PROJECT PLAN: DECISION DASHBOARD FOR URBAN FOOD PRODUCTION IN THE KANSAS CITY METRO AREA

ABSTRACT

This project will create a decision dashboard for urban food production that will integrate multiple data layers on food accessibility, socio-economic indicators, and built-environment characteristics. It will deploy a Multi-Criteria Decision Making (MCDM) framework where users can select specific data layers to be considered and assign their weights to produce a final suitability score at the land parcel level. While this framework can be applied for broader food system planning, we plan to start by identifying suitable lands for urban agriculture.

1 INTRODUCTION

The broad objective of our research project is to create a replicable model for enhancing food security in the Kansas City Metro Area and comparable urban areas by applying advanced decision-making frameworks. The findings will provide practical strategies for improving food system equity, assisting policymakers, planners, and community groups in developing interventions that foster health, equitable resource distribution, and create a resilient urban food system. The decision dashboard will help us create a webtool that can be used for both planning/zoning decisions and for participatory decision making at the community level.

2 BASELINE OR INITIAL ANALYSIS

Currently, we are in the process of developing a spatial MCDM framework that integrates different socio-economic and built environmental factors to identify optimum locations for healthy food solutions. This framework will support policy-driven decisions by balancing economic, social, and environmental goals (Erdoğan et al., 2016), and can help pinpoint areas for resource allocation, such as food hubs (Haloui et al., 2023; Dawood & van Vuuren, 2023). While healthy food solutions can come in different forms, this study will materialize this framework for urban agriculture, with options to adopt it for any other food production or accessibility solutions. This targeted application ensures that planning and resource allocation efforts are focused on neighborhoods facing the greatest food access challenges. Weights to be assigned to different factors within MCDM will be calculated through an Analytical Hierarchy Process (AHP). AHP requires stakeholders or expert groups to identify the relative importance of every pair of factors to measure the final weights of each of the factors (Linnemann et al., 2015). To translate the spatial findings of initial analysis into a participatory planning tool, the results of the AHP-based MCDA will be deployed via an interactive web mapping application hosted on ArcGIS Online/Python/R-based Interactive mapping.

3 FINAL ANALYSIS

This proposed research will focus on identifying and addressing food access barriers in underserved areas of the Kansas City metropolitan region. By adopting a data-driven approach, the study aims to equip policymakers, urban planners, and nonprofit organizations with reliable tools to make informed decisions for urban food system planning (Bao & Tong, 2017). Through this KDSC project, we expect to create an online data dashboard that can help users select and change weights of different data layers and identify suitable land parcels for urban agriculture.

4 FINAL GOALS & EVALUATION

We would like to see the analysis in the dashboard, where all outputs will be integrated into an interactive web mapping platform, allowing users to explore food access conditions, adjust criteria weights, and visualize priority zones. This tool will support evidence-based planning and stakeholder engagement across the Kansas City Metropolitan Area.

5 Related Work

Erdoğan, N. K., Altınırmak, S., & Karamaşa, Ç. (2016). Comparison of multi-criteria decision-making (MCDM) methods with respect to the performance of food firms listed in BIST. Copernican Journal of Finance & Accounting, 5(1), 67–90. http://dx.doi.org/10.12775/CJFA.2016.004

Dawood, F., & van Vuuren, J. H. (2023). A food insecurity mapping and allocation framework for guided decision-making. SSRN Electronic Journal, 1-16

Haloui, D., Oufaska, K., Oudani, M., & El Yassini, K. (2023). A multi-criteria decision-making approach for the sustainable location of urban farms: Towards Farming 4.0. Proceedings of the 9th International Conference on Control, Decision and Information Technologies (CoDIT, 2023), Rome, Italy, July 3-6. IEEE.

Bao, K. Y., & Tong, D. (2017). The Effects of Spatial Scale and Aggregation on Food Access Assessment: A Case Study of Tucson, Arizona. The Professional Geographer, 69(3), 337–347. https://doi.org/10.1080/00330124.2016.1252271

Linnemann, A. R., Hendrix, E. M. T., Apaiah, R., & van Boekel, T. A. J. S. (2015). Food chain design using multi-criteria decision making: An approach to complex design issues. NJAS: Wageningen Journal of Life Sciences, 72-73(1), 13-21.` https://doi.org/10.1016/j.njas.2014.10.002

6 Data & Technical Requirements

The dashboard can be developed on any platform that allows publishing GIS maps online, adding interactive buttons/boxes, and producing maps after some basic calculations. The expectation is that it will be available online and will allow the users to select data layers and change their weights to calculate a composite suitability score. The following GIS data layers/variables will be provided by the research team.

Datasets

Category	Variable	Years	Data Source
Demographic & Socioeconomic	Population Density	2023	U.S. Census Bureau (Decennial Census / ACS)
	% Black and Hispanic Population		U.S. Census Bureau (ACS)
	% Foreign Born Population		
	% Disability		
	% Aged 65+		
	% Households without Vehicle		
	% Households with Children		
	% Renter-Occupied Housing		
Economic Indicators	Median Income		
	Median Rent / Home Value		
	% of Households under Poverty Line		
	% SNAP Participation		U.S. Census Bureau (ACS) / USDA ERS
	Employment Rate		U.S. Census Bureau (ACS) / BLS
Education & Health	% Below High School Graduation		U.S. Census Bureau (ACS)
	% Obesity		CDC PLACES Project
	% Diabetes		
	% High Blood Pressure		

Built Environment / Access	Distance to Nearest Food Store	2025	Prepared through ArcGIS
	Public Transit Access	2025	
	Vacant Land Availability	2025	Parcel Data