Engaging summary of the project.

Title: Analysis of the Efficiencies of Food Management System Using a GIS Network Analysis Approach

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In recent years, the application of GIS for analysing the efficiencies of food systems has spurred interest in the private and public sectors. The objective of this project was to study how the GIS Network Analyst approach can be used to model and analyse the distribution of local markets and grocers in southwest Manitoba. The distribution of vendors, markets, and consumer demand was examined by applying:

- service area analysis
- origin-destination cost matrix analysis
- the closest facility analysis

The average distance between adjacent markets and grocers, and the distance from demand points was analysed to determine access to these services. In addition, three case studies were conducted to compare accessibility to local markets versus commercial grocers in urban and peri-urban settings. The spatial location analysis outputs have given a clear understanding about the geographical distribution of local food markets in southwest Manitoba

Preliminary results indicate that 95% of residents have access to a market within 45 kms. However, only 25% of the population of Brandon is within a 3 km distance of a market, while 99% are within a similar distance of a grocer. In Killarney 70% of the population has access to either a grocer or local market; however, there are obvious inefficiencies in their distribution. Hamiota has no access to a local market.

The spatial analysis and mapping are central to the discussion about local food systems and practices. Incorporating the remote sensing, the GIS techniques and Network Analysis tools in the analysis of local food production allows efficient policy interventions of policy makers and interested stakeholders with the aim of efficiently operating in food systems. The maps provide strong assistance to decision makers and fosters transparency and ownership of the local food chain. Through the geo-visualisation of the real features, it has been possible to optimise local food planning and gather data about it.

These results show that, while the overall distribution of markets is good across the study, the case studies reveal a great deal of variability and obvious inefficiencies in the placement of local markets. The output maps elaborated can help local authorities and stakeholders involved to strengthen the understanding of the current functioning and performance of their food system in the context of a city region of Manitoba, within which rural and urban areas and communities are directly linked.

The recommendation of a better food planning supported by GIS cartography leads

• an increase of efficiency in local food distribution,

• an increase in the level of access for peri-urban residents to affordable, nutritious, safe, adequate, and diversified food that contributes to healthy diets and that meets dietary needs,

The increase of efficiency in regional food system planning and the enhancement of rural and urban linkages can improve the food security and the resilience of local people too. The importance of strengthening the local food system is also related to the economic aspect of the region. Several aspects have to be considered in this topic. Improving the local food system of Manitoba means increasing the local financial resilience. A territorial-based development aims to increase the circulation of money flows inside the province, avoiding a leakage of money for foreign food stakeholders. Another benefit that can result from a better food planning system is the

increase of business food diversity for cities and region too, namely an increase in range of types, scale and location of food business

Keywords: ***Food System, Network Analysis, Food Map.***

Field of Geography: Geographic Information System, Food Systems