

# Hydroponic Technology in Agriculture Industry

**I Prayoga<sup>1\*</sup>, R A Putra<sup>2</sup>**

<sup>1,2</sup>Departemen Ilmu Komunikasi, Universitas Komputer Indonesia, Indonesia

Email : \*inggar.prayoga@email.unikom.ac.id

**Abstract.** The purpose of this study is to describe hydroponic vegetable products and analyze the marketing communication strategies of hydroponic vegetables using the marketing mix method. The result of this research showed that hydroponic technology was a method of farming using water media without soil media. This is done because the function of the soil as a supporter of plant roots and an intermediate nutrient solution can be replaced by streamlining or adding nutrients, water and oxygen through the media. With this technology, eating becomes a problem for producers to create marketing communications to attract consumers' attention to this hydroponic vegetable product. It can be effective if marketing objectives can be achieved or beneficial to consumers, especially conventional farmers in the application of the function of hydroponic technology.

## 1. Introduction

The agricultural sector is a source of income for some Indonesian people, because most of Indonesia's territory is agricultural land. Farmers usually use land for growing media in developing their agricultural products. This has become a common thing among the agricultural world. Vegetables are commodities that are often consumed by Indonesian people. In order to increase the added value of vegetable commodities, there is a need to emphasize the high potential of vegetable products in Indonesian society [1]. Farmers as the main object of agricultural development certainly have various problems. This problem often prevents farmers from developing their farming businesses. The problem faced by farmers is also a basic problem that must be solved to develop the Indonesian agriculture in the future [2]. The nature of agricultural products is generally seasonal which means the product will have an adequate amount at a certain time. For example, in the rice harvest season an abundant supply of rice will be available, but in the dry season the supply will be very limited. This characteristic certainly greatly influences the prices of agricultural products produced by farmers. When supply is over, the price will fall, while the supply is limited, there will be a price surge.

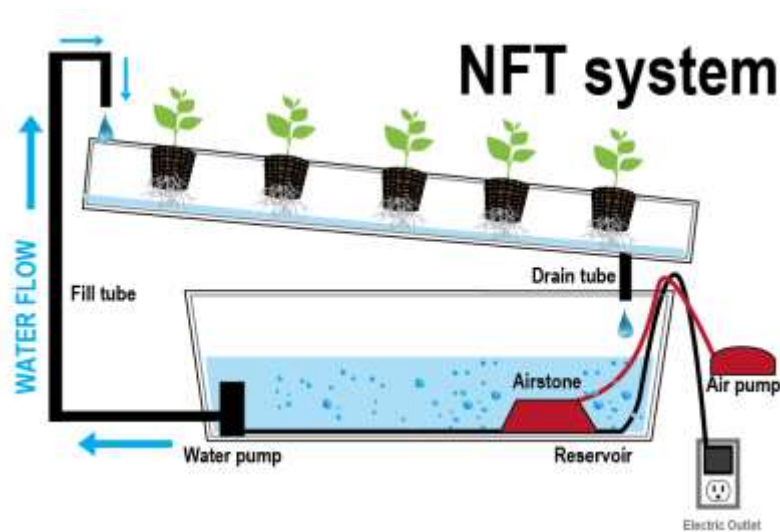
One problem that continues to haunt the development of Indonesian farmers is the narrowness of agriculture. With narrow arable land, of course farmers will also get limited income and make the level of welfare of farmers decrease. The average Indonesian farmer only has an area of 0.8 hectares [3], not to mention the problem of poor soil quality due to the use of chemicals such as pesticides. Seeing the amount of land that is not used by the community for agricultural land, there are currently other ways to utilize narrow land as an effort to develop agricultural products, namely by planting in hydroponic technology. Hydroponics is a method of agricultural cultivation without using soil media, so hydroponics are an agricultural activity carried out using water as a medium to replace soil. So that the hydroponic farming system can utilize even on the land in the yard or house [4].

The purpose of this study is to describe hydroponic vegetable products and analyze the marketing communication strategies of hydroponic vegetables using the marketing mix method.



## 2. Method

The method used was the marketing mix, which has an understanding of how the marketing communication of a seller, in this case, provides information and influences the public to buy products. In marketing communication, there is a branding of the product being sold. This activity was also an effort of farmers to establish relationships with potential consumers in the market and permanent consumers. With regard to marketing communication strategies, so far farmers had carried out traditional and modern marketing communication strategies, but with this research it was expected that farmers would be able to sell these hydroponic technology products in a sustainable period or greater than previous conventional products. Hydroponics literally means hydro for water and phonic for workmanship. So that generally means the system of agricultural cultivation without using soil but using water containing nutrient solution [5] (See Figure 1).



**Figure 1.** Hydroponic Media Forms, [www.source:ledhydro.com](http://www.source:ledhydro.com) on October 12 2019

## 3. Results and Discussion

The most appropriate hydroponic system for the agricultural business model, as one solution that should be considered to address the problem of community needs for food. All types of plants can be planted by the hydroponic method, but usually many people plant annual crops. Horticultural plants are usually planted with these media, including: vegetable plants, fruit plants, ornamental plants, and medicinal plants. How to grow hydroponically is actually already widely used by some communities to utilize land that is not too broad. Many benefits and benefits can be obtained from the system. Hydroponic systems can benefit from the quality and quantity of agricultural products, and can maximize existing agricultural land. Hydroponic cultivation is usually carried out in the (green house) to maintain plant growth optimally and truly protected from the influence of external elements such as rain, disease pests, climate and others. The advantages of some cultivation using the hydroponic system include plant density per unit area can be doubled so that it saves land use. Product quality such as shape, size, taste, color, cleanliness can be guaranteed because the nutritional needs of plants are supplied in a controlled manner in the green house. It does not depend on the season / time of planting and harvest, so it can be adjusted according to market needs [5].

Advantages of Hydroponic Systems The success of plants to grow and produce is guaranteed. Treatment is more practical and pest control is more controlled. The use of fertilizer is more efficient. Dead plants are more easily replaced with new plants. Does not require a lot of menial power because the work method is more efficient and has standardization. Plants can grow more rapidly and with conditions that are not dirty and damaged. Production yields are more sustainable and higher than those for planting in land. The selling price of hydroponics is higher than non-hydroponic products (See Figure 2).



**Figure 2.** Hydroponic Method

**Hydroponic Method** The basic principle of hydroponics is (Nutrient Film Technique). Media that can be used like Rockwool, Netpot, Pipe, Nutrition, TDS meter, PH meter. NTF is a mode of cultivation by placing plant roots in shallow water layers. The water is circulated and contains nutrients according to the needs of the plant. Roots can develop in the nutrient solution, because around the roots there is a layer of nutrient solution, the system is known as NFT. Excess water will reduce the amount of oxygen, therefore the nutrient layer in the NFT system is made a maximum height of 3 mm solution, so that the water (nutrition) and oxygen needs can be met. Hydroponic Systems The systems of hydroponic plants are as follows: Provide food ingredients in mineral or nutrient solutions needed by plants by flushing or dripping. Through this technique more plants can be maintained in a narrower space unit. In fact, without soil media can be maintained a number of more productive plants. The system of hydroponic plants must be free of pesticides so that there are no pests and diseases.

The hydroponic system focuses on the optimal way of providing water and nutrients, according to plant needs, plant age, and environmental conditions so that maximum results are achieved. Nutrients or nutrients are given to plants by being dissolved in water, then circulated to the roots of plants regularly or continuously depending on the type of hydroponic system used [6]. Nutrients used in aquaculture with a hydroponic system are AB mix nutrients. The AB Mix nutrient contains 16 essential nutrients needed by plants, out of these 16 elements 6 of them are needed in large quantities (macro) namely N, P, K, Ca, Mg, S, and 10 elements are needed in small amounts (micro) namely Fe, Mn, Bo, Cu, Zn, Mo, Cl, Si, Na, Co (Agustina, 2004). Nutrition AB mix is a nutrient that is used divided into two stocks, namely stock A and stock B. Stock A contains compounds that contain at Ca, while Stock B contains compounds containing sulfate andosphate. The division is intended so that under concentrated conditions do not occur sediment, because Ca if it meets sulfate or phosphate in concentrated conditions to become calcium sulfate or calcium phosphate and form a precipitate [7].

Nutrient solutions for hydroponic cultivation can be mixed together from a variety of chemicals, but it requires high accuracy and skill. The costs must be relatively large if only used on a small scale. Chemicals for gathering nutrients that are available on the market are usually in large packages or certain minimum packages, so for farmers and the general public, cultivation with a hydroponic system is still considered expensive. The use of NPK compound fertilizers, complete compound fertilizers, and liquid organic fertilizers as hydroponic nutrients is thought to be able to be done with a record containing adequate nutrition and according to plant needs [8]. The NFT series will be created in one installation. The height of nutrients flowing in the NFT system is only 2-3 mm (in the form of a thin film), Seeding for the NFT system is done using Rockwool. Rockwool is an inorganic material made by blowing air or steam into melted rock. The result is a type of fiber that has cavities with a diameter generally between 6-10 micro-meters. Rockwool cut to size adjusts the width of the gutter, then made a planting hole with a size of 2x2 cm. Furthermore, rockwool given water until wet. Seeds are placed in the planting hole, each planting hole 1 seed. The seedlings are placed in the NFT hydroponic installation to get water flow, so the seeds grow well. After the age of 7 days after seedling (hss), given a nutrient solution of 4 types of nutrients that were tested with EC 0.5 cm. The seedlings are transplanted after the age of 14 days, then the EC is raised to 2.5 cm.

Transplanting Transfers, the activity of transplanting in the NFT hydroponic system is done by cutting rockwool containing seeds with a size of 2x2 cm, then each rockwool cube is placed in a series of NFT with a spacing of 20 cm. Maintenance. Nutrition is given by dissolving the AB mix nutrition, NPK fertilizer, compound fertilizer, and liquid organic fertilizer into the water until the EC value becomes 2.5 cm. EC measurement is measured using an EC meter. Next, the nutrient solution is circulated to the NFT circuit. The degree of acidity of the water (pH) used is 5.5-6.5. The pH value is measured using a pH meter. If the pH value decreases add KOH to the solution, and if the pH value rises add HCl until the pH becomes 5.5-6.5. Pest and disease control Pest and disease control is done manually, by taking pests that attack plants. If the plant is attacked by a disease, it should be discarded immediately, to prevent the transmission of other plants.

Market Segmentation in general, there are three basic guidelines for companies to approach the market, namely mass marketing where the decision to mass produce and distribute products, marketing various products that present different product choices for different segments and directed marketing developing products for the market specific [9]. The strong correlation between consumer attitudes towards brands and brand market share or level of usage is well known. However, evidence of this attitude is mainly related to sectors where there are big and established brands. This raises the question of what is happening in fragmented markets where there is a proliferation of small brands that are mostly not very well known [10].

Target Market in setting a target market (target market), the company must first segment the market, by way of grouping consumers (buyers) into groups with almost the same characteristics. Each consumer group can be chosen as the target market to be achieved [2]. Market segmentation is intended to assess and explore the market segment opportunities faced by the company, assess market segments, and decide how many of the existing market segments will be served by farmers. Marketing options for hydroponic products, there are many ways to market the crop so that it can be sold on target. Nearby Circles start with the closest circle or relationship such as family, friends, neighbors and others. Invite them to harvest directly from the garden, explain the techniques and advantages of hydroponic products, and offer as a supplier of daily vegetable needs. Other marketing communities can develop communities that are from the arisan community, PKK, guardian community, and others. To be able to communicate intensely between sellers and buyers, you can use the private application apps so that communication can work better using voice, video or images. Hydroponic technology can be used for vegetables, namely oriental and western vegetables, with the main segment of hotels and restaurants up to middle class. (See Figure 3).



**Figure 3.** Hydroponic Market Target

#### 4. Conclusion

Direct marketing can be done for hotels and restaurants as suppliers of vegetables every day. Marketing to traditional markets has the advantage because traditional markets are a very large supplier of vegeta-

bles without demanding high quality, but have a low selling price, following the standards of non-hydroponic products. Therefore, the marketing of hydroponic products to traditional markets can be done for markets of class 2 and 3 with adjusted prices. Marketing communication activities using personal selling is very important because personal selling is responsible for products that are exclusive to certain brands. Personal selling is indispensable in supporting marketing communication because some of the products being marketed require explanation and demonstration of images, photos or information, information about new products, superior products, making deals with customers, and to reach customers from modern markets such as hypermarkets and supermarket. Utilizing a vegetarian lifestyle as more and more adopted by the community can develop tourism products with strategies that prioritize the vegetarian community in Indonesia. With this lifestyle strategy, developing a vegetarian vegetable sales business to reach a healthy lifestyle market can rely on innovations in various types of food, one of which is the use of hydroponic technology to improve the quality of vegetables and the selling price of vegetables with the main market share is the vegetarian community.

### References

- [1] Konno, K., Shimura, S., Ueno, C., Arakawa, T., & Nakamura, M. 2018. Abnormal swelling of the peritrophic membrane in Eri silkworm gut caused by MLX56 family defense proteins with chitin-binding and extensin domains. *Phytochemistry*, **147**, pp. 211-219.
- [2] Sitko, N. J., & Chamberlin, J. 2016. The geography of Zambia's customary land: assessing the prospects for smallholder development. *Land Use Policy*, **55**, pp. 49-60.
- [3] Young, L. J., Lamas, A. C., & Abreu, D. A. 2017. The 2012 Census of Agriculture: a capture-recapture analysis. *Journal of Agricultural, Biological and Environmental Statistics*, **22**(4), pp. 523-539.
- [4] Burns, C. B., & Prager, D. L. 2018. Does Crop Insurance Influence Commercial Crop Farm Decisions to Expand? An Analysis Using Panel Data from the Census of Agriculture. *Journal of agricultural and resource economics*, **43**(1835-2018-706), pp. 61-77.
- [5] Rahman, S. 2017. Climate, Agroecology and Socio-Economic Determinants of Food Availability from Agriculture in Bangladesh,(1948–2008). *Sustainability*, **9**(3), pp. 354.
- [6] Kordos, J. 2017. The challenges of the population census round of 2020. Outline of the methods of quality assessment of population census data. *Statistics in Transition. New Series*, **18**(1), pp. 115-138.
- [7] Li, W., & Wang, K. 2018. Effect of two kinds of new materials and compound fertilizers applying on cotton nitrogen use efficiency in field. *Southwest China Journal of Agricultural Sciences*, **31**(3), pp. 513-518.
- [8] Selladurai, R., & Purakayastha, T. J. 2016. Effect of humic acid multinutrient fertilizers on yield and nutrient use efficiency of potato. *Journal of Plant Nutrition*, **39**(7), pp. 949-956.
- [9] Sharma, L., Brigaityte, O., Honer, K., Kalfaoglu, E., Slinksiene, R., Streimikis, V., ... & Baltrušaitis, J. 2018. Carnallite-derived solid waste as potassium (K) and magnesium (Mg) source in granulated compound NPK fertilizers. *ACS Sustainable Chemistry & Engineering*, **6**(7), pp. 9427-9433.
- [10] Süzer, S., & Çulhacı, E. 2017. Effects of different organomineral and inorganic compound fertilizers on seed yield and some yield components of winter bread wheat. *Toprak Bilimi ve Bitki Besleme Dergisi*, **5**(2), pp. 87-92.

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.