CHAPTER I
INTRODUCTION

1.1 Background

Indonesia's manufacturing industry, particularly the bag production sector within the textile and related goods category, is facing substantial challenges amid shifting global market dynamics. According to the Central Bureau of Statistics (BPS), the export volume of national textiles and textile goods in the first half of 2023 was approximately 922.5 thousand tons, representing a 13% decline compared to the same period in 2022 (BPS, 2023). This downturn underscores the influence of various external factors, including volatile global demand, economic uncertainty, and evolving international trade policies, which collectively hinder the sector's performance and resilience in an increasingly competitive market.

Amid these challenges, the need for the industry to uphold and enhance product quality has grown more critical than ever. In an increasingly competitive and demanding market, product quality is not only essential for retaining market share but also for fostering long-term customer loyalty. High-quality products serve as a key differentiator, attracting consumers who expect more in today’s market. As a result, boosting production efficiency through the adoption of innovative, quality-centric methods is vital for the industry to not only survive but also thrive under mounting pressures.

One of the enterprises within the manufacturing sector that is currently facing these challenges is CV Andespuma Anugrah Pratama, located in Aur Duri, Padang, West Sumatra. The company specializes in the production of various types of bags utilizing polyester as its primary raw material, regularly supplying to institutions, schools, and private companies. The range of products includes backpacks, handbags, and tote bags, reflecting its capacity to meet diverse consumer demands. The sales performance for these products in March is presented

in Figure 1.1, offering insight into the company's market position amidst ongoing industry challenges.

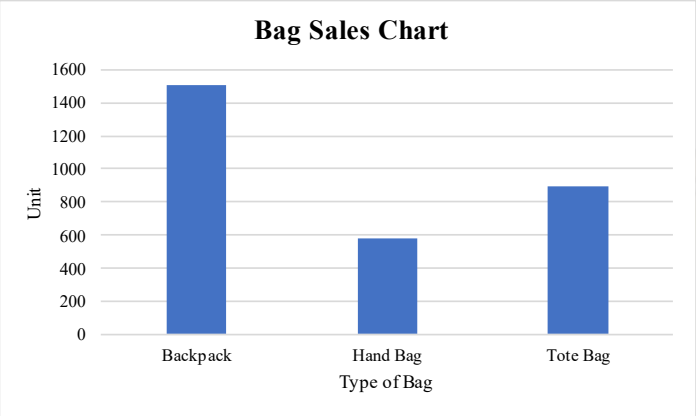

Figure 1.1 Product Sales for January – July 2024

Based on **Figure 1.1**, it is evident that backpacks were the highest-selling product in January until July 2024, with a total of 1,511 units sold. The popularity of this product can be attributed to its versatility and ample storage capacity, making it a preferred choice among consumers. This type of bag typically includes features such as a laptop compartment, front and side pockets, and padded foam for enhanced comfort. Given its significance as the most produced item, the backpack has been selected as the primary focus of this research. An illustration of the backpack can be found in **Figure 1.2** below.

Figure 1.2 Backpack Product

The bag production process involves several interconnected steps, starting with pattern making, followed by cutting, sewing, and packaging. Workstation 1 is responsible for pattern making, while Workstation 2 handles pattern cutting. The process then moves to Workstation 3 for sewing the back of the bag, followed by Workstation 4 for sewing the center section. Workstation 5 sews the front of the bag, and the final step occurs at Workstation 6, which handles final sewing and packaging. **Figure 1.3** presents the flow diagram of this sequential process.

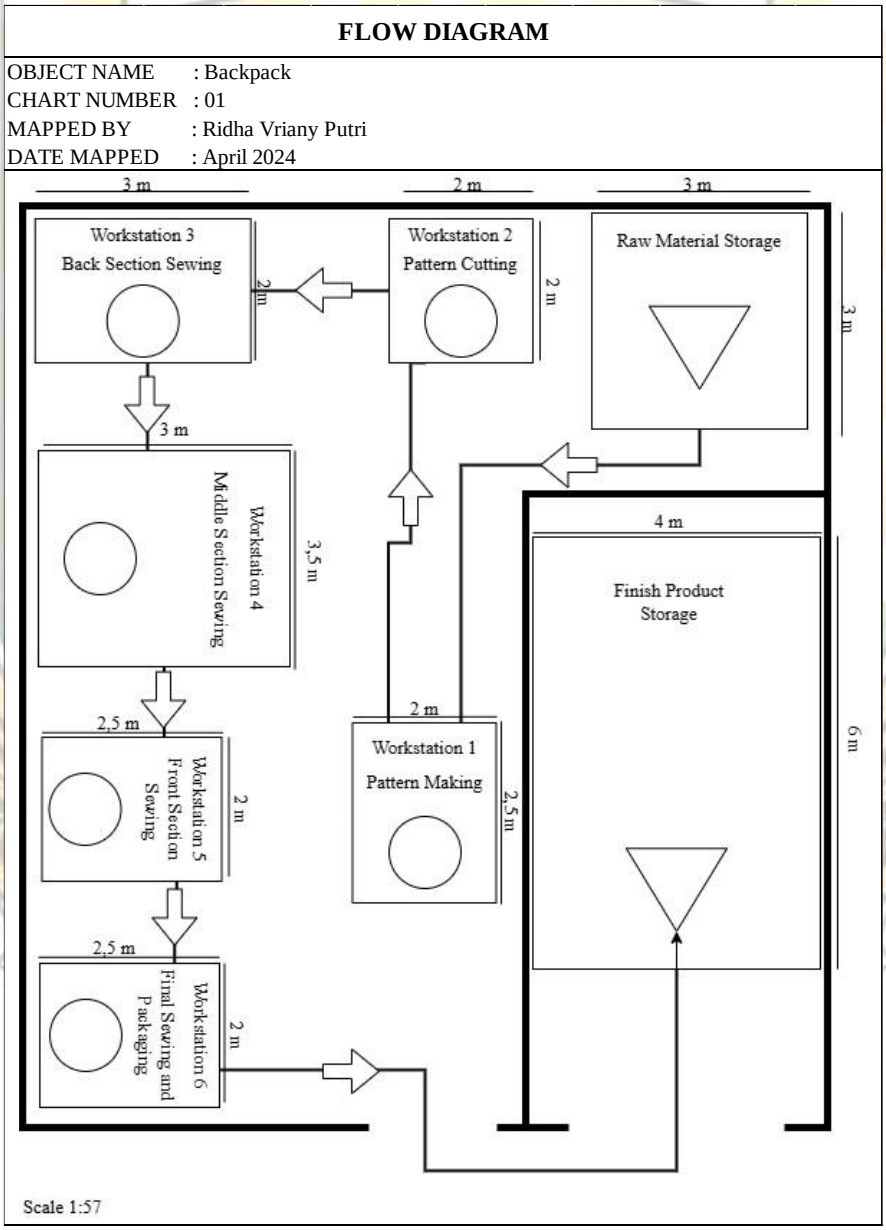

Figure 1.3 Flow Diagram

Furthermore, the current state of the bag production line reveals an imbalance in the distribution of workload across the various workstations. This issue is evident in the cycle time comparison chart shown in Figure 1.4. Specifically, the cycle times for Workstation 3 and Workstation 5 exceed the takt time. According to Heizer and Render (2011), takt time refers to the pace of production required to align with customer demand. The discrepancy between the cycle times and the takt time

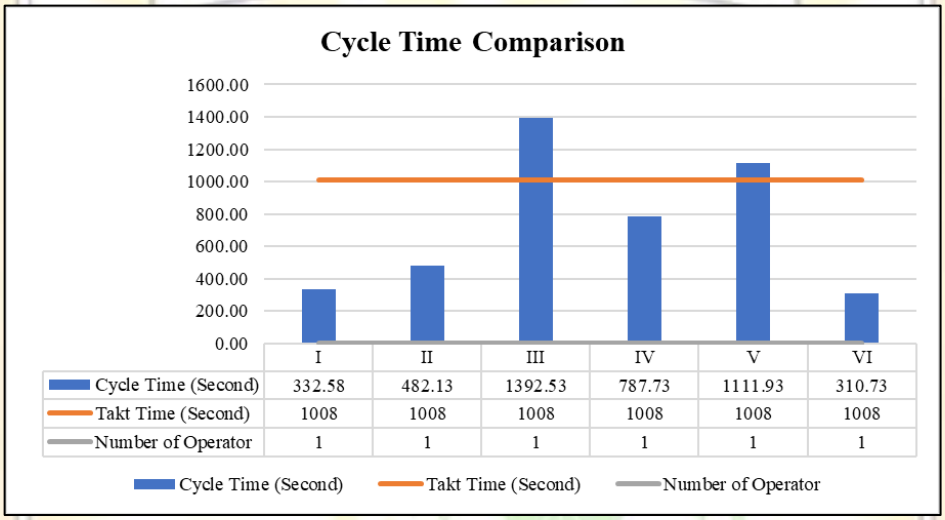

Figure 1.4 Cycle Time Comparison

The issues described above highlight inefficiencies within the bag production line, necessitating the implementation of line balancing. However, the solution extends beyond conventional line balancing; it involves exploring multiple alternatives that integrate various improvement methods. At bottleneck workstations, it is essential to evaluate and optimize work methods using the principles of motion economy. This approach aims to streamline movements and reduce waste, ensuring that the cycle time at each station aligns with or stays within the takt time, thereby enhancing overall production efficiency.

In the industry, a widely adopted method for addressing bottlenecks is line balancing, which ensures that the workload is evenly distributed across all stations in the production line, preventing work accumulation and inefficiencies. However, for CV Andespuma Anugrah Pratama, standard line balancing alone is insufficient.

The necessary improvements must be more comprehensive and precise, requiring a detailed overhaul of the work system. This includes not only redistributing tasks but also optimizing the overall workflow and processes to achieve a more efficient and balanced production system.

One method for improving the work system is through the application of motion economy principles. “Motion economy is commonly defined as the study of the motions used in the performance of an operation for the purpose of eliminating all unnecessary motions and building up a sequence of the most useful motions for maximum efficiency” (Barnes, 1949). The current state of the production line's work system is illustrated in the left-hand and right-hand operation charts, as shown in **Table 1.1**.

Table 1.1 Left-Hand Right-Hand Chart

LEFT HAND AND RIGHT HAND CHART							
WORK	: Sewing the Back of the Bag						
DEPARTMENT	: Production						
CURRENT [redacted]	PRPOSED						
MAPPED BY	: Ridha Vriany Putri						
DATE MAPPED	: April 2024						
LEFT HAND	Distance (cm)	Time (seconds)	Symbol		Time (seconds)	Distance (cm)	RIGHT HAND
Take the fabric and foam lining of the laptop pocket	55	18	Re, G, M	Re, G, M	18		Take the fabric and foam lining of the laptop pocket
Adjust the position between the fabric and foam		16	P	G,P	16		Adjust the position between the fabric and foam to fit.
Waiting		5	D	Re, G, M, Rl	5	55	Taking the clamp
Holds fabric and foam		24	H	U	24		Attaching clamps to hold the position between the fabric and foam.
Route and sew the laptop pocket pattern		89	P, H	P, H	89		Route and sew the laptop pocket pattern
Waiting		5	D	Re, G, M, U, Rl	7	45	Take the scissors, cut the thread, and put the scissors down
Holding the stitches		2	H				
Holding the stitches		9	H	G, M, Rl	9		Remove the clamp from the stitching
Take the fabric and foam lining the back of the bag	60	18	Re, G, M	Re, G, M	18		Take the fabric and foam lining the back of the bag
Adjust the position between the fabric and foam to fit.		7	P	G,P	7		Adjust the position between the fabric and foam to fit.

Table 1.1 Left-Hand Right-Hand Chart (Cont.)

LEFT HAND AND RIGHT HAND CHART							
WORK : Sewing the Back of the Bag DEPARTMENT : Production CURRENT [redacted] PRPOSED MAPPED BY : Ridha Vriany Putri DATE MAPPED : April 2024							
LEFT HAND	Distance (cm)	Time (seconds)	Symbol		Time (seconds)	Distance (cm)	RIGHT HAND
Holds fabric and foam		12	H	Re, G, U	12	30	Attaching clamps to hold the position between the fabric and foam.
Route and sew the back pattern of the bag with a sewing machine		117	H	H, U	117		Route and sew the back pattern of the bag with a sewing machine
Waiting		4	D	Re, G, M, U, Rl	6	30	Take the scissors, cut the thread, and put the scissors down
Holding the stitches		2	H				
Holding the stitches		6	H	G, M, Rl	6		Remove the clamp from the stitching
Waiting		5	D	Re, G, M	5	76	Taking out the laptop pocket part
Adjust the position between the back of the bag and the laptop pocket.		4	G, P	P	4		Adjust the position between the back of the bag and the laptop pocket.
Holds the back of the bag and laptop pocket		7	H	Re, G, U	7	25	Attaching a clamp to hold the position between the back of the bag and the laptop pocket.
Route and sew the back pattern of the bag and laptop pocket		66	H	H	66		Route and sew the back pattern of the bag and laptop pocket
Waiting		5	D	Re, G, M, U, Rl	7	30	Take the scissors, cut the thread, and put the scissors down
Holding the stitches		2	H				
Holding the stitches		7	H	G, M, Rl	7		Remove the clamp from the stitching
Waiting		5	D	G, M, Rl	5		Place the stitching on the right side
Take the fabric and foam lining for the right backrest.	65	5	Re, G, M	D	5		Waiting
Adjust the position between the fabric and foam to fit.		6	P	G,P	6		Adjust the position between the fabric and foam to fit.
Holds fabric and foam		8	H	Re, G, U	8	20	Attaching clamps to hold the position between the fabric and foam.
Route and sew the right back shoulder pattern of the bag		7	P, H	P, H, U	7		Route and sew the right back shoulder pattern of the bag
Waiting		4	D	Re, G, M, U, Rl	6	22	Take the scissors, cut the thread, and put the scissors down
Holding the stitches		2	H				

Table 1.1 Left-Hand Right-Hand Chart (Cont.)

LEFT HAND AND RIGHT HAND CHART							
WORK : Sewing the Back of the Bag DEPARTMENT : Production CURRENT [redacted] PRPOSED MAPPED BY : Ridha Vriany Putri DATE MAPPED : April 2024							
LEFT HAND	Distance (cm)	Time (seconds)	Symbol		Time (seconds)	Distance (cm)	RIGHT HAND
Holding the stitches		8	H	G, M, Rl	8		Remove the clamp from the stitching
Waiting		3	D	G, M, Rl	3		Place the stitching on the right side
Take the fabric and foam lining from the left back of the bag.	63	4	Re, G, M	D	4		Waiting
Adjust the position between the fabric and foam to fit.		3	P	G,P	3		Adjust the position between the fabric and foam to fit.
Holds fabric and foam		7	H	Re, G, U	7	25	Attaching clamps to hold the position between the fabric and foam.
Route and sew the left back shoulder pattern of the bag		68	P, H	P, H	68		Route and sew the left back shoulder pattern of the bag
Waiting		4	D	Re, G, M, U, Rl	6	21	Take the scissors, cut the thread, and put the scissors down
Holding the stitches		2	H				
Holding the stitches		7	H	G, M, Rl	7		Remove the clamp from the stitching
Positioning the back seam with the bag strap		46	P	P	46		Positioning the back seam with the bag strap
Holds the back seam and shoulder of the bag		5	H	Re, G, U	5	25	Installing clamps to hold the position between parts
Align and sew the right shoulder to the back of the bag		66	P, H	P, H	66		Align and sew the right shoulder to the back of the bag
Waiting		5	D	Re, G, M, U, Rl	7	20	Take the scissors, cut the thread, and put the scissors down
Holding the stitches		2	H				
Align and sew the left shoulder to the back of the bag		64	P, H	P, H	64		Align and sew the left shoulder to the back of the bag
Waiting		5	D	Re, G, M, U, Rl	7	20	Take the scissors, cut the thread, and put the scissors down
Holding the stitches		2	H				
Holding the stitches		6	H	G, M, Rl	6		Remove the clamp from the stitching
Waiting		5	D	Re, G, M Rl	5	80	Move the sewing results to the right side
Taking the sling	86	15	Re, G, M	D	15		Waiting

Table 1.1 Left-Hand Right-Hand Chart (Cont.)

LEFT HAND AND RIGHT HAND CHART							
WORK	: Sewing the Back of the Bag						
DEPARTMENT	: Production						
CURRENT [redacted]	PRPOSED						
MAPPED BY	: Ridha Vriany Putri						
DATE MAPPED	: April 2024						
LEFT HAND	Distance (cm)	Time (seconds)	Symbol		Time (seconds)	Distance (cm)	RIGHT HAND
Positioning and sewing the shoulder straps on the back of the bag		21	P, H	G, P, H	21		Positioning and sewing the shoulder straps on the back of the bag
Waiting		5	D	Re, G, M, U, Rl	7	20	Take the scissors, cut the thread, and put the scissors down
Holding the stitches		2	H				
Taking the buckle	73	17	Re, G, M	D	17		Waiting
Attaching the buckle to the bag strap		62	H	G, H	62		Attaching the buckle to the bag strap
Attaching the buckle to the back of the bag		127	P, H	P, H	127		Attaching the buckle to the back of the bag
Waiting		5	D	Re, G, M, U, Rl	7	21	Take the scissors, cut the thread, and put the scissors down
Holding the sewing results		2	H				
Taking a dip	83	13	Re, G, M	D	13		Waiting
Position and sew the dip around the back of the bag.		112	P, H	G, P, H	112		Position and sew the dip around the back of the bag.
Waiting		5	D	Re, G, M, U, Rl	7	20	Take the scissors, cut the thread, and put the scissors down
Holding the sewing results		2	H				
Waiting	240	12	D	Re, G, M, Rl	12	240	Place the sewing results on the next station
TOTAL	725	1179			1179	825	
PERCENTAGE*DELAY*		7%			5%		
SUMMARY							
TIME OF EACH CYCLE				1179			
PRODUCT QUANTITY EACH CYCLE				1			
TIME TO MAKE A PRODUCT				1179			

Based on the chart above, it is evident that the left hand experiences less utilization, with a higher delay percentage of 7%, compared to the right hand, which has a delay percentage of 5%. This imbalance in hand usage by operators indicates that there are opportunities for further improvement in the work system. The current workstation setup contributes to bottlenecks in the production line. Therefore, it is crucial to standardize the work system at each workstation before attempting to

balance the production line. Without proper standardization, workload distribution across workstations will remain suboptimal. By identifying these inefficient movements, the company can implement appropriate solutions to optimize operations at the bag sewing workstation. The proposed improvements not only aim to balance work time but also to eliminate unnecessary movements, ultimately enhancing the performance of the entire production line.

To enhance workstation efficiency and performance, the implementation of the 5S method presents an effective solution. The 5S methodology, which includes Sorting (Seiri), Set in Order (Seiton), Shine (Seiso), Standardize (Seiketsu), and Sustain (Shitsuke), focuses on creating a clean and organized work environment. It aims to eliminate unnecessary items, ensure tools and equipment are well-maintained, and promote a systematic workflow. By adopting the 5S approach, companies can minimize the time spent searching for tools and materials, optimize workspace utilization, and increase awareness of the importance of cleanliness and order in the workplace.

In conclusion, an integrated approach that combines the principles of motion economy, 5S, and line balancing is essential for enhancing the performance of the bag production line at CV Andespuma Anugrah Pratama. By implementing these strategies effectively, this research aims to assist CV Andespuma Anugrah Pratama in optimizing the efficiency of its production processes, ultimately leading to improved productivity and operational outcomes.

1.2 Problem Formulation

Based on the background presented, the research will address the following problems:

1. How to improve the work system at each work station using the principles of motion economy and 5S techniques?

2. How to improve the performance level of the backpack production line at CV Andespuma Anugrah Pratama using the line balancing method?

1.3 Research Objectives

The objectives to be achieved from this research are as follows:

1. Improve the work system at each work station using the principles of motion economy and 5S techniques.
2. Improve the performance level of the backpack production line at CV Andespuma Anugrah Pratama using the line balancing method.

1.4 Scope of Research

The scope of this research are as follows:

1. The research was conducted on the backpack production line.
2. The value compared in the selection of alternative improvements is the efficiency value of the production line.

1.5 Outline of Report

Report of the research is designed in accordance to the following outline.

CHAPTER I INTODUCTION

This chapter contains the background of research, formulations of problem, research objectives, scope of research, and outline of report

CHAPTER II LITERATURE REVIEW

This chapter presents the theoretical foundations that underpin the evaluation and improvement of the backpack production

line at CV Andespuma Anugrah Pratama. It focuses on the application of motion economy principles, 5S methodology, and line balancing techniques to enhance production performance.

CHAPTER III RESEARCH METHODOLOGIES

This chapter discusses preliminary studies, problem identification, problem formulation, method selection, collecting data, processing data, analysis, and closing.

CHAPTER IV COLLECTING AND PROCESSING DATA

This chapter contains data collection during the research and the results of data processing that will be used in the analysis of this research.

CHAPTER V ANALYSIS

This chapter provides a comprehensive analysis based on the processed data, aligned with the research objectives and the proposed improvements. The analysis aims to evaluate the effectiveness of the suggested enhancements in achieving the desired outcomes.

CHAPTER VI CONCLUSION AND SUGGESTION

This chapter contains conclusions based on data processing and analysis that has been carried out and suggestions for further research.