The Challenge of Adoption of New Technologies: A Consumer Research Perspective

Vic Adamowicz

Vice Dean, Faculty of ALES

University of Alberta

Thanks to Ellen Goddard for advice and assistance!

AI and Food Products

- Beneficial Impacts on Consumers
  - Choice enhancement / simplification
  - Preference matching
    - Information provision
    - New product development
    - Location
  - Food safety, Traceability, Environmental quality, etc.

- Potential Challenges
  - Concerns about new technologies
  - Personalization leading to adverse outcomes (spending, obesity, etc.)
  - Privacy concerns

Choice for Consumers

- Simplifying choice, more personalized choice
  - Make choice "easier" ("cognitive misers"; system I vs II processing)
  - Food options are increased – reduce effort in selection / evaluation
  - Understanding personal preferences helps in creating new products

- Preference matching
  - Identify food products that are desirable (taste, diet, health, etc.)
  - Similar to Netflix, Spotify

- Location
  - Machine Learning to identify ideal locations for new restaurants, using mobile phone GPS data

The founders of IntelligentX beer claim each batch of beer tastes better than the last.
NEWSWEEK

JOURNAL REPORTS: LEADERSHIP

Food Companies Add AI to Their Recipes

Wall Street Journal

Artificial intelligence can speed up the process of finding new flavors and products. Cumin pizza, anyone?

By Jaewon Kang

Oct. 9, 2019 7:07 pm ET

With its power to analyze data and spot trends, artificial intelligence is being used to develop new fashions, songs and TV ads. Now it is making inroads into another creative area that is possibly even more subjective: new flavors and foods.

McCormick MKC **-0.04%** ▼ & Co., Conagra Brands Inc. CAG **1.55%** ▲ and PepsiCo Inc.
PEP **-0.17%** ▼ are among the food giants using AI to cook up new concepts such as bourbon pork-tenderloin seasoning and pudding flavors meant to call to mind unicorns.

a.ca

Choices for Consumers

Application of Intelligent Recommendation Techniques for Consumers' Food Choices in Restaurants

Xinke Li [1,2*], Wenyan Jia [2], Zhaofang Yang [2,3], Yuecheng Li [2], Ding Yuan [4], Hong Zhang [4] and Mingui Sun [2,5]

[1] College of Communication Engineering, Chongqing University, Chongqing, China, [2] Department of Neurosurgery, University of Pittsburgh, Pittsburgh, PA, United States, [3] College of Computer & Information Science, Southwest University, Chongqing, China, [4] Image Processing Center, School of Astronautics, Beihang University, Beijing, China, [5] Department of Electrical and Computer Engineering, University of Pittsburgh, Pittsburgh, PA, United States
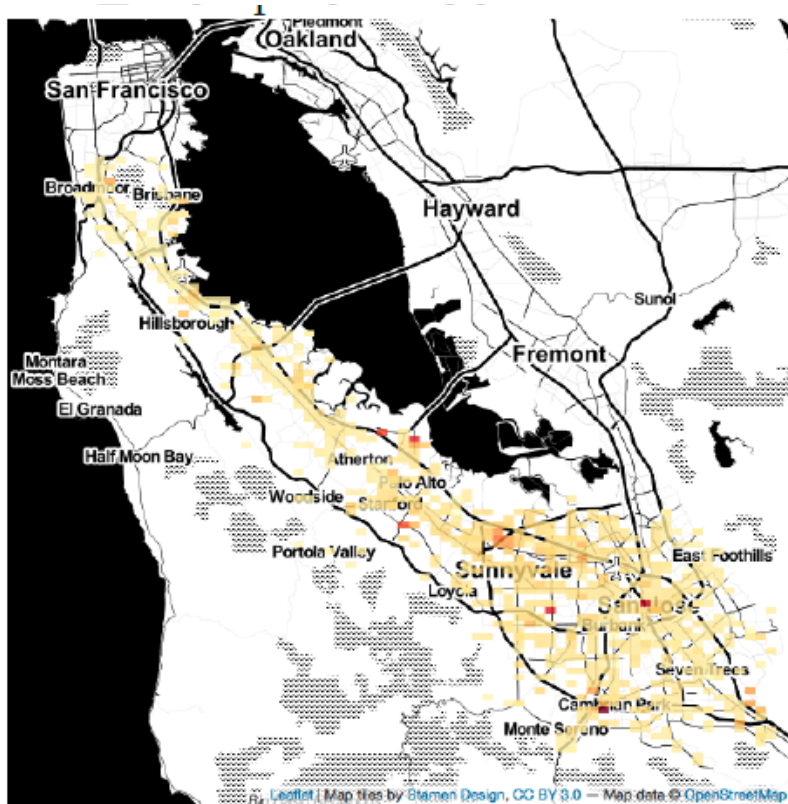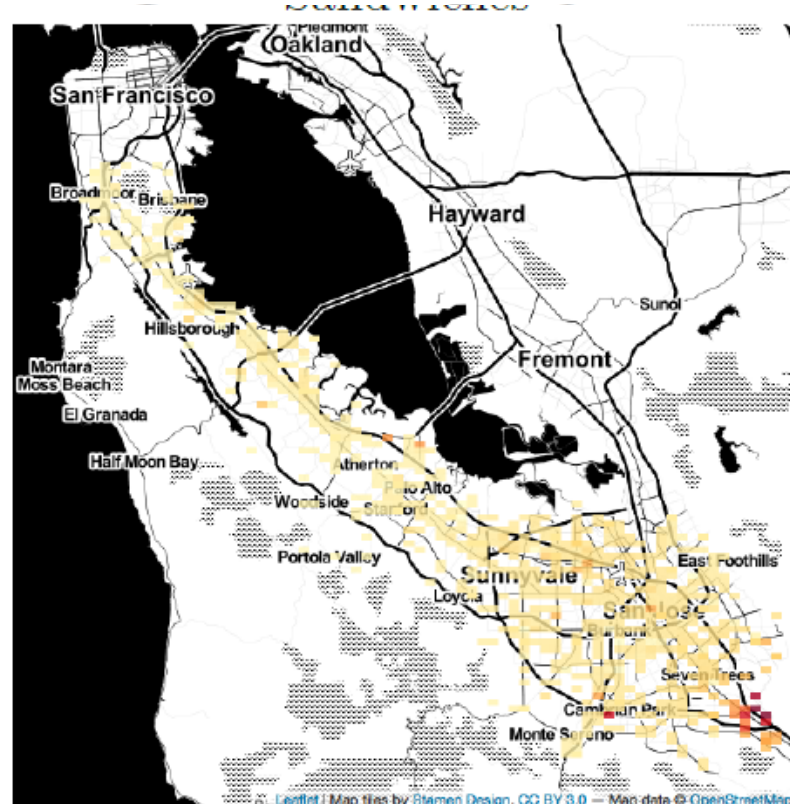
Vegetarian   Vietnamese Restaurants

FIGURE A9. BEST LOCATIONS FOR RESTAURANT CATEGORY

https://arxiv.org/abs/1801.07826

ales.ualberta.ca

Choice for Consumers

- Creating products / information for choice simplification and preference matching:
  – Less reliance on traditional surveys and sensory panels
  – Change in advertising, information provision
- More reliance on sensors, bio-physical information (bio-sensors, eye tracking)
- More reliance on sentiment analysis and large data structures (social media, GPS, etc.)
- More reliance on provision of tailored heuristic information

Improving outcomes for consumers

- Food Safety
  - AI / sentiment analysis / search data to identify food safety outbreaks
- Traceability
- Environmental improvements
- Animal welfare
- Dietary choices
- Country / Region of Origin preferences

Improved outcomes for consumers

BERT was able to correctly identify recalled products with 74 percent accuracy. Additionally, the machine learning tool identified 20,000 unsafe food products that were not recalled by the FDA but could warrant safety monitoring. The authors conclude that their findings support a role for artificial intelligence in foodborne illness surveillance by surveying online reviews, e-commerce websites and social media. The work was published in the *Journal of American Medical Informatics Association (JAMIA) Open*.

"Health departments in the US are already using data from Twitter, Yelp, and Google for monitoring foodborne illnesses," said Dr. Nsoesie in a news release. "Tools like ours can be effectively used by health departments or food product companies to identify consumer reviews of potentially unsafe products, and then use this information to decide whether further investigation is warranted."

The artificial intelligence platform was trained to pick up words like "ill" and "foul" in Amazon reviews of various food products, linking them to foods that have been recalled by the FDA.

Improved outcomes for consumers

Home / Articles / 2019 / Increasing Traceability in the Meat Supply Chain

Food Processing

Proteins / Technology

Increasing Traceability in the Meat Supply Chain

Pinpointing the movement of products is one of several important initiatives for meat and poultry.

By Pan Demetrakakes, Senior Editor
Oct 30, 2019

In a bit from the cable TV comedy "Portlandia," a couple orders chicken at a restaurant, and the server returns with a dossier, topped with a photograph:

"The chicken you'll being enjoying tonight, his name was Colin," she says. "Here are his papers."

Today's consumers are demanding nearly that level of transparency in their meat and poultry. And the technology exists to give it to them. Transparency and traceability are in great demand in food generally, and meat/poultry is arguably where the demand is most intense.

Improved outcomes for consumers

M.F. Hansen et al./Computers in Industry 98 (2018) 145–152 151

Fig. 8. Class activated maps overlaid on input images together with the original photographs. This gives us confidence that the network is not learning a discriminative feature based on something other than the pig's face (e.g. the time stamp). Pigs are shown in the same as order as Fig. 3, top row shows pigs 1-5, and the bottom row shows pigs 6-10.

rta.ca

Challenges

- New products / technologies
  - Food Neophobia

- Consumption effects
  - Health outcomes / Obesity
  - Expenditure / Financial

- Privacy concerns
  - Fallout from privacy breaches

Consumers and New Products (Frewer et al, Trends in Food Science & Technology 2011)

- Perceived personal benefits and risks (health, financial, animal welfare, etc.)

- Perceived social benefits and risks

- Distribution of benefits (consumer, industry)

- Ethical questions (animal welfare, privacy)

- Perceived regulatory effectiveness (trust)

- Cognitive / emotional aspects

- Controllability

- Familiarity

- Uncertainty
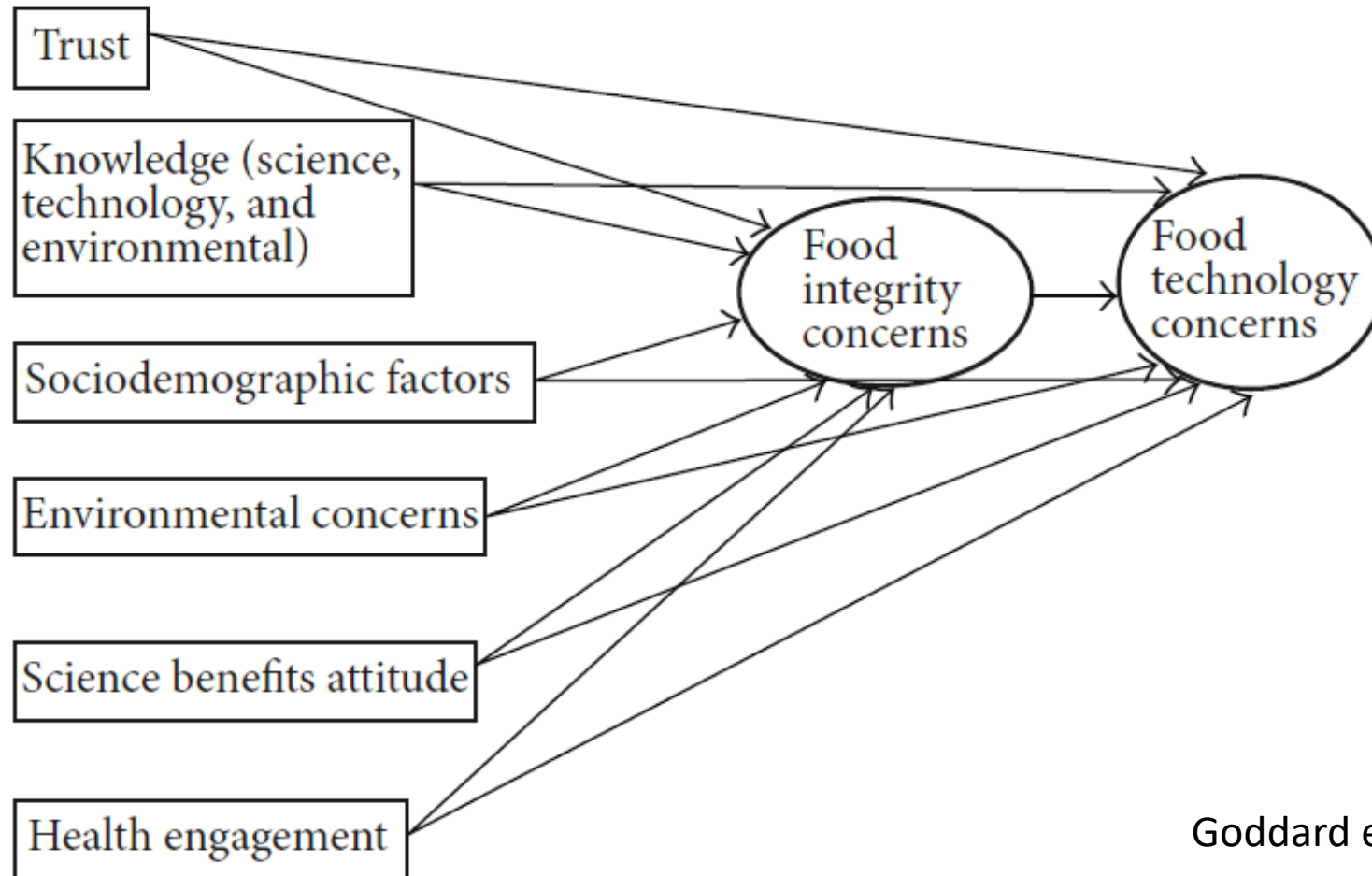
Goddard et al, 2018. P. 2.

FIGURE 1: Hypothesized model of factors predicting influences of food integrity concerns and concerns for the food product of technology.

lberta.ca

Challenges

GM vs GE

In your opinion, to what degree do you think there is a difference between genetically-modified (GM) and gene-edited (GE) foods?	Yes, I perceive a significant difference between GM and GE.	36%
	No, I do not perceive a significant difference between GM and GE.	31%
	I am unsure.	33%
In regards to the definitions and information provided in the previous questions, in your opinion, to what degree do you TRUST genetically-modified (GM) relative to gene-edited (GE) foods?	I trust GM and GE foods the same.	31%
	I trust GM foods more than GE foods.	8%
	I trust GE foods more than GM foods.	16%
	I am not sure.	45%

Henry An, et al, 2019.

a.ca

Challenges

Big Data and the transformation of food and beverage marketing: undermining efforts to reduce obesity?

Kathryn Montgomery, Jeff Chester, Laura Nixon, Lillian Levy & Lori Dorfman

- Data analytics for tracking and profiling consumers
- Geo-targeting
- Culture coding: targeting by ethnicity and race
- Cross device tracking and real time personal advertising
- In store surveillance and point of purchase prompting
- Micro-moment messaging

Challenges - Privacy

- Jin, G. 2018. Artificial Intelligence and Consumer Privacy. NBER Working paper No. 24253. www.nber.org/papers/w24253.

- Incomplete information about future data use
- Externalities
  - Uncompensated effects on third parties
  - Identify theft, blackmail, etc.
  - Impact on consumers
- Commitment
  - Will data collectors maintain commitments to data security?
  - Trust

Conclusions

- Significant potential benefits to consumer from AI / ML applications to food
  - Private benefits
  - Public benefits
- But concerns over privacy, potential adverse social outcomes, and the "unknown"
  - Trust, commitment, regulatory policy.
- *"I just don't want my food to be smarter than I am"*

Vic.Adamowicz@ualberta.ca

ales.ualberta.ca