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Surakarta's Strategic Role in Developing a Food Smart City: A Model for Urban Food Governance

Hendrika Ayuliani Muntiyas*, Yoshia Christian Mahulete, Nimas Melenia Mutiara Akbary

Department of Development Economic, Faculty of Economics and Business, Universitas Sebelas Maret, Surakarta, Indonesia

Abstract:

Surakarta's lack of a sustainable food system has led to its active participation in the 2020 Milan Urban Food Policy Pact (MUFPP). This study adopts a qualitative approach using primary and secondary data with descriptive analysis to examine the city's role in achieving a Food Smart City based on the six MUFPP pillars. The findings indicate that food management activities by stakeholders align with these pillars, covering sustainable, inclusive, safe, and diverse systems from production to consumption. However, several challenges remain. This study also identifies key activities, stakeholders, obstacles, and provides policy recommendations for food system development in Surakarta.

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Keywords:
Surakarta City; Milan Urban Food Policy Pact (MUFPP); Six Pillars Of MUFPP; Food Smart Cities; Sustainable Food Systems

Corresponding Author*:
Hendrika Ayuliani Muntiyas

Email:
hendrikayulianim@student.uns.ac.id

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1. Introduction

Surakarta is committed to becoming a Food Smart City as the second city in Indonesia to join and sign the Milan Urban Food Policy Pact (MUFPP) in November 2020. Cities that are "smart" in food management, with sustainable, inclusive, resilient, safe, and diverse food systems, ensure the availability of healthy and affordable food for everyone, starting with production, distribution, and consumption systems. The city of Surakarta's participation in MUFPP is motivated by the city's lack of a sustainable food system. So far, food consumption and availability in Surakarta have been met by supplies from the surrounding areas, specifically the districts of Boyolali, Karanganyar, Sukoharjo, Klaten, and Sragen, which have powerful agricultural bases. The government began to fear that if the city of Surakarta does not develop a sustainable food system, there will be anxiety between the city's food needs and fulfillment because it depends on production and distribution capacity of other regions.

Food problems are the most crucial issues confronting Indonesia's major cities. Natural population growth and urbanization are causing rapid population growth, which will impact the amount of available land. Settlements will be built on agricultural land. Surakarta, one of Indonesia's major cities, has a population of 522,364 in 2020, with an average population density of 11,861.13 people/km2 (BPS, 2020) and an area of land used for rice farming of approximately 75 Ha. The paddy field land will be 0 ha according to the revised Regional Spatial Plan (RTRW) for the city of Surakarta in 2021-2041 (Surakarta City Regional Regulation Number 4 of 2021).

Surakarta's consumption in 2020 has an Expected Food Pattern (PPH) score of 90.8, with a total Energy Consumption of 2,031 Kcal/capita/day (Department of Agriculture, 2020). This figure shows that Surakarta City residents' energy consumption has reached 94.5 percent of the ideal Energy Adequacy Ratio (AKE), which is 2,150 Kcal/capita/day. Meanwhile, Surakarta City received a PPH Availability score of 91.9, with a total Energy Availability of 2,481 Kcal/capita/day. Although it is currently sufficient for the people of Surakarta in terms of consumption and availability because other regions still supply it, the city of Surakarta needs to make policies that ensure the food system in Surakarta is sustainable and realizes a Food Smart City.

Food research has been conducted in numerous nations, with the results shown in table 1 below:

Table 1. Previous Research

No	Name of Author	Title of Research	Methods of Research	Result of Research
1.	Alexandra Doernberg, Paula Horn, Ingo Zasada, Annette Piorr (2019)	Urban food policies in German city regions: An overview of key players and policy instruments	Qualitative research	The purpose of this research was to investigate food policy and urban planning in ten major German cities by researching various policy and planning instruments and their applications to various parts of the food system. According to the study's findings, urban food policy activities are still highly fragmented and frequently focused on individual initiatives within the government. In Germany's large cities, an integrated urban food policy and its implementation through an urban food strategy are still the exceptions. The majority of city actors take a sectoral approach, employing a variety of guiding instruments, such as information instruments and public procurement policies. However, due to a lack of financial and human resources, their potential for policy implementation remains limited.

2.	Valerio Bini, Eleonora Mastropietro, Giacomo Pettenati and Giacomo Zanolin (2019)	Urban Food Policies And Metropolitan Spaces: The Case Of Milan	Qualitative research by interviewing 35 farmers	This study investigated whether and how specific territorial effects in the Milan Metropolitan Area can be produced by food and agriculture-based policies following the 2015 Milan Expo. According to the findings, there are no competent institutions that deal with food on a metropolitan scale, and there is a dependence on private funding from small amounts of actors. There is concern that they may fall prey to personal interests that aren't always in the best interests of the community.
3.	Sara A. L. Smaal ,Joost Dessein, Barend J. Wind and Elke Rogge (2020)	Social justice-oriented narratives in European urban food strategies: Bringing forward redistribution, recognition and representation	Exploration Document Analysis	With a sample of 16 cities in European nations, this study aimed to determine how the urban food strategy (UFS) that has been created has contributed to social fairness. According to the study's findings, the majority of UFS still focused on producing different sorts of food—local, organic, fair trade, nutritious, etc.—closer to urban residents than to those in the countryside. Access to social capital and land was frequently disregarded.
4.	Diego Martín and Rosa de la Fuente (2022)	Global and Local Agendas: The Milan Urban Food Policy Pact and Innovative Sustainable Food Policies in Euro-Latin American Cities	Qualitative perspective and empirical explicative approach	The Milan Urban Food Policy Pact (MUFPP), an international agreement, and its influence on the creation of local sustainable food policies are analyzed in this study, using case studies from three cities in the Euro-Latin America region: Madrid, Quito, and Valencia. According to the study's findings, MUFPP was successful in motivating local authorities to develop creative initiatives for altering their food systems.

5.	Edinam Dope Setsoafia, Wangli Ma and Alan Renwick (2022)	Effects of sustainable agricultural practices on farm income and food security in northern Ghana	Multinomial endogenous switching regression	This study examined the variables that affected smallholder farmers' choices to implement sustainable food systems (SAP) using better seeds, fertilizers, and water and soil conservation techniques. Numerous academics and international organizations had suggested using sustainable agriculture practices to address the issues of food security and climate change. According to the study's findings, implementing all three SAPs had a more favorable effect on agricultural revenue and food security than implementing just one or two SAPs.
6.	Rie Akamatsu, Nozomi Tonsho , Mika Saiki and Mihono Komatsu (2022)	Restaurant managers' readiness to maintain people's healthy weight and minimise food waste in Japan	a cross-sectional study conducted through an internet survey	This research explored whether restaurants assist Japan's national initiatives to reduce food loss and waste and preserve a healthy weight. According to the study findings of 950 participants conducted between May 28 and May 30, 2019, relatively few Japanese restaurants have started initiatives to help the country reach its aim of reducing food loss and waste. Restaurant business awareness of the Sustainable Development Goals (SDG) was still lacking. Since the respondents were small enterprises, one strategy to support the goal of maintaining a healthy weight and decreasing food waste was by serving the proper amount of food. This study revealed that the restaurant industry, where many cooks believed that portion size influenced consumer pleasure, was still not fully aware of the SDGs. Therefore, food that was not devoured has leftovers.

According to the findings of earlier food research, a city's decision to join the MUFPP has a favorable impact on the management of a sustainable food system. This fact motivates researchers to perform studies in Surakarta City on the implementation of programs that promote a sustainable food system so that the current food management can be properly managed and meet the community's needs for food, in this case, realizing Surakarta City as a Food Smart City.

As a result of Surakarta's food problems caused by the lack of a sustainable food system and the findings of previous studies, a study was conducted to monitor the implementation of activities in Surakarta city that support the six pillars of MUFPP. The primary goal of this research is divided into four goals: first, identify the activities carried out in Surakarta city to support the six pillars of MUFPP to realize a Food Smart City. Second, discuss the challenges encountered in carrying out the activities.

Third, identify stakeholders, who are involved in and actively participate to realize a Food Smart City. Fourth, develop policy recommendations for Surakarta City's development to realize a Food Smart City.

2. Literature Review

2.1 Surakarta City

Surakarta City is a major city in Central Java that opens the way for other cities such as Semarang and Yogyakarta, as well as other districts in the Subosukawonosraten region (Surakarta, Boyolali, Sukoharjo, Karanganyar, Wonogiri, Sragen, and Klaten). The administrative boundaries of Surakarta City are as follows:

North side: Boyolali and Karanganyar districts.

East side: Karanganyar district.

South side: Sukoharjo district.

West side: Sukoharjo and Karanganyar districts.

Surakarta City has a total area of 46.72 km^2. Surakarta City has divided administratively into five sub-districts administration areas, 54 urban villages, 626 hamlets, and 2,789 neighborhoods. Surakarta is located in the hillsides of the Lawu and Merapi Mountains, at a height of approximately 92 meters above sea level. In Surakarta City, the slope of the land ranges from 0 to 15%. Surakarta is divided and transmitted by three major rivers: the Bengawan Solo, the Kali Jenes, and the Kali Pepe. Surakarta City's main economic sectors are construction, trade and industry, information and communication, processing industry, and services.

Surakarta City has a population of 522,364 people in 2020. According to the population development trend from 2016 to 2020, there is an increase every year, with 0.44 percent growth rate in 2020. Surakarta City's population density in 2020 is 11,861.13 people per km^2. This figure is lower than the previous year's figure of 13,061.53 people/km^2.

The background of the Establishment of MUFPP

Following the failure of the urban food system in 2014, the City of Milan, Italy, initiated a study of its local food system, focusing on the entire food cycle with context and actors. The study's findings were debated in a public consultation involving 700 stakeholders until a comprehensive urban food policy was developed. Combating food waste is one of the policy's top priorities. It is appropriate to prioritize food waste, both in terms of substance and time.

Based on the findings of this study, Giuliano Pisapia, the Mayor of Milan from 2011 to 2016, established a network of world cities dealing with the sustainability of their food systems. In 2015, Milan hosted the Expo 2015, titled "Feeding the Planet, Energy for Life," for six months. The expo, which featured booths from 145 countries and 50 international institutions, was still going on. The Milan Urban Food Policy Pact was a significant legacy of the 2015 Expo (MUFPP). On October 15, 2015, 100 cities around the world signed the Milan Pact Declaration

Six Pillars od MUFPP There are six pillars of MUFPP, namely:

1) *Governance*

   All actions that aim to create an enabling environment for effective action in the city, such as facilitating collaboration across city agencies, increasing the participation of urban stakeholders, identifying, mapping, and supporting local community initiatives, developing or revising policies and urban food plans, and developing disaster risk reduction strategies.

2) *Sustainable diets and nutrition*

   Cities that want to promote sustainable eating, better consumption, and nutrition may be inspired by the recommended actions in this MUFPP category, such as: solving noncommunicable diseases associated with poor diet, developing pattern guidelines for sustainable eating for urban

environments, exploring regulatory and voluntary instruments to promote sustainable nutrition in cities and public facilities, and committing to achieving wider access to safe drinking water.

3) *Social and Economic Equity*

City leaders who want to address food system inequality and poverty can take a variety of recommended actions from this MUFPP category, such as: using forms of social protection systems such as cash and food transfers, food banks, community food kitchens, emergency food kitchens, and so on to provide access to healthy food for all citizens; encouraging and supporting social and solidarity activities; promoting networking and supporting local community activities; promoting participatory education, training, and research.

4) *Food Production*

The actions recommended in this category aim to strengthen sustainable food production and emphasize the importance of rural-urban connections, such as: promoting and strengthening urban and suburban sustainable food production; using an ecosystem approach to guide holistic and integrated land use planning and management that allows secure access to land for sustainable food production; and providing services to food producers in and around cities to support short food chains; improving waste and water management and reuse in agriculture.

5) *Food Supply and Distribution*

Cities can take several steps to ensure a sustainable, safe, equitable, and efficient supply and distribution of food within and between cities. For example, reviewing and strengthening food control systems, ensuring seasonal and local food consumption by connecting suburban and rural transportation and logistics, developing green public procurement and trade policies to facilitate short food supply chains, and supporting city and urban public markets.

6) *Food Waste*

City leaders and policymakers who want to reduce food waste and manage it more sustainably, using a circular economy approach, can use the recommended actions in this category, which include raising awareness of under- and over-food, recovering and redistributing food, and so on.

Food Smart City

Inspired by the main discussion at the "Conference on Food Security and Sustainable Development" in Milan in 2015, Rikolto, an international agriculture and food NGO based in Belgium, developed the MUFPP ideal of a Food Smart City as a city with a sustainable food system. A Food Smart City, according to Rikolto, is a city with a food system that can (1) ensure safety and hygiene throughout the entire supply chain "from land to mouth" (2) improve consumption patterns with the intake of various types of food (3) change social and consumer behavior using local food (4) Improve consumer habits for food ingredient management to reduce food loss and waste. Rikolto has collaborated with three cities in Indonesia (Bandung, Solo, and Depok) to create a Food Smart City Master. As previously stated, Bandung and Solo have joined MUFPP (Budi, 2019).

Surakarta City as A Food Smart City

Participation in MUFPP is inextricably linked to several efforts made by the Surakarta City Government that are thought to be in line with the indicators of MUFPP's six pillars. Several Surakarta City Government programs considered to support the achievement of a Food Smart City include the Regional Food Safety Network (JKPD), the urban farming carried out at the Surakarta City Farmers Group dependently and independently, the use of yard land through sustainable food yard activities, the processing of organic waste using Black Soldier Fly (BSF) larvae, and so on.

3. Data and Methodology

Paradigm seeks to explain social or cultural occurrences using the perspectives and experiences of the subjects being investigated (Muslim, 2016). In this study, the interpretive paradigm is employed to identify the role of regional apparatus or associated organizations outside the Surakarta City Government in achieving a Food Smart city, and the six pillars of MUFPP are implemented as part of the sustainability of the Food Smart City in Surakarta.

A qualitative approach subsequently emerged from the Interpretive Paradigm. According to Moleong (2010), qualitative research aims to comprehend complicated and delicate issues, evaluate an event, gain a fresh perspective, investigate an event in greater detail, and observe a background, such as motivation, roles, attitudes, values, and perceptions. The following describes the research methodology employed in this study:

1) Variables of Research

The dependent variable and the independent variable are the two types of research variables investigated in this study.

a. Independent Variables are elements that contribute to or affect the dependent variable. The independent variables used in this study are the six pillars of MUFPP (governance, sustainable diet and nutrition, social and economic equity, food production, food supply and distribution, and food waste management).
b. Dependent variable is an element influenced by an independent variable (Umar, 2003:50). Food Smart City is the dependent variable in this study.

The Operational Definition presented below aims to simplify comprehension and eliminate discrepancies in perception between the two variables:

Table 2. Variables of Operational Definition

No	Name of Variable	Definition of Variable	Indicator	Source
1.	Six Pillars of MUFPP: 1) Governance 2) Sustainable diet and nutrition 3) Social and economic equity 4) Food production 5) Food supply and distribution 6) Food waste management	The six MUFPP pillars are a collection of acts that cities in a country must follow to establish a sustainable food system.	1) The existence of a policy, strategy, or action plan for urban food 2) The existence of programs and laws to promote the provision of nutritious meals in public facilities. 3) The existence of activities to promote both social and economic endeavors. 4) The existence of activities to support and enhance food production in rural and urban. 5) The existence of an enhancement plan to strengthen the local food supply chains' resilience and logistical efficiency 6) The existence of rules or regulations to address food waste prevention, recovery, and redistribution.	Source: Milan Urban Food Policy Pact Monitoring Framework (July 2018 Version)
2.	Food Smart City	Food Smart City is a city one that can balance its food production with its citizens' food needs, solve issues regarding food quality, and solve environmental issues regarding the amount of food production in the city.	1) The existence of a safety and hygiene policy throughout the entire supply chain "from land to mouth", 2) The existence of activities to promote consumption patterns with the intake of various types of food, 3) The existence of activities to promote social changes and consumer behavior by utilizing local food, 4) The existence of activities to encourage consumer habit in managing food ingredients and reduce food loss and waste	Source: Rikolto, 2017

Source : Milan Urban Food Policy Pact Monitoring Framework (2018) and Rikolto (2017).

2) Type of Data

a. Primary data
Primary data is information that has been gathered directly from the source through discussions, observations, and interviews with relevant resource persons who have in-depth knowledge of the actions performed to assist the City of Surakarta in realizing a Food Smart city.
The sources for this work are as follows:
- Regional Development Planning Agency (Bappeda) of Surakarta city, related to data and information regarding the participation of Surakarta City in the Milan pact.
- The Department of Food Security and Agriculture of Surakarta city, related to data and information on activities that will be and/or have been implemented to support Surakarta's Food Smart City.
- Regional Apparatus and non-government institutions of Surakarta city, related to activities that support Surakarta's Food Smart City.

b. Secondary data
Data is gathered through intermediaries or parties who have previously gathered such information. In other words, researchers do not directly work in the field to get the data. Secondary data is obtained from Regional Apparatus or related institutions outside the Surakarta City Government supporting Food Smart City Surakarta activities, electronic news clippings, scientific journals, and published and unpublished documents. Secondary data required for this project include:
- Regional Medium-Term Development Plan (RPJMD) document for 2021-2026, to ensure Surakarta City's food policy.
- Department of Agriculture, Food Security, and Fisheries, Strategic Plan for 2021-2026 and Report on Analysis of Expected Food Patterns for 2020.
- Report on the progress of the Solo Food Smart City implementation by the Surakarta City Regional Apparatus, and local and international NGOs.

3) Techniques of Data Analysis
This study employs a descriptive data analysis technique. This technique entails analyzing, describing, and summarizing events or phenomena based on secondary data collection and direct observation in the field. The goal of descriptive analysis is to fully and thoroughly describe the events of the various phenomena studied.

4) Stages of Research, with several stages as follows:
a. Identifying activities carried out in Surakarta city to support the implementation of the MUFPP's six pillars.
b. Identifying challenges encountered in carrying out activities supporting the six pillars of MUFPP.
c. Mapping stakeholders actively involved in the realization of a Food Smart City.
d. Preparing policy recommendations for Surakarta city development in realizing a Food Smart City.

4. Result and Discussion

The activities that have been carried out and support the six pillars of MUFPP to determine whether the food system in Surakarta City is sustainable or not in realizing a Food Smart City are as follows:

1) Pillar I: Governance
The Surakarta City Government issued several policies that include food-smart components, in the form of:
a. Preparation of the Regional Medium-Term Development Plan (RPJMD) for 2021-2026, in mission 2 "Strengthening adaptive and sustainable economic growth", one of the strategies is "Improving Food Security".
b. Preparation of the Regional Action Plan for Food and Nutrition (RAD-PG) for the period of 2022-2026. RAD-PG is a type of policy integration at the regional, provincial, and national levels that emphasizes the importance of addressing food and nutrition security issues in developing quality human resources.
c. Preparation of a roadmap for the Food Smart City program, which will serve as a guideline for achieving a sustainable integrated food system in the form of Food Smart City of Surakarta (the year 2022 is being prepared).
d. All parties are working together to create a Food Smart City, for example, with buffer areas such as Boyolali, Karanganyar, Sukoharjo, Klaten, or Sragen districts to market agricultural products to Surakarta City.

Obstacle:

The Surakarta city regional apparatus and related stakeholders have not fully implemented the monitoring and evaluation process of policies and collaborations that have been prepared and established.

Stakeholder:

Academics, business actors in the food sector, national and international NGOs, and relevant regional apparatur in Surakarta City.

Recommendation:

Concerning the Surakarta City Government's food management policies, socialization among relevant stakeholders is being carried out, as well as the development of monitoring and evaluation guidelines for certain policies to facilitate supervision.

2) Pillar II: Sustainable diets and nutrition

Activities to promote sustainable eating patterns, better consumption, and nutrition in Surakarta city include:

a. Child-Friendly Healthy School Canteens

The school canteen plays an important role in providing students with well-balanced nutrition. The number of schools that use the full-day school system ensures that students spend enough time in school. Because this is where students usually buy food, it provides an opportunity for the school canteen to provide family meals. This highlights the significance of providing nutritious and safe food in the school canteen. Healthy school canteens have been identified as an indicator of a healthy school.

Food that is diverse, nutritious, balanced, and safe (B2SA) contains the nutrients that a child requires to live a healthy and productive life. A well-balanced diet of carbohydrates, protein, vitamins, and minerals should be served. There is no single food that contains all of the nutrients that the body requires. Consume a variety of foods to achieve this. Vegetables and fruits have the largest portion in one serving, which is half the plate for each meal. Furthermore, food must be clean, fresh, and free of potentially harmful chemicals or microbes.

There are five standards for child-friendly healthy school canteens: (1) physical and building; (2) school children's snacks that must adhere to the principles of diversity, balanced nutrition, and safety; (3) school children's snack supply; (4) canteen management; and (5) promotion, monitoring, and evaluation.

Surakarta currently has 16 Child-Friendly Healthy School Canteens ranging from Elementary School to Junior High School. To ensure food hygiene and safety, the school collaborates with the Surakarta City Food and Drug Supervisory Agency to implement health protocols in the processing, packaging, and distribution of school canteen food.

b. Baby Café

Nutrition plays a significant role in infant growth, so appropriate and affordable complementary feeding (MPASI) is one of the stunting prevention strategies. In general, after the baby is six months old, parents will find it difficult to fulfill complementary feeding. Because of their busy schedules and time constraints, some parents will satisfy their complementary feeding needs with instant food, while others will make their MPASI without knowing the baby's nutritional and calorie requirements.

The Sibela Community Health Center in Mojosongo Village has made a breakthrough in providing complementary feeding by establishing a Baby Café called Bintangku. Bintangku Baby Café is an example of community empowerment in the field of improving toddler nutrition. They serve WHO-recommended complementary feeding on a four-star menu made from local ingredients at reasonable prices. The entire process at Bintangku Baby Café is overseen and assisted by health center workers.

Obstacles:

a. There is no written regulation containing policies relating to the development of Child- Friendly Healthy School Canteens and Baby Cafés to ensure the long-term viability of this activity.

b. In schools, school administrators, and stakeholders regarding Child-Friendly Healthy School Canteens and Baby Cafés, there is still an uneven distribution of socialization among children.
c. There is no policy on the implementation of monitoring and evaluation of the Child-Friendly Healthy School Canteen and Baby Café activities, so the development of policies, obstacles, and problem-solving solutions are unknown.
d. There is insufficient capital support for the provision of healthy food without pesticides for food processing, Child-Friendly Healthy School Canteens, and Baby Cafés, human resources, and complementary feeding processing and distribution.

Stakeholder:

Food and drug administration (FDA), school committees, health centers, hospitals, business actors in the food sector, academics, and national and international NGOs are among the relevant regional apparatur in Surakarta city.

Recommendation:

a. The Child Friendly Healthy School Canteen's existence is directly related to the three pillars of the School Health Business (UKS), which are health services, health education, and healthy living development. One component is a healthy canteen. The Surakarta government must immediately draft a Mayor's Regulation for the implementation of UKS so that school principals, teachers, and students can be guided, developed, and improved in a planned and responsible manner. The educational program includes curricular activities, extracurricular activities, and other activities that promote clean and healthy living habits. Furthermore, there is a need to increase the number of Child Friendly Healthy School Canteens in each Surakarta school.

b. For the future development of Baby Café, a regulation in the form of a Mayor's Regulation that can be used as a guide for the community and Baby Café staff is required. This guideline relates to the processing of complementary feeding with a focus on nutritional content, the distribution of complementary feeding, baby health checks, and plans to expand Baby Cafés to health centers in other villages.

c. The Surakarta City Government and other parties must be concerned about the availability of financial support, human resources, nutritionists, and a facility for processing complementary feeding.

d. Initiation of school gardens and urban farming to provide healthy food free of pesticides to Child Friendly Healthy School Canteens and Baby Cafés.

3) Pillar III: Social and economic equity

To overcome inequality and poverty related to the food system, a form of social protection system can be used, namely:

a. Regional Food Safety Network (JKPD) of Surakarta

JKPD was formed as an increase in cross-sectoral cooperation in implementing the Regional Food Safety System to ensure the safety and quality of food products from chemical contamination (use of pesticides that exceed the maximum residue limit, use of hazardous materials, use of antibiotics outside of their function), physical and biological contamination. This activity is carried out by performing surveillance inspections of fresh and processed food products at markets and supermarkets, as well as testing the content of these food products.

b. Food Sharing

Food Sharing that is fit for consumption is one solution to the excessive amount of food waste in cities. Thus, surplus food in one region can assist in meeting food shortages in other regions.

Based on the findings of a study on household consumption patterns conducted in 2017 by "Gita Pertiwi," a national NGO in Surakarta, in collaboration with Soegijapranata Catholic University in Semarang:
(1) Surakarta's excess food (carbohydrates and vegetables) is 10.28 tons per day.
(2) This amount can feed 35,217 people.
(3) According to Surakarta city data from 2017, there are 90,098 poor people.
(4) Excess food daily can feed 39.08 percent of the poor in Surakarta.

According to the findings of Gita Pertiwi's 2018 research with Slamet Riyadi University Surakarta on the management of excess food in hotels, restaurants, and catering:

(1) Excess food or cooking from Surakarta hotels is 13%, of which 52% is distributed to employees (not to be taken home), 22% is discarded or processed into other dishes, and 3% is used for animal feed.
(2) Surakarta restaurants have 9% excess food or cooking, of which 52 percent is discarded, 40% is reprocessed into other dishes, and 8% is given to employees.
(3) Excess food from Surakarta catering is as much as 10% given to the customer.

Many communities have shared food in Surakarta, including Waroeng Moerah, Kusuma Sharing, Kala Canda, ICS (Info Cegatan Solo), OBS (Good People Solo), GNJ (Friday Rice Movement), and others. Carefood initiated the formation of a food bank in collaboration with the community in July 2019.

Food sharing initiatives are carried out not only by purchasing or processing food to be distributed, but also by excess food, such as that from hotels and catering in Surakarta. Surakarta caterers distribute the remaining 10% of food to customers. If the customer does not wish to take it home, the caterer will distribute it to the employees, and the rest will be donated to the orphanage after signing several documents about the condition of the food, its management, and the maximum amount that can be consumed. If the agreement is violated, the recipient of the food must bear the consequences.

Obstacle:

a. Regarding JKPD activities, if the results of testing on the content of food products contain hazardous materials in the form of preservatives, dyes, or bleaches, no firm action has been taken to punish the perpetrators because there are no regulations that regulate it. The perpetrators were only fined and warned not to repeat their actions that were detrimental to the community.
b. There is no regulation to ensure that food distributed by food banks is still suitable for human consumption, safe, and nutritious. Furthermore, there is no food distribution system from food donors to distributors and recipients.

Stakeholder:

Related regional apparatur in Surakarta, FDA, food providers, food sharing communities in food banks, hotels, restaurants and caterers, academics, and National and International NGOs.

Recommendation:

a. The Surakarta city government should establish cooperation between JKPD and law enforcement officials in terms of taking firm action against perpetrators who include hazardous materials in food products to provide a deterrent effect as well as legal protection to the community.

b. The Surakarta city government should prepare regulations to ensure the feasibility and safety of food distributed by food banks. In addition, the cities of Bandung and Semarang have created a digital food distribution system to facilitate food distribution from food donors to recipients.

   Food categorization can be made in the digital distribution system, namely fresh food items that must be distributed immediately and food items with a long expiration date (such as milk, corned beef, sardines, etc.) that can be stored and distributed within schedule to create a food reserve system.

4) Pillar IV: Food Production

Urban farming is one method of boosting sustainable food production in Surakarta city. Urban farming as a strategy for civilizing the community so that they are not reliant on the market for their daily food needs. Agriculture's presence in urban and surrounding areas has a positive impact not only on meeting food needs, but also on the ecological and economic sustainability of urban areas.

Urban farming management has the following advantages: (i) economic advantages, (ii) health advantages, and (iii) environmental advantages. Economically, urban farming that is managed in a modern manner using technology applications can generate additional income because it produces high-quality plant products with a specific market. Products are not only produced for personal

consumption, but are also sold in markets such as supermarkets or online markets, which offer added value or higher selling prices than traditional markets.

Green vegetables, herbs, tubers, fruits, and ornamental plants are some of the plants that can be grown in urban farming business management. Commonly grown vegetable crops include pokcay lettuce, mustard greens, celery, chives, spinach, and kale. Meanwhile, herbal plants such as ginger, lemongrass, galangal, and others can be grown. These plants can be managed using simple to complex technology.

The following are some urban farming methods that make use of technology applications: (i) verticulture, or vertical plant cultivation; (ii) hydroponic, or planting plants without soil media but with water and the addition of certain nutrients; (iii) aquaponic; and (iv) wall-gardening. Vertical application of urban farming technology is possible by using pipes in stages in a small room. Plants that can be grown using this method include mustard greens, spinach, celery, and chives.

Surakarta has 15 demonstration plots for urban farming and 70 active urban farming groups, including the Women Farmers Group (KWT), Farmers Group, and Pemuda Tangguh. The products of urban farming are used to meet their own needs as well as the needs of the residents. Some have partnered with restaurants and caterers. Surakarta Farmers Group conducts urban farming both independently and dependently. The help comes in the form of using yard land for sustainable food yard activities. Currently, a Food Independent Area is being developed in which each villages have one superior processed food product, such as Joglo Village with Aloe Vera products.

The Pemuda Tangguh community in Banyuanyar Village held training on making ice cream from vegetables as a form of innovation for urban farming products, which has been marketed to restaurants and caterers. This training aims to foster the development of new young entrepreneurs in Surakarta who work in the urban farming sector.

Obstacles:

a. There is limited land for the development of urban farming, despite the fact that there are still vacant lands in several Surakarta City urban villages.
b. Human resources are limited to the number and skills of extension workers.
c. The consistency and sustainability of community-based urban farming programs
d. Marketing constraints related to the limited fulfillment of agricultural production demand and the existence of eligibility requirements for agricultural products.

Stakeholder:

Relevant regional apparatur in the city of Surakarta, actors in urban farming, restaurants, and catering.

Recommendation:

a. The Surakarta city government should map unused vacant land to locate the landowner and request permission to use the land as part of the development of urban farming.

b. Increasing the number of agricultural extension workers accompanying urban farmers. Extension workers can be recruited from outside parties with expertise in the agricultural sector and obligated by a work contract agreement.

c. There is community socialization and training regarding the introduction of the urban farming program that has been carried out in the city of Surakarta to maintain the program's consistency and sustainability. Furthermore, the training includes urban farming management, beginning with the process of planting, maintaining plants, harvesting agricultural products, distributing agricultural products (standard packaging), and marketing agricultural products (promotion).

5) Pillar V: Food Supply and Distribution

The following activities were carried out to ensure the supply and distribution of food in a sustainable, safe, fair, and efficient manner within and between cities:

a. Application of Central Market Management

Surakarta's development cannot be separated from the development of the district formerly known as the Ex-Residency of Surakarta or abbreviated as "Subosukawonosraten" (Surakarta-Boyolali-Sukoharjo-Wonogiri-Sragen-Klaten). Surakarta is strategically located to become the center of the economy, trade, and livelihoods not only for the people of Surakarta but also for

the people surrounding Surakarta (Ex-Surakarta Residency). The greater the economic activity of the districts surrounding Surakarta, the greater the economy of Surakarta as a trading center. Surakarta is expected to be able to meet basic needs and essential goods while maintaining stock availability and stable prices. To support this, the city of Surakarta requires the presence of a central market as a trading center. The center market serves as a collection, auction, and temporary storage facility for food ingredients that will be distributed to other markets.

Legi Market has served as a semi-center market. Its primary function is to market basic commodities for the community, to serve as a wholesale center for retail traders, and to serve as a commodity market price benchmark (Leader Price). According to the results of the BPS Cost of Living Survey (SBH) in 2018, Legi Market has the highest weighting (45 percent) compared to other markets (Gedhe Market has a 35 percent weighting and Nusukan Market has a 20 percent weighting); around the market, there are many warehouse businesses as well as sales of basic commodities owned by individuals (such as rice, eggs, cooking oil, sugar, flour, shallots, chilies, and coconut) that are beyond the reach of market management.

A management system for the Center Market was developed to provide an overview of the conditions and feasibility of the Pasar Legi area. So, in 2021, the Surakarta city government conducted research through the Surakarta City Regional Planning, Research, and Development Agency. According to the study's findings, Legi Market can be developed and managed as a wholesale market with the primary function of serving as a distribution center to maintain the quantity, quality**,** and price stability of food ingredients and other needs for the entire Surakarta area. The **key variables for success in the central market are product quantity, product quality, product price, transportation management, cooperation, loading and unloading, parking management, inventory/warehousing, and waste management.**

b. Digitalization of the food distribution system

In 2021, the Ministry of Agriculture allocate a deconcentration fund budget to the Surakarta City Government through the Food Security and Agriculture Service to initiate the establishment of a Mitra Tani Shop (TMT) that sells strategic food commodities such as rice. During its implementation, the Surakarta Agriculture Service invited several basic food shops in Surakarta to become TMT partners. Solo Sejahtera by Vicky Shu is a new TMT that sells strategic food, local food, and high-quality vegetables at low prices. Rice is one of the strategic foodstuffs that are sold at reasonable prices and of high quality. Because of the transportation support provided by the Central Java Provincial Government to Regional Public Companies acting as rice distributors to TMT, rice can be sold at a lower price than in the market.

TMT Solo Sejahtera by Vicky Shu is currently distributed to consumers via digitization via the PasTani application with a free shipping promotion (Terms and Conditions Apply).

Obstacles:

a. There is no further policy that builds on the findings of the Pasar Legi research, which was developed with a management system for the management of the Center Market.
b. There are no TMT regulations in Surakarta (starting from TMT management, types of commodities sold by TMT, and distribution facilities for TMT commodities).

Stakeholder:

Related Regional Apparatur in Surakarta City, Traditional Market Association, Business Actors in the Field of Trade, and Mitra Tani Shop (TMT) of Surakarta

Recommendation:

a. The Surakarta city government should develop a Legi Market policy with a management system for the Central Market management following the function of a distribution center that must maintain the quantity, quality, and price stability of various commodities needed by the people of Surakarta City and the Ex-Residency of Surakarta (Boyolali-Sukoharjo-Wonogiri -Sragen-Klaten).
b. In 2022, the Surakarta City Food and Agriculture Security Service drafted a Surakarta City Mayor Regulation on Food Distribution Facilitation, which regulates TMT in Surakarta City.

6) Pillar VI: Food Waste Management

In Indonesia, the term "food waste" has not been defined. However, according to the Food and Agriculture Organization (FAO), food waste is the amount of waste generated during the food manufacturing process and after-eating activities related to seller and consumer behavior (Parfit et al., 2010).

Food waste, which can be managed and decomposed separately, is still included in municipal waste management in Indonesia, where it has the potential to quickly fill the capacity of Final Disposal Sites (TPA). Methods of managing urban waste through the TPA system, also known as the collect- take-disposal system, are extremely limited in context of the increasing volume of waste piles. This harms the environment and the living things that live in it.
Food waste contributes the most to the various types of waste generated in cities. After Saudi Arabia, Indonesia is the world's second-largest contributor to food waste. The food waste pile emits 1,702.9 Megatons of carbon dioxide (Bappenas, 2020).

The waste generator in Surakarta is generated by piles of waste produced by the following activities: (1) Household waste is managed by the sub-district; (2) road waste and fallen leaves are managed by the Surakarta City Environmental Service via street cleaners (3) waste from markets and shops, which is managed by the Trade Office, and (4) general waste. Based on data from 2019, the amount of waste per year in Surakarta was 110,894 tons in 2019 to 107,873 tons in 2020, a 5.23 percent decrease.

Surakarta's city government is currently processing insect-based organic waste with Black Soldier Fly (BSF) larvae, or Hermetia Illucens in Latin, through the Food Security and Agriculture Office of Surakarta. This waste management is one of the innovative and sustainable strategies implemented to reduce the burden of landfill waste, and it has the potential to create new profitable economic opportunities for city dwellers and small-scale entrepreneurs. Aside from the ability of BSF larvae to reduce waste, the final stage of larvae, known as prepupa, can be self-harvested, resulting in high added value protein and fat that can be used as fish and livestock feed.

The Surakarta City Food and Agriculture Security Service and Alila Hotel collaborated on this organic waste management. Hotel Alila, one of Surakarta's five-star hotels, has committed to managing its food waste to reduce environmental impact and empower the community. The Alila hotel's food waste, which amounts to approximately 9 tons per month, is then given to the community and used for maggot cultivation. Maggot larvae, also known as maggots, are BSF fly larvae. A maggot is a larva of a type of fly that developed from an egg and matured into an adult fly. Fresh maggot is used to feed fish (catfish and tilapia) and can replace factory feed up to 50% of the time. Meanwhile, cassava (the derivative of BSF larvae decomposition) is used as organic fertilizer for urban farming in the community and hotel environment.

Obstacles:

There are a limited number of vehicles and human resources available to transport hotel waste to the Surakarta City Food Security and Agriculture Office for processing.

Stakeholder:

Related Regional Apparatur in Surakarta City and the Hospitality Association.

Recommendation:

Regarding the issue of a limited number of vehicles and human resources, hotel organic food waste managers, the Food Security and Agriculture Office of Surakarta, and community environmental associations can collaborate to help meet the number of transport vehicles and provide community socialization on how to manage maggot. If these issues are resolved, it is possible to expand collaboration with hotels in Surakarta.

Table 3. Research Results on Activities that Support the Six Pillars of MUFPP in Realizing a Food Smart City

No	Variable	Independent Variable Indicator	Dependent Variable Indicator*)	Activities performed	Obstacles	Stakeholder	Recommendation
1.	Governance	The existence of a policy, strategy, or action plan for urban food	The existence of a safety and hygiene policy throughout the entire supply chain "from land to mouth",	1) Preparation of the Regional Medium-Term Development Plan (RPJMD) for 2021-2026 2) Preparation of the Regional Action Plan for Food and Nutrition (RAD-PG) for the period of 2022-2026 3) Preparation of a roadmap for the Food Smart City program 4) All parties are working together to create a Food Smart City	The Surakarta city regional apparatus and related stakeholders have not fully implemented the monitoring and evaluation process of policies and collaborations that have been prepared and established	Academics, business actors in the food sector, national and international NGOs, and relevant regional apparatur in Surakarta City	Socialization to stakeholders related to governance policies that have been prepared and the preparation of monitoring and evaluation guidelines
2.	Sustainable diets and nutrition	The existence of programs and laws to promote the provision of nutritious meals in public facilities	The existence of activities to promote consumption patterns with the intake of various types of food ,	1) Child-Friendly Healthy School Canteens 2) Baby Café	1) There is no written regulation 2) In schools, school administrators, and stakeholders there is still an uneven distribution of socialization among children. 3) There is no policy on the implementation of monitoring and evaluation	Food and drug administration (FDA), school committees, health centers, hospitals, business actors in the food sector, academics, and national and international	1) The Surakarta government must immediately draft a Mayor's Regulation for the implementation of UKS 2) A regulation in the form of a Mayor's Regulation that can be used as a guide for the community and Baby Café staff is required. 3) The Surakarta City Government and other parties must be concerned about the availability of

					4) There is insufficient capital support for the provision of healthy food	NGOs are among the relevant regional apparatur in Surakarta city	financial support, human resources, nutritionists, and a facility for processing complementary feeding. 4) Initiation of school gardens and urban farming to provide healthy food free of pesticides to Child Friendly Healthy School Canteens and Baby Cafés
3.	Social and economic equity	The existence of activities to promote both social and economic endeavors.	The existence of a safety and hygiene policy throughout the entire supply chain "from land to mouth"	1) Regional Food Safety Network (JKPD) of Surakarta 2) Food Sharing	1) There is no firm action has been taken to punish the perpetrators because there are no regulations that regulate it. 2) There is no regulation to ensure that food distributed by food banks is still suitable for human consumption, safe, and nutritious. Furthermore, there is no food distribution system from food donors to distributors and recipients	Related regional apparatur in Surakarta, FDA, food providers, food sharing communities in food banks, hotels, restaurants and caterers, academics, and National and International NGOs.	1) The Surakarta city government should establish cooperation between JKPD and law enforcement officials in terms of taking firm action against perpetrators who include hazardous materials in food products to provide a deterrent effect 2) The Surakarta city government should prepare regulations to ensure the feasibility and safety of food distributed by food banks. In addition, created a digital food distribution system to facilitate food distribution from food donors to recipients.
4.	Food production	The existence of activities to support and enhance food production in rural and urban.	The existence of activities to promote social changes and consumer behavior by	Urban farming	1) There is limited land for the development of urban farming, despite the fact that there are still vacant lands in several Surakarta City urban villages.	Relevant regional apparatur in the city of Surakarta, actors in urban farming,	1) The Surakarta city government should map unused vacant land to locate the landowner and request permission to use the land as part of the

			utilizing local food		2) Human resources are limited to the number and skills of extension 3) workers. The consistency and sustainability of community-based urban 4) farming programs Marketing constraints related to the limited fulfillment of agricultural production demand and the existence of eligibility requirements for agricultural products.	restaurants, and catering	development of urban farming. 2) Increasing the number of agricultural extension workers accompanying 3) urban farmers There is community socialization and training regarding the introduction of the urban farming program
5.	Food Supply and Distribution	The existence of an enhancement plan to strengthen the local food supply chains' resilience and logistical efficiency	The existence of a safety and hygiene policy throughout the entire supply chain "from land to mouth"	1) Application of Central Market Management 2) Digitalization of the food distribution system	1) There is no further policy that builds on the findings of the Pasar Legi research, which was developed with a management system for the management of the 2) Center Market. There are no TMT regulations in Surakarta (starting from TMT management, types of commodities sold by TMT, and distribution facilities for TMT commodities).	Related Regional Apparatur in Surakarta City, Traditional Market Association, Business Actors in the Field of Trade, and Mitra Tani Shop (TMT) of Surakarta	1) The Surakarta city government should develop a Legi Market policy with a management system for the Central Market management 2) In 2022, the Surakarta City Food and Agriculture Security Service drafted a Surakarta City Mayor Regulation on Food Distribution Facilitation, which regulates TMT in Surakarta City.
6.	Food Waste Management	The existence of rules or regulations to address food waste prevention,	The existence of activities to encourage consumer habit in managing	Circular economy implementation in the food system through collaboration between hotel and community,	There are a limited number of vehicles and human resources available to transport hotel waste to the Surakarta City Food Security	Related Regional Apparatur in Surakarta City and the	Regarding the issue of a limited number of vehicles and human resources, hotel organic food waste managers, the Food Security and Agriculture Office

	recovery, and redistribution.	food ingredients and reduce food loss and waste	by managing food waste for maggot cultivation. Maggot can be used as fish feed, organic fertilizer and sold.	and Agriculture Office for processing.	Hospitality Association.	of Surakarta, and community environmental associations can collaborate to help meet the number of transport vehicles and provide community socialization on how to manage maggot. If these issues are resolved, it is possible to expand collaboration with hotels in Surakarta.

Information :

*) Implementation of activities from the dependent variable supports the implementation of activities from the independent variable.

Stakeholders involved in carrying out activities related to the six pillars of MUFPP in transforming Surakarta into a Food Smart City are as follows:

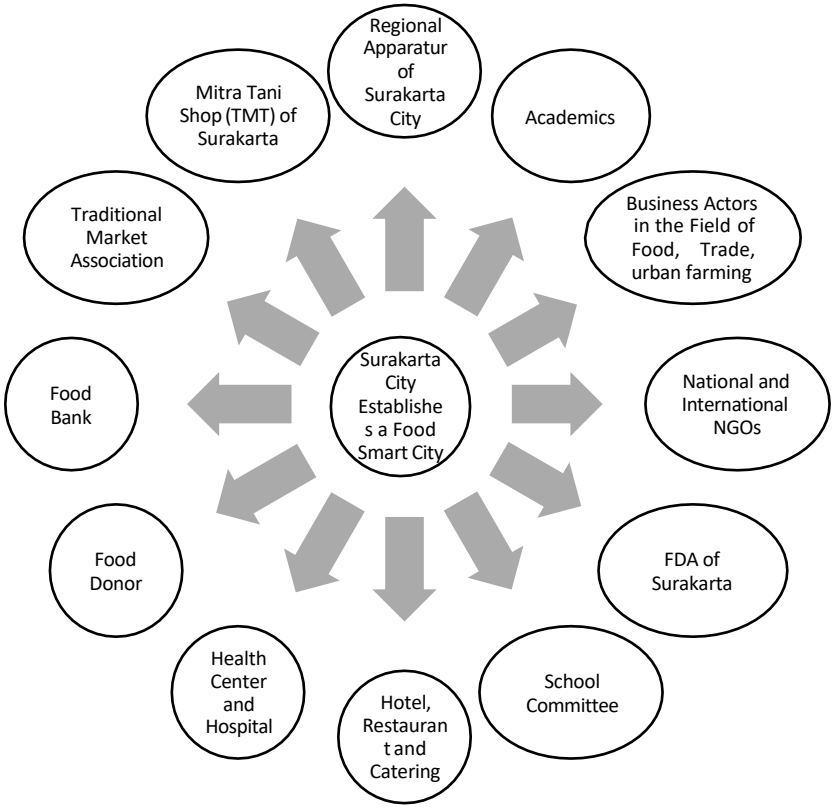

Figure 1. Identification of Stakeholders in Surakarta City to Establish a Food Smart City

5. Conclusion

Activities carried out by stakeholders in Surakarta that support the six pillars of MUFPP have begun to lead to creating of a sustainable food system, even though there are still some obstacles to overcome and the best solution to do. Surakarta's decision to join and sign the Milan Urban Food Policy Pact (MUFPP) is correct because stakeholders are encouraged to take initiatives in creating a food system. The food system must be sustainable, inclusive, resilient, safe, and diverse. This food system must include the production system (urban farming), distribution (Regional Food Safety Network), food sharing, center market management implementation, digitalization of food distribution systems, and consumption (child-friendly healthy school canteens and baby cafes). These initiatives aim to ensure the availability of healthy and affordable food for everyone with a human rights-based framework.

Based on the identification findings, activities carried out by stakeholders in Surakarta city in managing a sustainable food system that refers to the six pillars of MUFPP show that several major policy recommendations need development to address these obstacles. The policy recommendations are divided into two categories: the Surakarta city government developing policies to support a sustainable food system and holding regular meetings between stakeholders to discuss food innovations implemented and the challenges encountered.

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