

## V. CONCLUSIONS AND SUGGESTIONS

### A. Conclusions

Based on the objectives of the research and the results that have been done, this research can be reported several conclusions as follows:

1. The utilisation of tubers' extract, including jicama starch, porang flour and purple sweet potato starch with different concentrations, had a significant effect ( $p < 0.05$ ) on physicochemical characteristics of the peel-off gel mask formulas, such as pH value, viscosity, spreadability, peeling time, antibacterial and antioxidant capability as well as organoleptic features including homogeneity, irritation and sensory evaluation. In the evaluation, no irritation or side effects were recorded; most formulas followed the required standards for cosmetic products based on the Indonesian National Standard (SNI 2007). However, some formulas from 4% of purple sweet potato starch and porang flour with 2, 3 and 4% and the control sample did not meet the standards and had low scores for the organoleptic test. From the results of the first stage, it can be concluded that for each type of tubers' extract, 4% jicama starch, 1% porang flour, and 3% purple sweet potato starch with the appropriate features and highly recommended by the panellist were chosen as the gel base formulas to continue for the next stage.

2. The application of aloe vera gel added into the base formulas had positive effects on improving the function features of the peel-off gel mask product, including antibacterial activity and antioxidant capability. From the results, starch had a better interaction with reinforced antimicrobial agents. However, according to the effective classification for the antimicrobial inhibitory zone, all formulas were stated to have an active action against the growth of *Staphylococcus aureus*. Among tubers' extract, porang flour had an outstanding feature in the DPPH resistant percentage, representing the antioxidant capability. All formulas followed the SNI 2007 standard for beauty product processing.

3. The application of porang flour with 1% concentration and 2% addition of aloe vera gel in formulating peel-off gel masks obtained the highest average score for organoleptic testing. This formula was also the most preferred product for color and consistency, odor, applied feeling and acceptance parameters by panellists compared to the remaining formulas. Moreover, this formula also had the highest total score (8.42).

It was selected as the superior product using the MADM-SAW method with consideration of physicochemical and organoleptic criteria for each formula.

4. Based on the results of the economic feasibility analysis, a peel-off gel mask formulated from porang flour (1%) and aloe vera gel added with 2% concentration obtained a Net Present Value (NPV) of Rp. 240,718,333.79 with an Incremental Rate of Return (IRR) of 58% and a Net B/ C worth 6.32 times. Based on existing criteria or assumptions, this business is feasible to carry out with a Pay Back Period (PBP) of nearly a year, or the capital invested in this business can be returned before the project ends (3 years).

## **B. Suggestions**

Because the objectives of this research highly focused on the utilization of commodity tubers and aloe vera in making peel-off gel products, the time for the research was limited. Therefore, the research did not get the perfection and fulfil all the requirements for beauty product development; several suggestions for this research are listed below:

1. To test the shelf life of the best final peel-off gel product with 1% porang flour and 2% aloe vera gel addition.
2. To test the product with other bacterial strains representing gram-negative bacteria for antibacterial activity. Furthermore, porang flour exhibited a high potential for antioxidant capability, and the recommendation is to test the product with other free radical scavenging activity.
3. Do the optimization for the compositions of the product in order to decrease the chemical ingredients and enhance the natural active compounds.
4. According to the dermatologist tested, the product also needs to investigate for facial problems.
5. Based on the economic feasibility of the product, it is also hoped that this product can be applied to the Micro, Small & Medium Enterprises scale, especially in the cosmetic industry.