CHAPTER I

INTRODUCTION

This chapter contains the research background, problem formulation, research objectives, research scopes, and outline of the research report.

1.1 Background

Cassava is a tropical and subtropical perennial plant that can be grown throughout the year, almost in every region in Indonesia. The edible parts of the cassava plant, aside from the tuber or root and leaves, are typically used in various dishes, especially as a vegetable. The relatively low cost of cassava roots also has the potential to develop processing activities into products with many variations. Cassava can be cooked in various ways and used in a variety of dishes. However, it has a slight drawback; cassava tubers cannot be stored for a long time even when placed in the refrigerator. Therefore, further processing is needed to extend its shelf life (Harsita, 2019).

From a nutritional standpoint, cassava tubers are a rich source of carbohydrate energy but very low in protein. Good sources of protein are found in cassava leaves. Many people are unaware that cassava is an excellent staple food alternative to rice. In addition to being a fiber-rich and low-calorie food, cassava also has health benefits. Moreover, cassava can fulfill snack needs and can be used with cassava compositions as desserts, such as cassava chips (Setyawati, 2021). The following is productivity data for cassava in each city in West Sumatra over a period of 3 years.

Table 1. 1 Harvest Area, Production, and Productivity Data of Cassava in Each City in West Sumatra

City/Regency	Harvest Area, Production and Productivity of Cassava								
	Harvest Area (Hectares)			Production (Tons)			Productivity (Quintal/Hectares)		
	2019	2020	2021	2019	2020	2021	2019	2020	2021
Kepulauan Mentawai	63.00	76.00	86.00	1663.58	2188.94	2585.03	264.06	288.02	300.58
Pesisir Selatan	190.00	375.80	301.20	7049.00	14536.21	11561.83	371.00	386.81	383.86
Solok Regency	176.40	208.00	228.60	7031.30	7888.18	8724.91	398.60	379.24	381.67
Sijunjung	59.70	33.00	63.50	1985.24	1289.84	2518.10	332.54	390.86	396.55
Tanah Datar	412.10	454.90	354.90	15453.75	19394.58	14879.83	375.00	426.35	419.27
Padang Pariaman	248.00	275.00	208.00	9586.12	10283.37	7637.06	386.54	373.94	367.17
Agam	1119.90	247.00	502.00	42529.32	9609.75	22795.52	379.76	389.06	454.09
Lima Puluh Kota	1095.40	1199.10	888.00	56484.82	60705.27	51778.43	515.65	506.26	583.09
Pasaman	40.00	34.00	58.00	1091.24	1075.62	1913.20	272.81	316.36	329.86
Solok Selatan	143.00	186.00	213.00	4130.70	7089.12	8118.95	288.86	381.14	381.17
Dharmasraya	62.50	54.50	43.50	2660.63	1661.24	1695.46	425.70	304.81	389.76
Pasaman Barat	214.00	124.00	152.00	8556.58	4816.05	5629.85	399.84	388.39	370.38
Padang	40.00	27.00	20.00	1141.76	1033.70	767.63	285.44	382.85	383.82
Solok City	17.50	18.00	7.00	894.81	626.65	283.52	511.32	348.14	405.03
Sawahlunto	151.00	186.00	183.00	6106.90	6916.44	7015.62	404.43	371.85	383.37
Padang Panjang	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bukittinggi	13.00	13.00	10.00	457.60	499.12	374.86	352.00	383.94	374.86
Payakumbuh	113.00	106.00	98.00	3796.80	4755.32	4258.69	336.00	448.62	434.56
Pariaman	9.00	9.00	19.00	321.17	359.36	873.52	356.85	399.29	459.75
West Sumatera Province	**4167.50**	**3626.30**	**3435.70**	**170941.31**	**154728.76**	**153412.02**	**410.18**	**426.68**	**446.52**

The data in **Table 1.1** shows cassava production in West Sumatra from 2019 to 2021, combining cassava production across all regions of West Sumatra, both at the city and regency levels (Central Bureau of Statistics, 2021). Several regions have relatively large harvested areas and high cassava production, indicating their potential as major cassava-producing centers, while other regions demonstrate lower productivity despite having considerable harvested areas. This condition suggests that cassava remains one of the key agricultural commodities in West Sumatra, both in terms of raw material availability and opportunities for processed product development. The high production levels in certain regions also highlight the need for processing tools, particularly cassava slicers, which can help improve the efficiency of small and medium enterprises engaged in cassava-based food processing.

Cassava can be processed into various products, including boiled cassava, fried cassava, roasted cassava, tape, kolak, gethuk, cassava chips, and others. Different cassava processing methods can influence its physical and chemical properties, thereby affecting consumer interest and preferences (Setyawati, 2021). One of the regional culinary specialties in West Sumatra that is frequently visited by tourists and has become a well-known souvenir is *"keripik sanjai."* The history of *"keripik sanjai"* production began in a village in Bukittinggi. Over time, the popularity of *"keripik sanjai"* has expanded

beyond Bukittinggi, with the Department of Cooperatives, Industry, and Trade of Bukittinggi playing a role in supporting Small and Medium Enterprises (SMEs). **Table 1.2** presents data on the locations of cassava chips production in Padang City in 2014, obtained from the West Sumatra Department of Cooperatives and SMEs.

Table 1. 2 Data on the Number of Chips Production Facilities in Each Subdistrict of Padang City (Source: Badan Pusat Statistik, 2014)

No	Subdistrict	Number of Enterprises
1	Kuranji	1
2	Pauh	2
3	Padang Utara	15
4	Padang Barat	4
5	Padang Selatan	12
6	Padang Timur	15
7	Bungus Teluk Kabung	-
8	Koto Tangah	12
9	Nanggalo	9
TOTAL		70

From a survey conducted on 16 SMEs in Padang City, 11 of them were found to use a manual cassava slicer in the form of a simple cutting board. The cassava slicer used is a basic manual tool operated by repeatedly moving the cassava back and forth until it is gradually sliced. **Figure 1.1** shows the cassava slicer commonly used by cassava chips SMEs in Padang City.

Figure 1. 1 Initial Design of Cassava Slicer Tool

Based on **Figure 1.1** the initial design of the cassava chopping tool consists of five components. The following are explanations and functions of each product component.

1. Base Board: As a place for cassava to run during the slicing process.
2. Side Board: Holding the knife to keep in position so that it does not move from the base board.
3. Blade: Functions to chop cassava.
4. Nut and Bolt: Used to adjusting the tightness of the side board to the baseboard, it can be loosened when you want to adjust the position of the blade.
5. Screw: Useful for holding the blade to the base board.

As the basis for problem formulation, interviews were conducted with 11 cassava-processing SMEs in West Sumatra. The results of the interviews revealed that the majority of respondents expressed concerns regarding the safety aspects of using traditional cassava slicers, followed by issues related to slicing time efficiency, inconsistency of slice uniformity, and user convenience. The complete questionnaire data are presented in Appendix A, while the recapitulation of the relevant processed questionnaire results is shown in **Table 1.3** as an overview of the level of problems faced by users.

Table 1. 3 Recapitulated Questionnaire Data with a Total of 11 Respondents

No	Pernyataan Responden	Jumlah Responden	Persentase (%)
1	Pengirisan singkong dengan alat kayu memakan waktu lama	9	82%
2	Hasil irisan sering tidak seragam	8	73%
3	Penggunaan alat membutuhkan tenaga yang besar	7	64%
4	Risiko tangan terkena pisau tinggi	10	91%
5	Alat sulit digunakan untuk kebutuhan lain selain mengiris singkong	6	55%

Based on the questionnaire results conducted with 11 respondents from cassava-processing SMEs, it was found that most users still face various obstacles in using traditional wooden cassava slicers. A total of 91% of respondents stated that the risk of direct contact with the blade remains high, while 82% complained that the slicing process takes too much time. In addition, 73% reported that the slices are often uneven, and 64% mentioned that the tool requires considerable effort, making it less comfortable to use.

These findings indicate that the main problems lie in aspects of safety, efficiency, and ease of use. Therefore, the development of a cassava slicer design that is safer, more effective, and ergonomic is required to support SME production activities.

The interviews also provided an assessment of the voice of customer from each respondent's statement. **Table 1.4** presents the total scores and average ratings of each voice of customer.

Table 1. 4 Voice of Customer Assessment Data from 11 Respondents

No	Voice of Customer	Jumlah Responden	Rate
1	Proses pengirisan lebih cepat	9	4.09
2	Hasil irisan lebih seragam	8	3.64
3	Alat mudah digunakan tanpa tenaga berlebih	7	3.18
4	Mengurangi risiko tangan terkena pisau	10	4.55
5	Bisa digunakan untuk berbagai bahan makanan lain	6	2.73

The Voice of Customer (VoC) assessment in this study was measured using a 1–5 scale, where a score of 1 indicates a very low level of importance and a score of 5 indicates a very high level of importance. Thus, the higher the rating value, the greater the priority of the issue to be addressed in the development of the tool design. The calculation of the rating value was carried out by converting the respondents' questionnaire results into a 1–5 scale using the following formula:

Rate = (Number of respondents in agreement / Total respondents) × 5

From the rate calculation results based on the Voice of Customer table, it can be seen that the safety aspect has the highest score (4.55), followed by slicing time efficiency (4.09), slice uniformity (3.64), user convenience (3.18), and the tool's ability to be used for other food ingredients (2.73). This indicates that the main priorities in designing the cassava slicer are improving user safety and efficiency.

Based on the issues identified with the cassava chopping tool, it can be concluded that the tool's design still has some shortcomings. This results in the suboptimal functionality of the tool, leading to an ineffective cassava chopping process. Through this research, improvements to the design of the cassava chopping tool are being made to enhance its usability for SMEs employing this tool.

1.2 Problem Formulation

The wooden longitudinal cassava slicer widely used by SMEs is considered inefficient, as it requires relatively long slicing time, lacks safety due to the high risk of direct contact with the blade that may cause injury, and is inconvenient to use because of its unstable position during operation. There are five voices of customer with an average rating of 3.64 out of 5, indicating that the level of user satisfaction with the existing tool is still in the moderate category and requires improvement.

1.3 Research Objectives

The objective of this study is to propose a redesign of the longitudinal cassava slicer that can be utilized by SMEs to achieve the following targets:

1. To improve the efficiency of cassava slicing process
2. To enhance user safety during the operation
3. To make the slicer more user-friendly and adaptable for different purposes

1.4 Research Scopes

1. The product is a multi-purpose cassava cutting tool used in the process of cutting cassava-based foods.
2. The developed tool focuses on a cassava slicer that produces elongated cuts.
3. Cost calculations in this research were not considered.

1.5 Outline of the Research Proposal

The outlines of the research proposal used in this final project report are as follows:

CHAPTER I INTRODUCTION

This chapter contains the research background, problem formulation, research objectives, research scopes, and the research outline.

CHAPTER II LITERATURE REVIEW

This chapter contains materials related to the problems discussed, consisting of literature related to problems in research.

CHAPTER III RESEARCH METHODOLOGY

This chapter contains the steps taken in completing this research which consists of preliminary studies, literature review, problem identification, problem formulation, data collection, data processing, discussion, conclusions, and suggestions for further research.

CHAPTER IV DATA COLLECTION AND PREPARATION

This chapter contains the stages of data collecting and processing in redesign the tool.

CHAPTER V ANALYSIS

This chapter contains the analysis of data processing that has been carried out.

CHAPTER VI CONCLUSION & RECOMMENDATIONS

This chapter contains conclusions of the research and suggestions for future research.