

# POPPY ARSIL-23

*by* Poppy Arsil

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## Perspectives on the development of local food policy using the Analytical Hierarchy Process

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## Perspectives on the development of local food policy using the Analytical Hierarchy Process

P Arsil\*, K E Sularso, A Mulyani and N F Hardana

Faculty of Agricultural, Universitas Jenderal Soedirman, Purwokerto, Indonesia 25123

\*Email: poppy.arsil@unsod.ac.id

**Abstract.** For nearly five decades, Indonesia's agriculture ministry has promoted food diversification. Despite this, few studies have looked at government policies to increase local food consumption. We interviewed a diverse group consisting of local government officials, local business executives, consumers and food decision-makers in both urban and rural households. Respondents were chosen using a stratified random sampling technique. Purwokerto in Central Java and Kupang in East Nusa Tenggara were purposefully chosen to represent urban areas. To represent rural areas, the Banyumas Regency in Central Java and the Alor Regency in East Nusa Tenggara provinces were chosen. To assist decision-makers in identifying the dimension for the development of local food, the Analytical Hierarchy Method (AHP) was used as a decision support model. The findings show that important strategies to increase the local food consumption involved 1) empowering women as change agents and 2) developing local food councils. Alternative strategies include developing a master plan for rural development related to local food, strengthening capital and insurance for local industries, and policies encouraging food diversification.

### 1. Introduction

Since the 1960s, the agricultural ministry has initiated a food diversification policy in Indonesia. Efforts have been made to encourage people to eat diverse foods and improve their diet's nutrient content. President's instruction number 14 for 1974 for enhancing the folk food menu was the earliest food diversification program policy. The policy was then followed in 2009 by the President's Regulation No 22 on the acceleration of food diversification centred on local resources. This strategy aimed to achieve diverse food intake, boost nutritional balance, and achieve the 95 of Desirable Dietary Pattern (DDP) scores in 2015 [1][2]. The DDP is a food diversity arrangement based on the energy contribution of the major food group. However, data indicate that DDP score in 2018 was 90.4 with the composition of food intake: whole grains (65.7%), proteins (11.6%), oils and fats (12%); tubers (2.7%), oily seed (1.1%), nuts (3%), sugar (3.9%), fruits and vegetables (5.6%) and others (2.6 per cent). According to the Indonesian Food Security Agency, a score of 100 includes 50% of grains, 12% of animal proteins, 10% of oils and fats, 6% of tubers, 3% of oily seeds, 5% of nuts, 5% of sugar, 6% of fruits and vegetables, and 5% of others (3 per cent). To achieve higher DDP scores, Indonesians need to eat less grain, more tubers, nuts, oily seed, animal proteins and fruits and vegetables [1]. A "One day, no rice" movement was created in Depok and spread nationwide aiming at encouraging people not to eat rice a day every week/month. The use of family's back yards is also initiated in fulfilling their diverse food consumption [1][2]. According to Nawacita, nine priorities of President Joko Widodo's work program during 2015-2019 include improving self-sufficiency in food security.



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So, the development policy can be guided to grow food diversification industries based on local resources.

Despite various interventions, the food consumption trend has not meaningfully changed. Even food consumption trend in Indonesia tend to adjust to eating more instant noodles, as stated by [3]. This is made worse by the assumption that rice is a must for the everyday consumption of consumer goods. If you have not eaten rice, your diet is still not adequate, even if you have consumed enough other carbohydrate calories. This paper investigates strategies to improve food diversification policy through the method of analytical hierarchy process (AHP).

This study employed the analytical hierarchy process (AHP) developed by Thomas L. Saaty. This measurement technique determines the most important priorities based on the answers of respondents [4]. AHP has been successfully used to solve safety and security issues in the food supply chain [5] and has also been used to measure the potential for sustainability in food production [6]. The main strength of the method is the ability to assign levels of a complex problem in the form of a hierarchical arrangement. Additionally, AHP can calculate priorities based on each level's contents, linking to those levels above. Then, their relative importance has weighted the priority of strategies.

## 2. Research methods

The survey will identify factors that may influence, stakeholders involved, and strategies for food diversification programmes. The study was conducted using stratified sampling techniques [7] in 2019. Java island is the most densely populated island in Indonesia. We selected Central Java to represent Java people. East Nusa Tenggara province is a smaller Sunda Island in southern Indonesia. This province has 500 islands with big islands such as Sumba, Flores and part of Timor. We sampled urban and rural areas in both province areas. The city of Purwokerto and Kupang was selected to represent the urban area while the Banyumas and Alor regencies represent the rural areas. The respondents are the decision-maker at a household and the experts as well. The respondents interviewed comprised 390 individuals of food decision-makers at a household, 175 from urban areas and 115 from rural areas. In addition, a hundred persons were also selected judgmentally, consisting of experts from local universities, food manufacturers, food distributors, and farmers (Table 1).

**Table 1.** The composition of respondents from experts, local government officials and businessman.

| Respondents               | Urban |     | Rural |     |
|---------------------------|-------|-----|-------|-----|
|                           | n     | %   | n     | %   |
| Experts from university   | 10    | 20  | 8     | 16  |
| Local food businessman    | 10    | 20  | 8     | 16  |
| Local food distributors   | 10    | 20  | 7     | 14  |
| Farmers                   | 14    | 28  | 17    | 34  |
| Local government officers | 6     | 12  | 10    | 20  |
| Total                     | 50    | 100 | 50    | 100 |

The AHP was used to analyse the data that consists of several steps:

1. Define the problem and set the objectives following by sub-criteria and alternatives.
2. Construct the hierarchical form from the top (goals) to down (alternatives/strategies).
3. Structure a set of pair comparison matrices.
4. Calculate the weight of the vector criteria.
5. Compute the score option of matrices.
6. Rank the alternative [4].

At the first step, the hierarchy was constructed to prioritise what sort of actions are the most important (Figure 1).

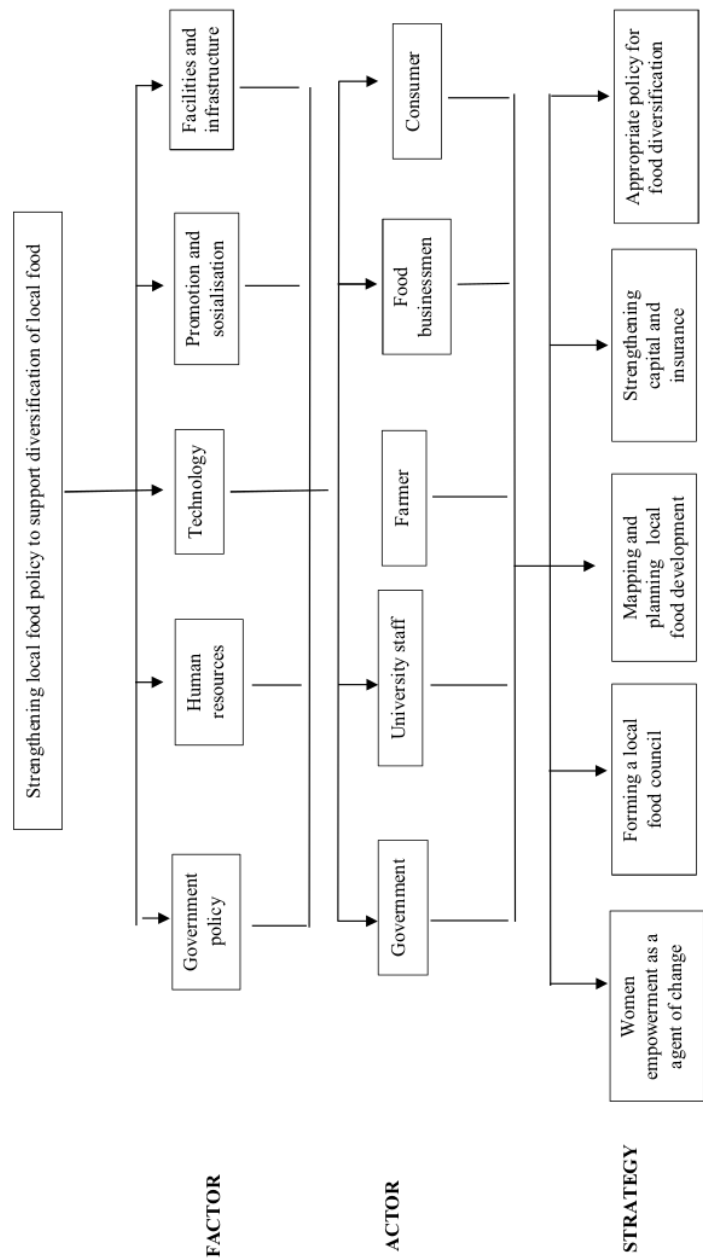


Figure 1. A hierarchical design that supports local food diversification.

An analysis was performed that used a specific scale that described the presence of importance of each element (Table 2).

**Table 2.** Saaty scale used to determine the relative importance of one element over another element [4].

|         |  |
|---------|--|
| 1       | A is equally important to B                            |
| 3       | A is of moderate importance to B                       |
| 5       | A is of strong importance to B                         |
| 7       | A is of very strong importance to B                    |
| 9       | A is of extreme importance to B                        |
| 2,4,6,8 | The intermediate value between the two adjacent scores |

The next step is to set the pairwise matrices. When A is perceived as a consistent matrix, the comparative judgment represents by  $a_{ij}$ . If  $a_{ij}$  is 1, then  $a_{ji}$  is  $1/a_{ij}$  or, reciprocally,  $a_{ji} = 1/a_{ij}$ . The weight  $W_j$  and judgment  $a_{ij}$  were calculated by applying a formula [2].

$$A = [a_{ij}] = \begin{bmatrix} 1 & a_{12} & \dots & a_{1n} \\ \frac{1}{a_{12}} & 1 & \dots & \frac{1}{a_{1n}} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{1}{a_{1n}} & \frac{1}{a_{2n}} & \dots & 1 \end{bmatrix} \quad [1]$$

$$a_{ij} = \frac{w_i}{w_j}, i, j = 1, 2, \dots, n \quad [2]$$

While the consistency index (CI), an index that shows the consistency of judgement by respondents across all pairwise metric was calculated using a CI formula. The  $\lambda_{\max}$  shows the maximum of the eigenvalues of a consistent matrix, while n shows the number of comparisons made [3]

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad [3]$$

$\lambda$  = eigenvalue of the matrix

CI = consistency index

n = number of comparisons

The matrices consistency (CR) was measured that equals CI divided by random index (RI). The CR range should be between 0.1 and 1, demonstrating the depth and quality of the research [4].

### 3. Result and discussion

#### 3.1. General description and respondent characteristics

The majority of respondents were female (63 per cent), age range between 30-50-year-old. Based on occupation, the number of employees was higher in urban areas while housewife was dominated in the rural area. Over half of respondents have completed high school. Socioeconomic status, or SES, is higher in urban areas than in rural areas. Twenty-five per cent of urban locals earns more than 4 million IDR a month, while 19 per cent of rural locales earn more than 4 million IDR a month. Most of the respondents were married (76.5%), and the majority of respondents had a family member that is between 1-5 people

(63 per cent) (Table 3). The results are similar to those reported in [8] who reported that women are playing important role in the local food decisions of a family. The participants were dominated by people age between 30 to under 60 years old and who have completed high school. The family earns less than 4 million IDR a month.

**Table 3.** Respondent characteristics in urban and rural areas.

| Characteristic           |                                   | Urban (n=225) |    | Rural (n=165) |    | Total (n=390) |             |
|--------------------------|-----------------------------------|---------------|----|---------------|----|---------------|-------------|
|                          |                                   | n             | %  | n             | %  | n             | %           |
| <b>Gender</b>            | Male                              | 78            | 35 | 64            | 39 | 142           | 37          |
|                          | <b>Female</b>                     | 147           | 65 | 101           | 61 | 248           | <b>63</b>   |
| <b>Age</b>               | > 20 ≥ 30                         | 41            | 18 | 33            | 20 | 74            | 19          |
|                          | > 30 ≥ 40                         | 56            | 25 | 48            | 29 | 104           | <b>27</b>   |
|                          | > 40 ≥ 50                         | 67            | 30 | 38            | 23 | 105           | <b>26.5</b> |
|                          | > 50 ≥ 60                         | 54            | 24 | 27            | 16 | 81            | 20          |
|                          | > 60                              | 7             | 3  | 19            | 12 | 26            | 7.5         |
| <b>Education</b>         | Junior high school                | 12            | 5  | 14            | 8  | 26            | 6           |
|                          | <b>Senior high school</b>         | 99            | 44 | 95            | 58 | 194           | <b>50</b>   |
|                          | Undergraduate                     | 103           | 46 | 48            | 29 | 151           | 39          |
|                          | Master degree and above           | 11            | 5  | 8             | 5  | 19            | 5           |
| <b>Income/month (RP)</b> | ≤ 2,000,000                       | 47            | 21 | 43            | 26 | 90            | 23.5        |
|                          | > 2,000,000 ≥ 3,000,000           | 59            | 26 | 44            | 27 | 103           | 26.5        |
|                          | <b>&gt; 3,000,000 ≥ 4,000,000</b> | 62            | 28 | 46            | 28 | 108           | <b>28</b>   |
|                          | > 4,000,000                       | 57            | 25 | 32            | 19 | 89            | 22          |
| <b>Family member</b>     | <b>1 – 5 people</b>               | 176           | 78 | 123           | 75 | 299           | <b>76.5</b> |
|                          | 6 – 10 people                     | 49            | 22 | 42            | 25 | 91            | 23.5        |
| <b>Marital status</b>    | <b>Married</b>                    | 139           | 62 | 105           | 64 | 244           | <b>63</b>   |
|                          | Single                            | 78            | 35 | 53            | 32 | 131           | 33.5        |
|                          | Widowed                           | 8             | 4  | 7             | 4  | 15            | 4           |

### 3.2. Consumers' perception of local

When respondents asked what makes local and non-local food different, urban respondents replied: "quality" (32%) and "distance" (31%). Respondents from rural areas answered "price" instead of "quality" (25%) (Table 4). Consumers indicated that "quality" is an important factor in determining local food. When asked about the distance between producers and customers, urban respondents stated that food that came from the same regency was local (29 per cent). Most rural residents responded that food produced within 30 kilometres of where they live. Over 90% of survey participants were growing on the farm and believed local food was more affordable and of higher quality than non-local food in rural areas. This study is consistent with other research [8] which found a location, quality and price to be the most salient characteristics of local food products in Indonesia. What is produced within a village is the preferred view with respect to location.

**Table 4.** Consumers' perception of local food

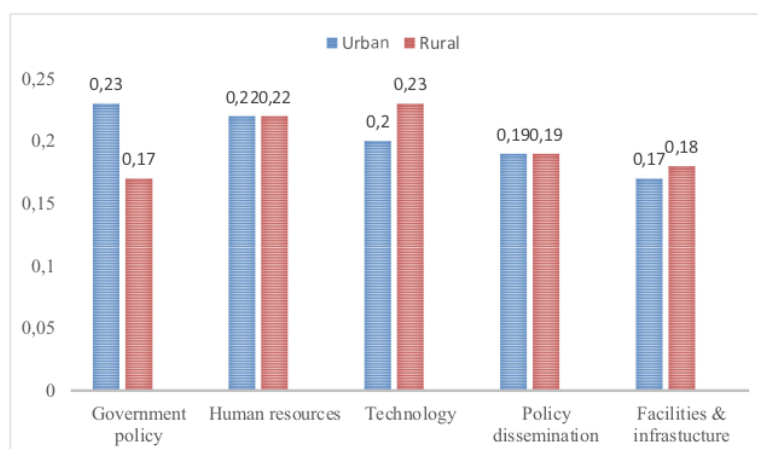
| Statements  |  | Urban<br>(n=225) |    | Rural<br>(n=165) |    | Total<br>(n=390) |      |
|---|--|------------------|----|------------------|----|------------------|------|
|   |  | n                | %  | n                | %  | n                | %    |
| <b>What makes the difference between local and non-local food</b> | Distance                                       | 69               | 31 | 26               | 16 | 95               | 24   |
|   | Quality  | 72               | 32 | 30               | 18 | 102              | 26   |
|   | Price  | 28               | 12 | 42               | 25 | 70               | 18   |
|   | Processed or not processed food                | 56               | 25 | 31               | 19 | 87               | 22   |
|   | Others   | 0                | 0  | 36               | 22 | 36               | 9    |
| <b>Distance for local<sup>a)</sup></b>                            | Same district                                  | 25               | 11 | 13               | 8  | 38               | 9    |
|   | Same regency                                   | 66               | 29 | 11               | 7  | 77               | 18   |
|   | < 20 KM  | 42               | 19 | 12               | 7  | 54               | 13   |
|   | >20 KM ≥ 30 KM                                 | 39               | 17 | 115              | 70 | 154              | 36   |
|   | >30 KM ≥ 40 KM                                 | 19               | 8  | 26               | 16 | 45               | 11   |
|   | > 40 KM ≥ 50 KM                                | 16               | 7  | 15               | 9  | 31               | 7    |
| <b>Quality of food</b>  | > 50 KM  | 18               | 8  | 9                | 5  | 27               | 6    |
|   | Local is of higher quality than non-local food | 154              | 68 | 119              | 72 | 273              | 70   |
|   | Local is the same quality than non-local food  | 48               | 21 | 23               | 14 | 71               | 17.5 |
|   | Local is lower quality than nonlocal food      | 21               | 9  | 14               | 8  | 35               | 8.5  |
|   | I don't know                                   | 2                | 1  | 9                | 5  | 11               | 3    |
| <b>Price</b>  | Local is cheaper than nonlocal food            | 149              | 66 | 156              | 95 | 305              | 78   |
|   | Local is the same price as non-local food      | 45               | 20 | 9                | 5  | 54               | 14   |
|   | Local is expensive than nonlocal food          | 29               | 13 | 0                | 0  | 29               | 7    |
|   | I don't know                                   | 2                | 1  | 0                | 0  | 2                | 1    |
|   | I don't know                                   | 2                | 1  | 0                | 0  | 2                | 1    |
| <b>Grown in the farming</b>                                       | Yes  | 146              | 65 | 153              | 93 | 299              | 77   |
|   | No   | 79               | 35 | 12               | 7  | 91               | 23   |

<sup>a)</sup>A respondent can reply to one or more answers

### 3.3. Strategy for strengthening local food policy in urban and rural areas

There are three stages of hierarchy in the local food diversification strategies. Factors shaping local food policy to develop the food diversification initiative are at the first stage. The actors involved in the production and implementation of local food policy are at the second level. The last level regards alternatives or strategy links to local food policy (shown in Figure 1).

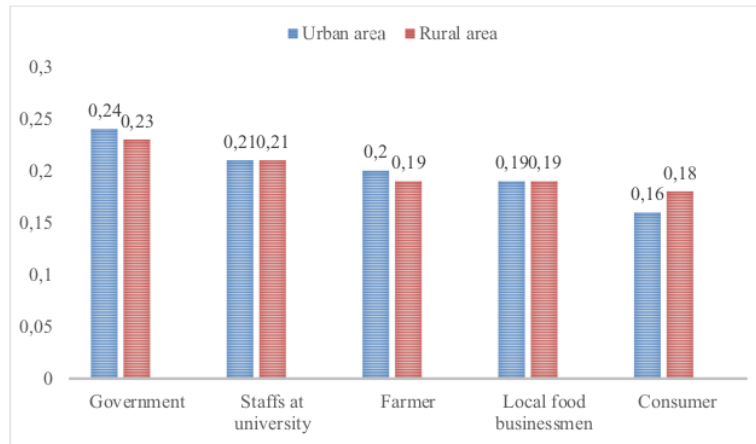




**Figure 2.** Factors shaping local food policy supporting the initiative for food diversification

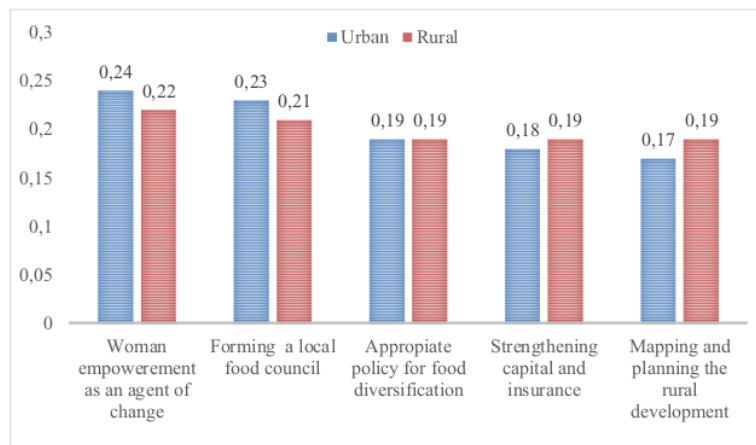
In the urban area, government policies were the top factor priority, followed by human resources, technology, human resources, facilities and infrastructure. In addition, respondents responded that technology (0.23) is the most critical determinant of strengthening local food policy to support the food diversification programme, followed by human resources (0.22), policy dissemination (0.19), infrastructure and facilities (0.18) as well as government policies (0.17). Government policies should address barriers that may impede an increase in local food consumption and diversification. One barrier identified by [9] is that intermediate marketing channels may encounter difficulties in year-round availability, working with multiple vendors and adequate supply delivery on time. Food-hub, a food business that handles aggregation, can be one solution through government law and policy. Local food alternatives that are promoted in places like schools, hospitals and restaurants could diversify people's diet. Technology is the most critical determinant for respondents from rural areas. Food production innovation can increase local food production. The added value of food can be improved by food processing technology. Therefore, policy regarding transfer technology may be suitable for rural residents. Systematic and future technology and innovation, as described in [10], are key drivers of the transformation of the food system, ranging from food production, post-harvest technology, food processing, food packaging, transportation and distribution and marketing to improve diets. Food regulation and subsidies could raise the rate of innovation.

In urban and rural areas, the crucial players involved in the food production and implementation of local food diversification policies illustrate the same trend. The most critical factor is the government, followed by university staffs, farmers, locally processed entrepreneurs, and consumers. The government is a key player in improving local food policy as the regulator. As an expert, university workers contribute to educate and research local food products, while the private sector and customers play a less important role in this report.



**Figure 3.** Actors who are influential in shaping food policy in support of local food diversity.

Empowerment of women was decided to be an agent of change and to be the most successful strategy for improving local food policy in urban and rural areas following by establishing a local food development council. The third primary concern among urban residents is mapping and planning rural development. This priority is the least important among those in rural areas. For them, it is more important to accelerate a diversification program than strengthening capital and insurance.



**Figure 4.** The strategies for supporting local food diversity and the importance of it

Women play a critical role in food decision-making in Indonesian households. In Indonesia, mothers or grandmothers are responsible for deciding what to eat daily [8]. Empowering women will have a high impact on the success of diversification food programme through women activities such as women groups in a district or village, women groups reciting at mosques, and women group learning about food consumption. The Food Security Council who responsible for local food acceleration might create local food councils at the village level to better reach broader consumers.

#### 4. Conclusion

The AHP is a practical approach for examining the key strategies for local food policy, particularly the factors that influence an effective local food system and actors involved. The analysis concludes that women empowerment is the most effective means of achieving change. Women play a primary role in food decision-making in traditional Indonesian cultures. To improve women's skill, education and knowledge of food consumption must be increased through formal and informal education. The second strategies involve local food councils developing food systems as well as working with other institutions to improve food security. This study has its limitations because it was limited to only two urban and rural areas.

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#### References

- [1]. B Hariyanto, Sugiatmi, A gantina, A Maulad 2018 Directory of the development of food consumption, Food Security Council: Jakarta
- [2]. G S Hardono 2014 Strategi pengembangan diversifikasi pangan lokal, *Analisis Kebijakan Pertanian* **12(1)** 1-17
- [3]. Food Security Council 2015 Kebijakan strategis pangan dan gizi tahun 2015-2019, Food Security Council: Jakarta
- [4]. L Saaty 1990 How to make a decision: The Analytical Hierarchy Process, *European Journal of Operation research* **48** 9-26
- [5]. Y K Sharma, A K Yadav, S K Mank, P P Patil 2018 Ranking the Success Factors to Improve Safety and Security in Sustainable Food Supply Chain Management Using Fuzzy AHP, *Material today's: Proceeding*, 5(5) 12187-12196
- [6]. L A Ocampo 2019 Applying fuzzy AHP-TOPSIS technique in identifying the content strategy of sustainable manufacturing for food production, *Environment, Development and Sustainability* **21(5)** 2225-2251
- [7]. S Chambers, A Lobb, L Butler, K Harvey and W B Traill 2007 Local, national and imported foods: A qualitative study, *Appetite* **49(1)** 208-213
- [8]. P Arsil, E Li and J Bruwer 2014 Perspectives on consumer perceptions of local foods: A view from Indonesia, *Journal of International Food & Agribusiness Marketing* **26 (2)** 107-124
- [9]. S.W. Martinez 2016 Policies Supporting Local Food in the United States, *Agriculture* **6(43)** 1-13
- [10]. M Herrero, P K Thornton, D Mason-D'Croz et al. 2020 Innovation can accelerate the transition towards a sustainable food system, *Nature Food* **1** 266-272

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