Chapter I Preliminary

I.1 Background

Musculoskeletal disorders (MSDs) or offending skeletal muscle is damage to the muscles, nerves, tendons, ligaments, joints, cartilage, and disc invertebralis. Basically, MSDs can occur in two ways:

- Fatigue and exhaustion continously are caused by a long period of time, which is associated with persistent activity.
- Suddenly damage is caused by a very strong activity / weight.

Based on research (Cahyanto, 2009), MSDs is caused by several factors, including:

1. Repetition of continuous movement
2. Strength (force)
3. Mechanical stress
4. Posture
5. Vibration
6. Temperature
7. Pressure is caused by outside condition

Posture is the position of the body part which associated with other body parts are connected by a connection angle. Posture is one of the factors that most often associated with risk factors for MSDs (Cahyanto, 2009). In standardization (Cahyanto, 2009), the posture of the human body should be in a neutral state. For the upper arms and shoulders are relaxed in neutral zone with shoulders parallel to the floor and in the same plane beside arm. Working with the position of the arm away from the body, overextended, may increase the risk for injury. Posture and body positioning factors such as twisting torso, shoulder raise, rotate/turn his head, lifting elbow sleeves are often associated with an increased risk of symptoms of MSDs.

PT. ABO FARM is a company engaged in agriculture which focuses its business on the export of vegeTables, especially beans that is located in the rural areas Nengkelan, sub Ciwidey, Bandung regency. One of the processes that occur in the

PT. ABO FARM is loading process which this process occurs in the collecting entity. In generally, the process of loading includes the following activities:

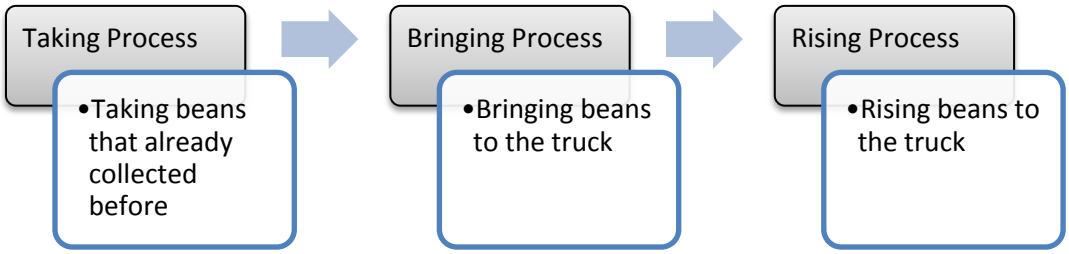

Figure I.1 Taking Activity

Figure I.2 Carrying Activity

Figure I.3 Raising Activity

Based on observations, material handling that is used today is in the form of a plastic bag that has dimensions of 96 x 43 x 36 cm and the weight capacity of 55 kg, while according to the NIOSH, recommended limit of maximum load to be lifted is equal to 23 kg. Poor existing material handling plus the lack of tools for the operator is the cause of resulting bad posture of the operator when loading activity.

Rapid Entire Body Assessment or commonly called REBA is one of the methods that used to analyze the human body posture. This method is designed to evaluate operators or activity, such as working that has a tendency to cause discomfort such as fatigue in the neck, back, neck, arms and so on.

REBA has classified work postures based on the values that have been determined, as for its value as follows:

Table I.1 Classification of REBA Values

REBA Score	Risk Level	Action Level	Action
1	Negligible	0	Not need
2-3	Small	1	Maybe is needed
4-7	Moderate	2	Necessary
8-10	High	3	As soon as
11-15	Very High	4	On this time

Based on the evaluation results of the posture of the operator by using REBA, it is observed that the current posture of the operator can cause discomfort for the operator. It can be seen from the results of the calculation level REBA score for the third opertaor working posture during her promotion.

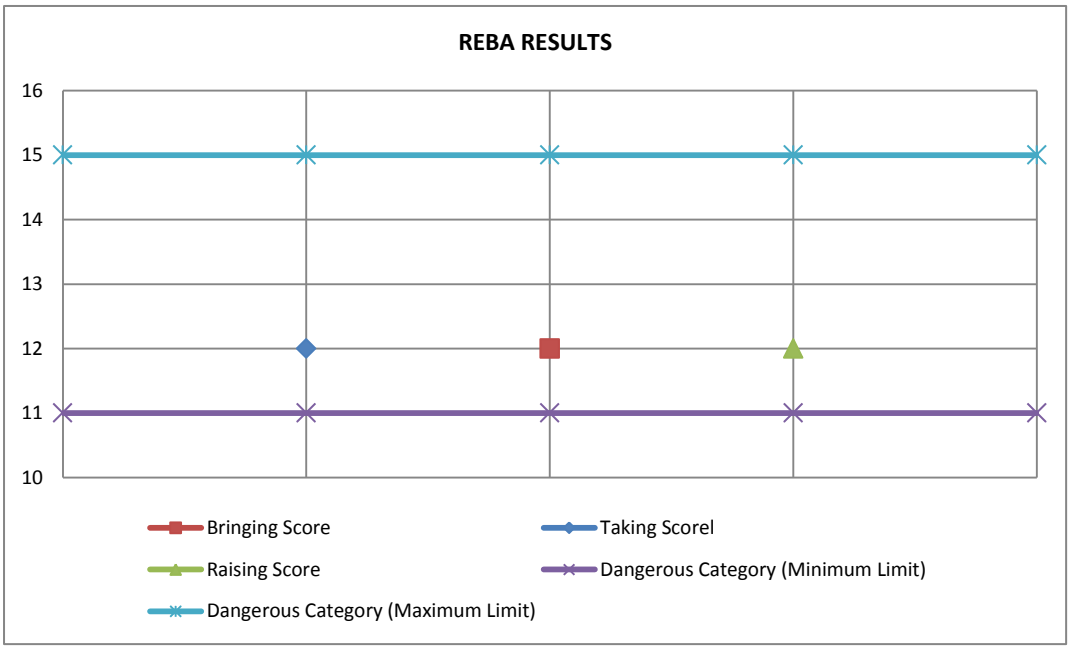

Figure I.4 Reba Result for Highest Score

In the Figure I.4 , it can be observed that the value of REBA for each working posture is in the dangerous category interval. Very high score of REBA indicates that the need for repairs nowly.

In addition to using Reba, it was used a questionnaire SNQ (Standard Nordic Quisttionare). SNQ is used to identify the complaints of the operators in their work. Questionnaires were administered and filled by workers after work. The data is summarized by weighting to determine the level of musculoskeletal complaints in each part of the body with each category of pain, so it can know which body part is the most sickness and it repairs work facility design that can minimize the pain. Below, it is the results of SNQ processing each operator that has been done.

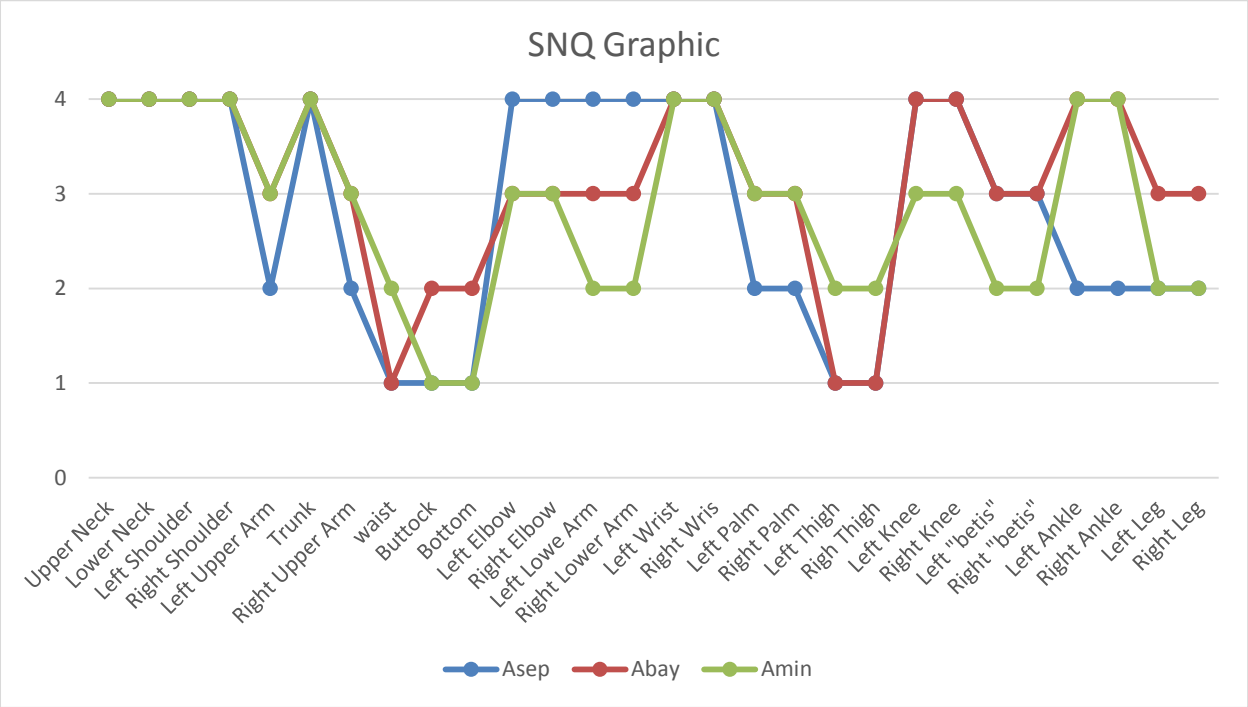

Figure I.5 Standar Nordic Quistionnare Graphic

From the Figure I.5, it can be observed that the parts of the body like the upper neck, lower neck, left shoulder, right shoulder, hip, left elbow, right elbow, left forearm, left wrist, right wrist, left knee, right knee, left ankle, right ankle are the part of the body that get pain fully which is accompanied by a remarkable tension (muscle contraction fully) so that operators feel saturated and fatigue quite large.

By comparing the results on the value of the score on the reba and snq result, it can be drawn the conclusion that the existing work postures are getting problems. Therefore, to overcome the problem of improper working posture, it is necessary to design appropriate material handling for loading so that the operator can reduce the level of risk of MSDs.

I.2 Problem Definition

In this section, problem definition describes in the form of question. The problem definition of this research is how to design a appropriate material handling to reduce the level of risk of MSDs on REBA analysis?

I.3 Objective Research

This section describes the purpose of the research conducted, the objective from this research is designing material handling appropriate to reduce the risk of MSDs on the operator level

I.4 Research Limitations

These are some limitation used in this research :

1. This study only discusses the activities of loading for beans
2. The study focuses on the transport of vegeTables using a sack of beans.
3. The study focuses on the transport of beans using a pickup.
4. Ergonomics approach is limited only to *anthropometry*
5. The design is only limited to the design visually and not to the production stage
6. Making design using SolidWorks *software*
7. The study did not discuss the terms of the investment costs incurred
8. This study did not arrive at the prototype stage

I.5 Research Benefits

The benefits of this research is as follows:

- This research can help the operators to avoid the risk of *MSDs.*
- This research can help companies increase productivity by maximizing the total output

I.6 Writing Systhematic

The systhematic from this writing is as follows:

Chapter I Preliminary

This chapter contains a description of the background research, the formulation of the problem, the purpose of the study, limitation of the study, the benefits of research, and systematic writing.

Chapter II Theory

This chapter contains the literature relevant to the problem under study and also discussed the results of previous studies. The second section discusses the relationships between concepts into research studies and description of research contributions.

Chapter III Research Methodology

In this chapter the research steps described in detail include: stages of formulating research problems, formulate hypotheses, and developing models of research, operationalization of variables to identify and conduct research, prepare research questionnaire, designing data collection and processing, test instruments, designing data processing analysis .

Chapter IV Data Collection and Processing

in this chapter, it was collected the relevant data used in this study. then, it was performed data processing in order to test whether the data collected is used or not feasible

Chapter V Material Handling Design Analysis

in this chapter, an analysis of material handling design proposals based on criteria specified by the consumer before

Chapter VI Conclusion and Suggestion

This chapter consists of two sub-chapters, which are the first conclusions include overall conclusions drawn from the analysis carried out, then the second which includes the suggestion given suggestions for subsequent research