



# Backyard Fruit Crops Potential in Supporting Urban Agro-Industry

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Date of publication (dd/mm/yyyy): 06/11/2017

**Abstract** – Utilizing backyard is the best solution in strengthening the economy in an urban society with a limited agricultural land. In escalating the situation of family finance Agro-industry existence is really expected, however the main problem of agro-industry up until today is the continuity of the material availability. With more intensified backyard management, the availability of the material, especially fruit crops, as a main support of agro-industry will be guaranteed. The objectives of this research are (1) identifying the potential of planting fruit crops in the backyard as an agro-industry material, (2) analyzing fruit crops as an agro-industry material priority, and (3) make an agro-industry development model by utilizing backyard comprehensively. The data used in this research are analyzed with descriptive method that carried out in some area that uses fruit crops as a material supplier in agro-industry. The method used in analyzing the data is exponential comparison method (MPE). The result found in this research are (1) there are 9 types of fruit crops planted in backyard that performed as the support of agro-industry material identified, those are mango, guava, rambutan, longan, banana, papaya, sapodilla, rose apple and gneumon. (2) After performing MPE test, it shows that each area has a different finer fruit crop priority (3) the agro-industry development model are adjusted depending on the finer fruit crop type of each area.

**Keywords** – Fruit Crops, Backyard, Urban Agro-Industry.

## I. INTRODUCTION

The main problem in urban area is limited agricultural space, which make utilizing the backyard is the best solution for strengthening the economic condition of urban population and also in reserving foods. Backyard, when managed and planned properly, can play a big role in supporting nutrients needs for family while on the other hand it can give an aesthetic touch for the view and also increase family income. Backyard can be used as a live pharmacy by planting herbs, known as TOGA. It can also provide the material for agro-industry business that can increase family income by making processed product that produced from the resources that is planted in the backyard. Utilizing backyard space by implementing an advanced approach for various plants, farming, and fishes can ensure the availability of varied nutrient foods supply. If managed intensively corresponding with its potential, not only it can provide the food supply for the family but it can increase family income. (Peny, DH and Benneth Ginting, 1984).

The existence of agro-industry nowadays is really hoped to increase family income, and also as a motor for industrial sector. A lot of hopes are put into agro-industry sector, even though its success depends on its own potential. By utilizing backyard with fruit crops, it is hoped to be the supplier of

agro-industry material so that it can help boosts business passion to the society, and also increase family income by producing a commodity that play a role as a material for processed product. Generally, the main problem faced by agro-industry are: a). Limited material continuity, (b) the processing still use a low-end technology so it can not last very long, (c) limited fund that the person has for reserving the material, and (d) the marketing only done locally, as the seller can not expand their market because of the continuity problem they faced. From the problems mentioned above, in order to help the continuity of the material needed, it needs more attention in developing urban agro-industry by improving the commodity that support backyard cultivation so that it can create the proper structure for agribusiness and agro-industry.

The objectives of this research are identifying the potential of planting fruit crops in the backyard as an agro-industry material, analyzing the priority fruit crops as an agro-industry material, find the prospect of agro-industry development by utilizing backyard comprehensively.

The Urge (Importance) of the research in developing agro-industry based on utilizing backyard are really important an also really suitable for some reasons, which are: 1). The industry from utilizing backyard can increase the economical activities in agricultural sector, 2) it has a prospect of developing the potential from the agricultural sector, 3) increase the prosperity and the income for farmers, and it can also open up job opportunities. Furthermore, the growth of agro-industry can be achieved by escalating the productivity and the efficiency of farmer's business continuously, so what should be considered is the head industry that support farmer's business so that it is favorable in agro-industry, especially in preserving quality seeds, primary industry (crops production process), and the branch industry that works on the processing the crops (home industry) and also its marketing.

In accordance with what mentioned previously, the early stage that is done in this research is reviewing the backyard potential that can be used as the agro-industry material, from the variety used, agro-climate system, the technology used, preparing the fund, marketing, etc. By handling those parts, it can increase the amount of reserved material. Another important thing in this research is the quality of the local commodity used as the material for agro-industry, so that the value added from the material used in making a processed product can be found in the product. Subsequently, this research will focus on the agro-industry development model based on utilizing backyard for fruit plant comprehensively.

## II. METHOD

The choosing of the area used are done purposively by considering that the areas are the capital of each district, Mejayan for Madiun District, Ngawi for Ngawi District, Magetan for Magetan District, and Taman, Kartoharjo, and Manguharjo for the city of Madiun. Choosing the respondent is done with purposive random sampling, which is done by taking 20 randomly sample from each district capital. The method used in this research is descriptive analysis method, which analyzing one object in the present time. The method used in analyzing the data is exponential comparison method (MPE) which is one of the methods used in deciding the quantification in depth in a specified scale, and in this method scoring is used in the selection available. The steps that need to be done in MPE are: 1) determine the alternative decision, 2) organizing the criteria that will be evaluated, 3) determining the relative importance level of each decision using a specified conversion scale that corresponds with the objectives wanted to be reached. 4) Putting on rating on each alternative decision value. (Marimin, 2004). The formula used in calculating each decision is as follows:

$$\text{Total Value (TNi)} = \sum_{j=1}^m \text{Bj} \cdot \text{Vij}$$

Where the sign means:

TNi = Alternate Total Value i.

Vij = Relative importance scale of the criteria j on decision I, that can be stated with ordinal scale (1, 2, 3, 4, 5).

Bj = The importance scale of criteria decided, stated with weight.

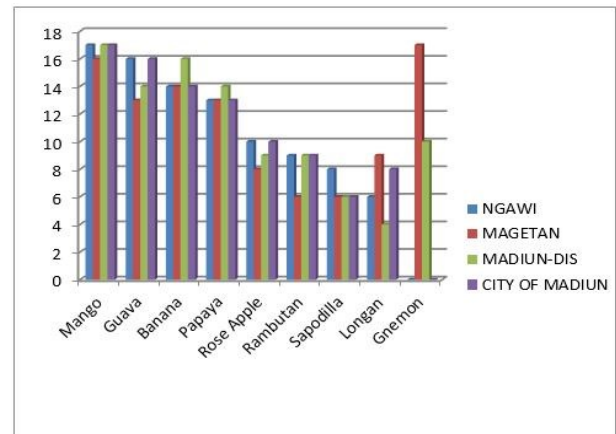
m = The amount of conclusion criteria.

In this research, experts' opinion chosen is the ones that relevant with the research and comes from practitioners, relevant government institution, academia or researcher, and the subject/the agro-industry businessman. In deciding the alternative decision of potential agro-industry development, 3 highest priority of plant crop type planted in the backyard from each research location are used.

## III. RESULT AND DISCUSSION

### 1. Identification of Plant Crops Planted in Backyard

The result of a survey done in research location shows that in Ngawi, Magetan, Madiun district, and the city of Madiun, there are 13 types of fruit crops. After inventory and identification of expert's opinion are done with the basis of the criteria of choosing the development potential plant crops which includes surface area, production, crops type, the ease of cultivation, society interest in planting, storability and the continuous availability, from 13 types of fruit crops that plays a role as the material for agro-industry are reduced to 9 types of fruit crops. The graphic follows shows the number of respondent and the fruit crop types in the backyard.



Graphic 1. The number of respondent and fruit crop types planted in the backyard

From the graphic, it can be seen that the highest number of respondent are planting Mango, which can be found in Ngawi district, Madiun District and the city of Madiun. While in Magetan district the highest number of crops planted by the respondents is gnemon. It can also be seen that many respondents are planting Guava, which is the second highest of fruit crop planted in Ngawi and in the city of Madiun, while in Madiun District the second highest fruit crop is banana. For Magetan District, the second highest fruit crop planted is Mango. For the third highest fruit crop planted by respondents is banana which can be found in Ngawi district, Magetan District and the city of Madiun. For Madiun District, the third highest fruit crops planted is papaya.

### 2. Identification of Agro-Industry with Fruit Crops as its Material

From the result of the survey done in research location, it can be found that there are 26 types of agro-industry that uses fruit crops as its material in Ngawi District, Magetan District, Madiun district, and the city of Madiun. After inventory and identification of expert's opinion are done with the basis of the criteria of choosing the development potential of fruit crops which includes the availability of the material, human resources, the tools, technology used in production, marketing, competitors and the support from government policy, from 26 types of agro-industry with fruit crops as its material it is then reduced to 15 agro-industry types. From these 15 agro-industry types the decision can be decided using MPE method that includes mango, guava, banana, gnemon and papaya which are all 3 highest fruit crops priority planted in the backyard that are found in each research location.

### 3. The Priority of Fruit Crops type that are Planted in Backyard

There are many types of fruit crops that are planted in the backyard that can be found in research locations, which are Ngawi District, Magetan District, Madiun District, and the city of Madiun. From these research locations the result found is that the fruit crops planted by the society are varied from each house. This shows that the potential from each location are also different. Here is the result of the fruit crops priority planted in the backyard after the MPE method testing is done:

Table 1. Fruit Crops Priority Planted in Backyard

| No | Crops Name | Crops Type Priority In Research Location |          |           |          |             |          |                |          |
|----|------------|--|----------|-----------|----------|-------------|----------|----------------|----------|
|    |            | Ngawi                                    |          | Magetan   |          | Madiun Dis. |          | City Of Madiun |          |
|    |            | MPE Value                                | Priority | MPE Value | Priority | MPE Value   | Priority | MPE Value      | Priority |
| 1  | Mango      | 192625739                                | 1        | 326579021 | 2        | 116110029   | 1        | 182926916      | 1        |
| 2  | Guava      | 133527328                                | 2        | 74658424  | 4        | 38150990    | 4        | 82560517       | 2        |
| 3  | Banana     | 80447571                                 | 3        | 80463046  | 3        | 80480241    | 2        | 47474522       | 3        |
| 4  | Papaya     | 56691809                                 | 4        | 65083482  | 5        | 66968021    | 3        | 36229191       | 4        |
| 5  | Rose Apple | 19834274                                 | 5        | 20033140  | 8        | 10106016    | 7        | 23521939       | 5        |
| 6  | Rambutan   | 5923745                                  | 6        | 36726073  | 6        | 10276416    | 6        | 11644532       | 6        |
| 7  | Sapodilla  | 3288500                                  | 7        | 3288500   | 9        | 3288500     | 8        | 3446266        | 7        |
| 8  | Longan     | 3060338                                  | 8        | 36726073  | 7        | 1378095     | 9        | 3060156        | 8        |
| 9  | Gnemon     | 0  | 0        | 426318202 | 1        | 25681298    | 5        | 0              | 0        |

Source: Primary Data

From the table above, it can be inferred that from many fruit crops planted in Ngawi District, Madiun District, and the city of Madiun, mango sits on the number 1 priority, while in Magetan District the number one priority is gnemon. For the second highest fruit crops priority in Ngawi District and the city of Madiun is guava, while for Madiun District the second highest fruit crop priority is banana and for Magetan District the second highest fruit crop priority is mango. The third highest fruit crop priority in Ngawi District, Magetan District and the city of Madiun is banana, while on the other hand the third fruit crops priority in Madiun District is papaya.

#### 4. Agro-industry with Fruit Crops as its Material Development Priority.

In developing agro-industry in research locations, processed product that are produced from fruit crops in each location that can be used as a material should be considered. The priority that can be used in developing agro-industry can be inferred from experts' opinions and the experts consist of: agro-industry businessman, academia and from related institute. Here is the agro-industry development potential priorities that are found after MPE testing corresponding with the fruit crops potential in each research location are done:

#### a). NGAWI DISTRICT

Table 2. Agro-Industry Development Priority with Mpe for Fruit Crops Material

| No | Processed Product Name | Agro-industry Development Potential Priority |          |                |          |                 |          |
|----|------------------------|--|----------|----------------|----------|-----------------|----------|
|    |                        | Mango Material                               |          | Guava Material |          | Banana Material |          |
|    |                        | MPE Value                                    | Priority | MPE Value      | Priority | MPE Value       | Priority |
| 1  | Fruit Extract          | 471965146                                    | 1        | 50837019       | 1        | -               | -        |
| 2  | Fruit Chips            | 372002414                                    | 2        | -              | -        | 151225439       | 1        |
| 3  | <i>Dodol</i>           | 55495596                                     | 3        | -              | -        | 24453355        | 4        |
| 4  | Syrup                  | 35235068                                     | 4        | -              | -        | -               | -        |
| 5  | Pickled Fruit          | 35151579                                     | 5        | -              | -        | -               | -        |
| 6  | Juice                  | -  | -        | 29853294       | 2        | -               | -        |
| 7  | <i>Getuk</i>           | -  | -        | -              | -        | 36421965        | 2        |
| 8  | <i>Sale</i>            | -  | -        | -              | -        | 36233002        | 3        |
| 9  | Flour                  | -  | -        | -              | -        | 9779560         | 5        |

Source: Primary Data

From the table above, it can be seen that the result of selecting the decision with MPE, the agro-industry potential development with mango material is fruit extract in Ngawi District, as it is the number one priority in Ngawi District and followed by various fruit chips, *Dodol*, syrup and pickled mango. For the agro-industry potential with guava

as its material, fruit extract is the number one priority and followed by juices. For the agro-industry development with banana as its material, the number one priority is a processed product as a banana chips. After the chips, the priority is also a processed product such as *getuk*, *sale*, *dodol* and banana flour.

#### b). MAGETAN DISTRICT

Table 3. Agro-Industry Development Priority with Mpe for Fruit Crops Material

| No | Processed Product Name | Agro-Industry Development Potential Priority |          |                 |          |                 |          |
|----|------------------------|--|----------|-----------------|----------|-----------------|----------|
|    |                        | Mango Material                               |          | Gnemon Material |          | Banana Material |          |
|    |                        | MPE Value                                    | Priority | MPE Value       | Priority | MPE Value       | Priority |
| 1  | Fruit Chips            | 182627042                                    | 1        | -               | -        | 292754651       | 1        |
| 2  | Fruit Extract          | 158450987                                    | 2        | -               | -        | -               | -        |
| 3  | <i>Dodol</i>           | 56094085                                     | 3        | -               | -        | 20595275        | 4        |
| 4  | Syrup                  | 35628097                                     | 4        | -               | -        | -               | -        |
| 5  | Pickled Fruit          | 35151579                                     | 5        | -               | -        | -               | -        |
| 6  | <i>Emping Gnemon</i>   | -  | -        | -               | 1        | -               | -        |
| 7  | <i>Getuk</i>           | -  | -        | -               | -        | 34286689        | 2        |
| 8  | <i>Sale</i>            | -  | -        | -               | -        | 34148233        | 3        |
| 9  | Flour                  | -  | -        | -               | -        | 10160272        | 5        |

Source: Primary Data



From the table above, it can be inferred that the selecting of alternative decision in Magetan District for agro-industry potential development with mango as its material is fruit chips as it has the highest priority compared to the other. Fruit chips then followed by mango fruit extract, mango *dodol*, mango syrups and pickled mango. For the selecting of the alternative decision for agro-industry with gnetum as its material is only with a processed product as *emping* (gnetum chips). This corresponds with the gnetum

cultivation as the highest backyard fruit crops in Magetan and this resulted in making Magetan District as the center of *emping* production. The third highest fruit crops priority in Magetan District is banana. For the agro-industry potential development with banana as its material, fruit chips is the highest priority. Fruit chip is followed by banana *getuk*, banana *sale*, banana *dodol* and flour made from banana.

**c). MADIUN DISTRICT**

Table 4. Agro-Industry Development Priority with MPE for fruit Crop Material

| No | Processed Product Name | Agro-Industry Development Potential Priority |          |                 |          |                 |          |
|----|------------------------|--|----------|-----------------|----------|-----------------|----------|
|    |                        | Mango Material                               |          | Banana Material |          | Papaya Material |          |
|    |                        | MPE Value                                    | Priority | MPE Value       | Priority | MPE Value       | Priority |
| 1  | Fruit Chips            | 159519600                                    | 1        | 82320063        | 1        | -               | -        |
| 2  | Fruit Extract          | 157852061                                    | 2        | -               | -        | -               | -        |
| 3  | Syrup                  | 38454307                                     | 3        | -               | -        | -               | -        |
| 4  | Pickled Fruit          | 38018866                                     | 4        | -               | -        | -               | -        |
| 5  | <i>Dodol</i>           | 13817471                                     | 5        | 20595275        | 3        | -               | -        |
| 6  | <i>Getuk</i>           | -  | -        | 34110109        | 2        | -               | -        |
| 7  | <i>Sale</i>            | -  | -        | 19891141        | 4        | -               | -        |
| 8  | Flour                  | -  | -        | 6289137         | 5        | -               | -        |
| 9  | Sauce                  | -  | -        | -               | -        | 89250251        | 1        |
| 10 | Sweets                 | -  | -        | -               | -        | 37890562        | 2        |
| 11 | Cosmetic Product       | -  | -        | -               | -        | 37886649        | 3        |
| 12 | Candy                  | -  | -        | -               | -        | 31119153        | 4        |
| 13 | Soap                   | -  | -        | -               | -        | 7186839         | 5        |

Source: Primary Data

From the table above it can be inferred that the result of selecting the alternative decision in Madiun District for agro-industry potential development with mango as its material is fruit chips, as it is the number one priority in Madiun District. Fruit chips then followed by mango fruit extract, mango syrup, pickled mango and mango *dodol*. For agro-industry potential development with banana as its material, the number one priority is a processed product as

a banana chips. Banana chips then followed by another processed product such as banana *getuk*, banana *dodol*, banana *sale* and flour made from banana. For agro-industry potential development with papaya as its material, the number one priority is a processed product in form of sauce made from papaya. The sauce then followed by cosmetic products, sweets, candy and papaya soap.

**d). THE CITY OF MADIUN**

Table 5. Agro-Industry Development priority with MPE for fruit Crops Material

| No | Processed Product Name | Agro-Industry Development Potential Priority |          |                |          |                 |          |
|----|------------------------|--|----------|----------------|----------|-----------------|----------|
|    |                        | Mango Material                               |          | Guava Material |          | Banana Material |          |
|    |                        | MPE Value                                    | Priority | MPE Value      | Priority | MPE Value       | Priority |
| 1  | Fruit Chips            | 159212863                                    | 2        | -              | -        | 49669100        | 1        |
| 2  | Fruit Extract          | 182628122                                    | 1        | 15211575       | 1        | -               | -        |
| 3  | <i>Dodol</i>           | 13448460                                     | 5        | -              | -        | 20689672        | 2        |
| 4  | Syrup                  | 43970541                                     | 3        | -              | -        | -               | -        |
| 5  | Pickled Fruit          | 38096373                                     | 4        | -              | -        | -               | -        |
| 6  | Juice                  | -  | -        | 5773313        | 2        | -               | -        |
| 7  | <i>Getuk</i>           | -  | -        | -              | -        | 17991549        | 3        |
| 8  | <i>Sale</i>            | -  | -        | -              | -        | 16279597        | 4        |
| 9  | Flour                  | -  | -        | -              | -        | 6307037         | 5        |

Source: Primary Data

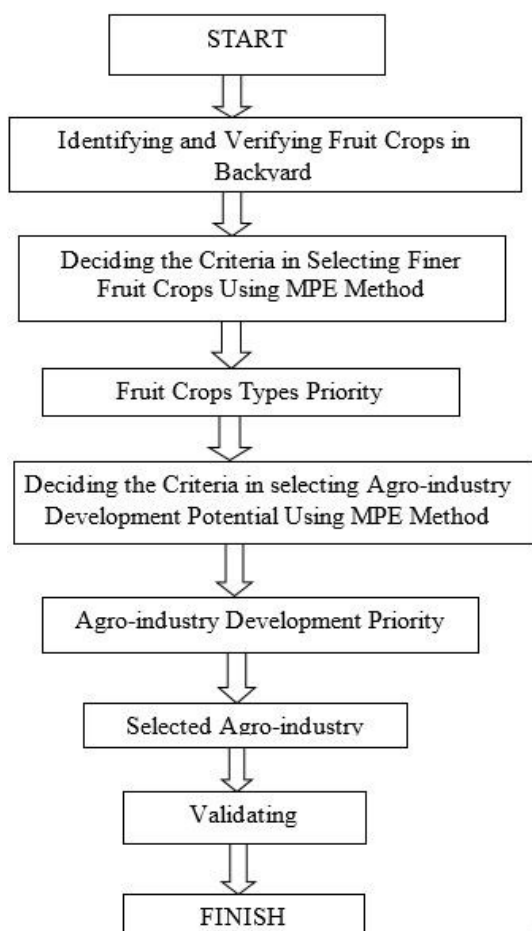
From the table above, it can be inferred that the selecting of alternative decision in the city of Madiun for agro-industry potential development with mango as its material is mango fruit extract as it has the highest priority compared to the other. Mango fruit extract then followed by the other processed product such as mango fruit chips, mango syrup, pickled mango, and mango *dodol*. For the agro-industry potential development with guava as its material, the number one priority with the highest number is a processed product in the form of guava fruit extract. It is then followed

with another processed product, which is guava juice. For the agro-industry potential development with banana as its material, the highest priority in the city of Madiun is a processed product in the form of banana fruit chips. Banana fruit chips then followed by the other processed product in the form of banana *dodol*, banana *getuk*, banana *sale* and flour made from banana.

**5. Agro-Industry Development Model with Backyard Fruit Crops as its Material**



Generally, backyard are planted with a multi-commodity, it can be vegetable crops, fruit crops, herbs and even decorative crops. In order to make fruit crops that are planted in the backyard optimum in supporting the agro-industry development as its material, selecting and types and also selecting the potential of the fruit crops are needed to be done. Therefore, in organizing the model of agro-industry development, many factors are considered such as deciding the criteria, selecting the indicators and deciding the objective. The result from the discussion with experts in organizing the model of agro-industry development, it shows that some steps can be done to organize the model. Here are the steps:



Picture 1. Backyard Fruit Crops Agro-industry Development Model.

Each research location (Ngawi District, Magetan District, Madiun District, and the city of Madiun) has different finer fruit crops in their area, which resulted in the differentiation in each agro-industry development.

Table 6. Agro-industry with fruit crops material development in 4 locations.

| No | District/ City | Material Commodity | Agro-industry Development                                       |
|----|----------------|--------------------|---|
| 1  | Ngawi          | Mango              | Fruit Extract, Fruit Chips, <i>Dodol</i> , Syrup, Pickled Mango |
|    |                | Guava              | Fruit Extract, Juice  |
|    |                | Banana             | Fruit Chips , <i>Getuk</i> , <i>Sale</i> , <i>Dodol</i> , Flour |

| No | District/ City  | Material Commodity | Agro-industry Development   |
|----|-----------------|--------------------|---|
| 2  | Magetan         | Gnemon             | <i>Emping</i> Gnemon  |
|    |                 | Mango              | Fruit Chips, Fruit Extract, , <i>Dodol</i> , Syrup, Pickled Mango |
|    |                 | Banana             | Fruit Chips, <i>Getuk</i> , <i>Sale</i> , <i>Dodol</i> , Flour    |
| 3  | Madiun District | Mango              | Fruit Chips ,Fruit Extract, Syrup, Pickled Mango, <i>Dodol</i> ,  |
|    |                 | Banana             | Fruit Chips, <i>Getuk</i> , <i>Dodol</i> , <i>Sale</i> , Flour    |
|    |                 | Papaya             | Sauce, Cosmetic Product, Sweets, Candy, Soap                      |
| 4  | Madiun City     | Mango              | Fruit Extract, Fruit Chips, Syrup, Pickled Mango, <i>Dodol</i> ,  |
|    |                 | Guava              | Fruit Extract, Juice  |
|    |                 | Banana             | Fruit Chips, <i>Dodol</i> , , <i>Getuk</i> , <i>Sale</i> , Flour  |

#### IV. CONCLUSION

From this research, it can be concluded that:

1. In identifying fruit crops planted in the backyard that support the agro-industry as its material, it is found that 9 fruit crops that support the agro-industry are mango, guava, rambutan, longan, banana, papaya, sapodilla, rose apple and gnetum gnemon.
2. After MPE testing is done, it is found that each research location has its own priority fruit crop type that works as agro-industry material differently.
3. Agro-industry development model are adjusted with the finer fruit crop in each research location.

#### ACKNOWLEDGMENT

Thank you very much for supporting this research to: (1). The Director General of Research and Community Service Director General of the Higher Education Ministry for Research Technology and Higher Education of the Republic of Indonesia, (2) the Coordinator of Kopertis Region VII Surabaya, (3) the Rector of Merdeka Madiun University, (4) the Chairman of the Institute for Research and Community Services Merdeka Madiun University.

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