Acceptability tilapia fish (Oreochromis niloticus) jerky: an application of the many-facets Rasch Model

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Abstract
Tilapia fish jerky is a fish product through the process of soaking spices and drying. The soaking and drying time influenced to acceptability consideration. The purpose of this research was to observe preference organoleptic. This study used the soaking and drying time according hedonic preferences of ten panelists evaluating four criteria. Soaking time along was 10, 15, and 20 hours. Drying time along was 5, 10, and 15 hours. Ensuring data were used by the many-facets Rasch Model. The study found as long as soaking and drying time 10 hours and 5 hours preferences panelists to color, texture, odor, and taste. Taste criteria easy to judge by panelists. Color criteria are hard to judge by panelists. Tilapia fish jerky by soaking in seasoning formula for 10 hours and drying for 5 hours can be recommended to increase consumer preference.

1. Introduction
Jerky is a slab-shaped food product made from sliced or ground fresh meat that has been seasoned and dried [1]. Tilapia fish (O. niloticus) is the raw material of jerky because compact meat texture. Tilapia jerky product development fewer preferences.

Some previous research tilapia fish jerky seasoning formula and drying as different preferences. The treatment of addition of palm sugar at different concentrations is a significant effect sensory appearance of 3.92%, aroma 4.00%, color 3.92%, and flavor 4.24% [2]. The method used different sugar types and concentrations treatment obtained 25% brown sugar was more preferred than other treatments with the median value of appearance, texture, and taste was 7 (preferred) and the aroma was 8 (very preferred) (3) The addition of 3% red ginger is the best treatment with the color specification with a value of 2.7 which is closer to dark brown, for an aroma with a value of 5.6 which indicates that it is close to the strong aroma of spices, the texture with a value of 4.2 indicates a bit soft, and the taste with a value of 4.2, it is quite sweet and delicious (4) Drying 75°C most preferences to color, taste, aroma, and texture (5).

Tilapia jerky preferences using seasoning formula treatment soaking time and drying time not yet informed. Data collecting organoleptic using many-facets Rasch model analysis for preferences tilapia jerky product important to inform criteria hedonic of the panelist. Aims This study analyzes preferences on tilapia jerky by soaking seasoning formula and drying time differently.
2. Materials and methods
The tilapia jerkies were produced the last for one month this study was conducted at the biotechnology and organoleptic laboratory of Fishery and Marine Science Faculty, Universitas Negeri Gorontalo, in Gorontalo, Indonesia. The materials and seasoning formula used to produce the tilapia jerkies were tilapia fish 350 g from Limboto lake, coriander 2 g, ginger 2 g, union 2 g, garlic 2 g, salt 2 g, sugar 30 g, cayenne pepper 2 g, and water 200 ml. The tools used were a mechanical dryer and a deep fryer.

The soaking of seasoning formula (A) and drying (B) was done in various hours. The treatments were: \( A_1B_1 \) 10 and 5 hours; \( A_1B_2 \) 10 and 10 hours; \( A_2B_1 \) 10 and 15 hours; \( A_2B_2 \) 15 and 5 hours; \( A_2B_3 \) 15 and 10 hours; \( A_3B_1 \) 15 and 15 hours; \( A_3B_2 \) 20 and 5 hours; \( A_3B_3 \) 20 and 10 hours; \( A_3B_4 \) 20 and 15 hours. Before the hedonic test, it’s deep frying for 10-20 seconds. The criteria analyzed were taste, odor, color, and texture. The data were analyzed quantitatively by the Rasch model and probability preferences.

2.1 Tilapia Jerky process

2.2 Hedonic organoleptic procedure
Testing of hedonic organoleptic in [1] with modifications to material and seasoning formula. The sample had been prepared fillet of tilapia, soaking in seasoning formula, drying used mechanical dryer at 60 °C ± 2 °C, and deep-frying 10-20 seconds before the hedonic test. Score sheet used for tools hedonic test score 1-9 (no interest until very interest) evaluation four criteria by ten panelist’s. Instrument organoleptik score sheet used [6].

Data collection with frequency probability preference and then many-facets Rasch model analysis. The steps many-facets Rasch model analysis in ([7]).

3. Results
The test preferences are shown in Figures 2 to 4
Figure 2. Tilapia Jerky product

Figure 3. Frequency probability

Figure 4. Many-facets Rasch model analysis
4. Discussion
Soaking time in seasoning formula and drying time can give a difference in acceptance of tilapia fish jerky. Figure 2 shown that product A_1B_1 (soaking and drying time 10 and 5 hours) is superior in taste, odor and color. Information frequency probability on figure 3; 80% panelist interest on taste, 80% panelist interest on color, and 100% panelist interest odor. Figure 4 shown that the study found as long as soaking and drying time 10 hours and 5 hours preferences panelists to color, texture, odor, and taste. Taste criteria easy to judge by panelists. Color criteria are hard to judge by panelists. Along soaking seasoning formula absorption occurs and along drying evaporation protein. It's frying before consumption so that color, texture, odor, and taste change.

Texture
Based on panelist’s assessment results, for the hedonic texture of tilapia jerky products, were obtained highest value in the combination treatment of 10 hours of soaking and 15 hours of drying (A_1B_2) with criteria like until interest (values 7-9). While the treatment soaking time was 20 hours and 15 hours of drying time (A_2B_2) produces the lowest hedonic value with the criteria of not interest to someone interest (values 2-6). As for the probability analysis for A_1B_2 treatment has a probability value of 90% for the value of consumer acceptance, and A_3B_3 treatment has a probability value of 90% for consumer rejection of tilapia jerky products.

After frying for 20 seconds at a temperature of approximately 190 °C, the tilapia jerky product with A_1B_3 treatment was preferred by the panelist’s because the resulting texture was somewhat chewy and soft. Meanwhile, the panelist’s not interest in the A_3B_3 treatment because the resulting texture was hard and stiff. The texture is one of the factors that influence consumer choice of a food product. The texture of food material will affect the final shape caused by the material [8]. The taste of a food product is usually influenced by the texture when viewed physically. [9] stated that texture has complex properties and is related to the structure of the material which consists of three elements, namely mechanical (hardness, elasticity), geometric (sandy, crumbly), and mouthfeel (oily, watery).

4.1 Color
Based on assessment panelist’s results for the hedonic taste of tilapia jerky products, it was found that on average they gave an assessment of the criteria from not interest to interest (values 2-8). The highest value in the combination treatment of 10 hours of soaking and 5 hours of drying (A_1B_1) (with criteria interest to very interest (values 7-9) while the treatment soaking time of 15 hours and drying time of 15 hours (A_2B_3) resulted in the lowest color hedonic value by the criteria of very disliking to moderately liking (values 2-6). As for the probability analysis for the treatment, A_1B_1 has a probability value of 90% for the value of consumer acceptance, and treatment A_1B_1 has a neutral value to not interest probability of 90% for consumer rejection of the product tilapia jerky in terms of color.

The panelist’s acceptance of tilapia jerky products after frying for 20 seconds and a temperature of approximately 190 °C with A_1B_1 treatment was preferred by panelists because the color of tilapia jerky after frying produced a light yellowish-brown color. Meanwhile, the panelist’s did not like the A_3B_3 treatment because the color of the tilapia jerky product was brownish. The color hedonic criteria of a product can affect the level of consumer acceptance. Color is important for the appearance of food products because the color result from the response received by the eye from physical stimuli in the form of light related to the sense of sight [10].

4.2 Taste
Based on the results of the panelist’s assessment for the hedonic taste of tilapia jerky products, average it gave from the criteria of interest to very interest (6-9). The highest value in the combination treatment of 10 hours of soaking and 15 hours of drying (A_1B_2) with criteria interest to very interest (values 7-9) while the treatment soaking time of 15 hours and drying time of 15 hours (A_2B_3) resulted in the lowest hedonic taste value with the criteria rather interest. As for the probability analysis for the treatment, A_1B_2 has a probability value of 100% for the value of consumer acceptance, and treatment
A_2B_3 has a probability value of 40% for consumer acceptance of the tilapia jerky product in terms of taste.

The tilapia jerky product on the hedonic assessment of taste, the panelist’s preferred the overall average impression of the combination treatment of soaking time and drying time. For tilapia jerky products with A_1B_3 treatment, panelist’s prefer more because the taste of tilapia jerky after frying produced a distinctive taste of delicious and savory jerky seasoning due to the formulation of the seasoning formula used and drying time. There are causes the water content of the tilapia fillet to decrease a lot and what remains attached to the fillet is a seasoning solution that does not evaporate. However, the A_2B_3 treatment was somewhat superior to the panelist’s. The taste of the tilapia jerky product gives the impression that it is too seasoned because the fillet was soaked in the seasoning solution for too long consumers give the impression of being a bit like it’s. The addition of spices to beef jerky produces phenolic content, high antioxidant activity, on improves the quality of beef jerky [11]. Sugar is the sweetener often used in various industries, which functions to improve taste, aroma, improve physical properties as a preservative, and improve chemical properties although a source of calories for the body [8]. Taste is an assessment of something felt through the sense of taste with a tool, namely the tongue. The nervous system found in the rag causes humans to feel sweet, sour, salty, or bitter tastes [12]. The addition of sugar affects the flavor of jerky. The presence of spice flavor in all treatments was due to the addition of spices to the fish jerky and the drying process [13].

4.3 Aroma
Based on the panelist's assessment for the hedonic aroma of fish jerky products, the value interval is 3-9 (not interest until very interest). The highest value is in the combination treatment of soaking time of 10 and 15 hours with drying time of 10 hours (A_1B_2 and A_2B_2) with criteria like to very interest (values 7-9) while the A_3B_3 treatment (20 hours of immersion and 15 hours of drying) resulted in the lowest hedonic aroma value with the criteria of not interest to neutral (values 3-5). the level of consumer acceptance and A_3B_3 treatment has a probability value of 70% for customers against tilapia jerky products in terms of aroma.

The product of tilapia jerky with A_1B_2 and A_3B_2 treatment was preferred by panelist’s because the aroma of tilapia jerky after frying produced a distinctive smell of the spices used. With a soaking time of 10 and 15 hours, the compounds contained in the seasoning solution can absorb into the meat of the tilapia fish fillet well. Drying time for 10 hours could evaporate the water content in the tilapia fillet radiate a specific smell of the spices used. The A_1B_3 treatment was not superior to the panelist’s because it took too long to dry. It causes the volatiles of the tilapia jerky to evaporate with a large percentage so that the jerky product had a neutral smell (lost the distinctive smell of beef jerky from the spices used). Aroma is an assessment caused by food and can make someone interest and eating it. Aroma is related to the volatile components of an ingredient volatile components had contained in the sharper the aroma formed [14].

5. Conclusion
To increase consumer preference tilapia fish jerky by soaking in seasoning formula for 10 hours and drying for 5 hours.

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