) & diversity of product (intraregional)

#### Last mile

- Access to cold storage warehousing
- Truck size
- Traffic congestion
- Who pays to move food consumer, wholesale buyer, seller

## Sustainable wholesale food systems: Terminals and trip segments



#### One shipper to one terminal, 1 or many buyers?

#### CR England Company History

CR England (2015) http://www.crengland.com/aboutus/company information/companyhistory

#### SmartWay Excellence Awards

USEPA (2015) https://nepis.epa.gov/exe/Zy

## **CR England trajectory**

- North America's largest wholesale cold chain
- Founded in 1920 as regional food carrier in UT
- First reefer in 1950
- 1960 1st cross country runs to public food terminal
- 1978 opened 1<sup>st</sup> DC in NJ
- 2015 also in CA, IN, TX
- 2016 LA dropyard to separate duty cycles, improve last mile
- EPA SmartWay awardee

## Proof of concept: Ontario Food Termina

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## Farmers must make money

- Too small too diverse and operating under economic thresholds
- Too big too efficient and operating over environmental limits
- Farmers with sales < \$75k are reliant on off-farm income.
- Farmers with sales \$350k-\$1m: half show positive returns and the top quartile are making 42% ROA.
- Farmers selling over \$1m: 75% are profitable, with top quartile making 65% ROA.

Thilmany McFadden, Bauman and Jablonski, 2016 "The financial performance implications of differential marketing strategies: exploring farms that pursue local markets as a core competitive advantage". Presented at the 153th Congress of the European Association of Agricultural Economists, Gaeta, Italy

- Market within 200 miles of a single drop point
- Enough production to fill
   53' trucks
- Enough diversity for healthy soil
- Enough efficiency to streamline farm labor

# Truckers and wholesale buyers must make money

- Regular hauling and buying contracts
- Full trucks
- 1-day runs (no overnights)
- One point of delivery
- Anticipated, minimal road congestion
- Trip-segment specific engineering
- Affordable cold storage space
- 1-truck delivery to buyer
- Wholesale market within 50 miles of buyers

## Systemic change to improve food access

- Food is a right, not a privilege. Physical and economic access is a public good.
- Increase the food flow first, then neighborhood groceries will emerge, not the other way around. Avoid gentrification.
- Food terminals are a public utility. If the private sector is not meeting the needs of small supply chains and independent business ownership, then there is a need for a public terminal.
- Terminal design must hold space for businesses of all sizes, and improve regionto-region freight movements.
- Terminal design must move food to trucks, not trucks to food.
- Terminals need to optimize energy efficiency and product diversity.
- Terminals need a governance structure that protects the public interest in food.

# Logistics in the public interest

- Detailed, dynamic understanding of food flow at national and regional levels
- Algorithms for seasonal logistics accessible to small business collaborations
- Drive time data analysis accessible for small, independent fleets
- Food access emergency planning data
- Regional systems designs for improved food access within cities and rural areas under anticipated climate scenarios
- Support for USDA-Agricultural Marketing Service to collect and analyze relevant data and assist with infrastructure development
- Public policies that support civic interest in resilient food supply chains