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Entrepreneurship Education Program: Analysis of Sorghum Products' Quality Parameters for Penetration of Potential Market

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Abstract. **The research aims to analyze the quality parameters of sorghum products for penetration potential market in entrepreneurship education programs. The method used is quantitative research. The observation covers various aspects of excellence in every aspect of the entrepreneurial education learning model, the quality of sorghum products, and marketing aspects, followed by statistical analysis. The results show that 1) learning model of entrepreneurship education triggered activities/events and developed entrepreneurial competencies; 2) integrated learning models of entrepreneurship education improved efficiency and development of entrepreneurship; 3) the quality of sorghum products was determined by chemical analysis, rheology properties, physical properties, and organoleptic evaluation; and 4) the market penetration strategy of sorghum products were better understood by students through a series of practices, and group discussions and could be well formulated in business planning and entrepreneurship education**.

Keywords: ***entrepreneurship education program, sorghum products quality, potential penetration market, education learning models***

INTRODUCTION

Entrepreneurship education is an educational concept that encourages students to be creative and innovative in making products or services. This pattern of education requires students to be productive, which directs and equips students to be able to respond quickly to change and understand the socio-economic needs of the community. Students need entrepreneurship education capable of adopting an environment changes in real-world business, and also encourages creativity and innovation [1]–[3].

The topic of business for food entrepreneurs is always exciting and important because it will strengthen food security and the welfare of the community. One innovative and healthy raw material in the food business is quality sorghum. Sorghum is one of the cereal plants. Every 100 g of sorghum contains 73 g of carbohydrate, 11 g of protein, 3.3 g of fat, 0.38 g of vitamin B1, and 28 mg of the mineral calcium, 4.4 mg of iron and 287 mg phosphorus. It is also enriched with fiber, antioxidants, tannins, and free of gluten. Sorghum-based products include sorghum drinks, sticks, flakes, cake and cookies, sorghum stem syrup, bakery, sorghum noodles, rice, and various products from sorghum bran. Therefore, it becomes one of the main subjects at Universitas Wijaya Kusuma Surabaya (UWKS) [4]–[7].

Entrepreneur in the food sector is one of the important fields to ensure healthy food availability and adequate amount of food products for the people. Thus, alternative food entrepreneurship education program gets special attention in the education sector. The learning module is designed by integrating research activities at the university and the empowerment of sorghum entrepreneur networks organized by Centre Sorghum Entrepreneurship (CSE) - UWKS.

Creative ideas about healthy and raw materials must be accompanied by the application of appropriate marketing strategies, in this case, the exploration of market potential penetration strategies for selected products. Growth strategies that focus on selling existing products, in order to maintain or increase product market share, be safe from market dominance, mature market restructuring by competitive maneuvers, and increase the consumption of existing customers. The teaching model in entrepreneurship education according to [8]–[12] are classified based on the following categories: case studies, group discussions, individual presentations, individual written reports, group projects, formal lectures, guest speakers, and action learning [13].

METHOD

The is quantitative research using observation, which covers various aspects of excellence in every aspect of the

entrepreneurial education learning model, the quality of sorghum products, and marketing aspects.

The research aims to get a learning model that could improve and effectively support the integrated sustainable entrepreneurship program. The implementation of entrepreneurial education learning models include 1) learning models with integrated A entrepreneurship education methods (practice - case studies - theories - business plans); and 2) learning models with integrated B entrepreneurship education methods (theory - practice - case studies - business plans). In entrepreneurship education, the number of lectures, case studies, and business analysis is 60 %, and 40% for practices. The parameters of the observation were efficiency, entrepreneurial development, and the final score of the students as the outcome of the activities, followed by statistical analysis [14].

It analyzed the quality of sorghum product parameters, which were carried out in 2 stages, namely 1) making products of sorghum rice "nasi" (treatment NV_1 and NV_2) , and 2) making cookies products from sorghum flour (treatment CV_1 and CV_2), with red sorghum (*Sorghum bicolor*) varieties from Bandung Regency and white sorghum varieties (*KD 4*) from Lamongan Regency, Indonesia. Then a test was conducted using chemical analysis, rheological properties, physical properties, and organoleptic evaluation with the following scale: 1 = dislike very much, 2 = dislike, 3 = neutral, 4 = like, and 5 = like very much. Data analysis included rheological properties and physical aspects with descriptive analysis. The organoleptic tests were performed using the Friedman test, while chemical tests were carried out using analysis of variance, followed by the Duncan test of 5% [15], [16].

Potential market penetration methods are based on several aspects: the production of sorghum in the last 5 years has been quite good, sorghum production in the world ranks fifth after wheat, rice, corn, and barley. This is in line with technological advances and people's knowledge about the importance of healthy food, one of which is sorghum as a healthy alternative food.

Besides supporting research in the field of alternative food and sorghum development, this is also the implementation of alternative food policy to support the Indonesian Nation's food security [17], [18]. There are some weaknesses of sorghum products , for example, sorghum has not been planted nationally, so it is not readily available at any time; problems of sorghum storage, seeds, rice, flour, rice bran, which is the place of flea pests; the standard price of for sorghum has not been decided.

The research purpose is also to predict the market penetration of sorghum products through a simulation model of sorghum-based healthy food products and sorghum marketing simulation model.

RESULT

The results showed that product formulations had been successfully obtained for alternative foods, including chemical analysis, rheological properties, physical properties, and organoleptic evaluation. The quality test results for sorghum products parameters are presented in Table 1 below. The teaching module for processing sorghum products conducted at the beginning of the semester and discussion with Sorghum Entrepreneurship Unit (SEU) was more motivating and encouraged students to think about current and future problems.

Table 1. Quality test results for sorghum products parameters

Analysis parameters	NV_1	NV_2	CV_1	CV_2
Physical properties	4,48	4,51	4,57	4,61
Chemical analysis				
Carbohydrate	41,01	40,59	63,87 a	64,21 b
Protein	4,69	4,83	6,75 a	6,88 b
Fat	2,47	2,22	3,87 a	3,99 b
Fibber	1,20	1,22	2,56	2,48
Glycaemic index	34,37 a	46,12 b	63,82	63,87
Rheological properties	4,52	4, 58	4,68	4,61
Organoleptic evaluation				
Taste	3,98 *	4,12 *	4,54 *	4,22 *
Colour	4,15 *	4,28 *	4,25 *	4, 11 *
Flavor	4,03	4,09	4,13	4,15

Note: NV_1 = red sorghum "nasi" products; NV_2 = white Sorghum "nasi" products; CV_1 = red sorghum cookies products; CV_2 = white sorghum cookies products
* Significant Friedman Test 5%
Different notations show Significant Duncan 5%

The analysis results presented in Table 1 show the highest taste score for "rice" and sorghum cookies (NV_2 and CV_1treatment), color score (NV_2 and CV_1), and aroma score (NV_2 and CV_2). The chemical test of sorghum products showed very good result, in which all the criteria were met for the quality of healthy food products. It was revealed that GI was "low" for "rice," and "medium" for cookies, and all products contained fibber. The physical aspect scored 4,48 – 4,61, and rheological properties was 4,52 – 4,68, which indicate that all products were acceptable for the consumers. Sorghum was also considered healthier because it was gluten-free and contained anti-oxidants and tannin [19], [20].

In terms of penetrating the market potential of sorghum products, the results show that a simulation model of sorghum-based healthy food products [21]–[23] and sorghum marketing simulation models can be carried out in the stages as shown in Table 3.

Table 2. Market penetration strategy

	Existing Products	**New Products or Services**
Existing Markets	**Market Penetration** Selling more of your existing products and services to existing customers – the lowest risk strategy	**Development** Creating extensions to your existing products or new products to sell to your existing customers
New Markets	**Market Development** Entering new market segments or completely new market either in your home country or abroad	**Diversification** Selling a new product into new markets; the riskiest strategy as both are relatively unknown. To be done if other strategies have not been successful

Source: [26], [27].

The choice of market penetration strategies in entrepreneurship education programs was based on product analysis that was available in markets with low-risk levels for beginners. However, students were given insight into choosing strategy choices different conditions, such as the marketing strategy quadrant position in Table 2 above [24], [25].

Integrated learning models of entrepreneurship education could trigger entrepreneurship competency, this is shown in the results of the assessment and evaluation during learning and at the end of the semester, which show a variety of competency indicators and activities and discussion content (Table 3).

Table 3. Indicator competency in education learning models

No	Indicator competency	Model A			Model B		
		2016	2017	2018	2016	2017	2018
1	Spatial vision on the market	3,5	3,7	3,7	3,4	3,5	3,5
2	Discussion activities	3,4	3,6	3,7	3,3	3,5	3,6
3	Creativity (market penetration strategy)	3,5	3,5	3,5	3,5	3,5	3,5
4	Innovation (prominence of product promotion / branding / packaging)	3,7	3,7	3,7	3,6	3,6	3,6
5	Response to changes	3,6	3,6	3,6	3,4	3,4	3,5
6	Understanding of community needs (need assessment)	3,7	3,8	3,8	3,6	3,6	3,6
7	Business ideas	3,5	3,6	3,7	3,4	3,6	3,6
8	Marketing promotion program	3,5	3,6	3,6	3,5	3,5	3,5
9	Business plan preparation	3,6	3,7	3,7	3,6	3,6	3,6
10	Product development	3,7	3,8	3,8	3,6	3,6	3,6

Note: Model A = (practice - case study - theory - business plan)
Model B = (theory - practices - business plan cases)
1 = less; 2 = adequate; 3 = good; 4 = very good
n = 20 (number of students)
Recapitulation of research questionnaires (2018)

Lecturer assessment evaluated the outcomes of the entrepreneurial education learning models at the end of the semester, as shown in Table 3. The results of the analysis of indicators of entrepreneurship education reveal that the average rating of model A (3,63) was higher than the model B (3,53). It means that using student-centered learning (SCL) method is highly recommended. The indicator competency of the entrepreneurship education process shows that the expected goals were gradually achieved. The success of entrepreneurship education in college was determined by the ability to design learning activities. Also, creating an entrepreneurial atmosphere was important to support the implementation of entrepreneurship education, namely the existence of the SEU network. The awareness of most students and the ability to see business opportunities were also essential to be a potential entrepreneur. This is consistent with the research of [28], which found that business plan preparation, case studies, and theory are popular models of entrepreneurship education. Whereas [29], entrepreneurship education has a variety of methods depending on educational goals. One of them is by increasing students understanding about entrepreneurship using media, seminars, or lectures. Other methods include traditional/ passive entrepreneurship education methods (consisting of material lecture theory and concepts), "innovative methods, and active methods (practicing certain skills) [30].

CONCLUSION

Entrepreneurship education at university is essential. The key to success in conducting entrepreneurship education in college is determined by learning activities and method (student-centered learning or SCLis highly recommended). The active entrepreneurship learning model is more productive and effective in developing students' understanding of the problem of sorghum food business as an alternative food. The practice method and introduction of real business through discussions with business people encourage better understanding for students. Besides, learning the market area, the scope of the target market and expanding spatial/territorial awareness as a large potential market are equally important.

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