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# **A STUDY ON FACTORS THAT AFFECT THE EFFICIENCY OF FRESH CROPS IN MATERIAL HANDLING**

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# CHAPTER 1

## INTRODUCTION

### 1.1 INTRODUCTION CHAPTER

This research entitled A Study on Factors That Affect the Efficiency of Fresh Crops in Material Handling. We are the student of Politeknik Sultan Salahuddin Abdul Aziz Shah did the research on factors that affect the efficiency of fresh crops in material handling. This study begins with the background of the study, problem statement, and followed by the objective, research questions, scope of the study, significant research, and operational definition terms.

### 1.1 BACKGROUND OF THE STUDY

Fruits and vegetables are very important food commodities. Though the production of fruits and vegetables make us believe in our strength for self-sufficiency, a significant qualitative and quantitative loss occurs in the produce from harvest till consumption. For self-sufficiency and also for processing, export and to meet additional requirements, a lot of emphasis need to be given to reduce post-harvest losses, besides increasing production and productivity of horticultural produces. Processing plays an important role in conservation and effective utilization of these perishable commodities. However, only less than 2% of total production of fruits and vegetables are processed. (K. P. Sudheer, V. Indira, 2007)

Preserving the quality of fresh produce has long been a challenging task. In the past, several approaches were in use for the postharvest management of fresh produce, but due continuous advancement in technology the increase health consciousness of consumers, and environmental concerns, these approaches have been modified and enhanced to address these issues and concerns. (MW Siddiqui, A Ali – 2017)

Fresh horticultural produce is diverse in morphological structure, in composition, and in general physiology. The requirements and recommendations for maximum post-harvest life vary among various groups of commodities. All fresh commodities are high in water content. They are also susceptible to attack by bacteria and fungi. Magnitude of post-harvest losses estimated in fresh fruits and vegetables range from 5 to 25 % in developed countries 20 to 50 % in developing countries. A recent survey shows that in India, about 505 of total fruits and vegetables produced annually are being lost due to poor post-harvest practices. Consequently, net per capita availability of fruits and vegetables is reduced. There is a wide range of simple postharvest technologies from which to choose, and many practices have the potential of meeting the special needs of small scale food handlers and marketers. There are many interesting steps involved in any postharvest system. (K. P. Sudheer, V. Indira, 2007)

Effective management during the postharvest period, rather than the level of sophistication of any given technology, is the key in reaching the desired objectives. While large scale may benefit from investing in costly handling machinery and high – tech postharvest treatments, often these options are not practical for small-scale handlers. Instead,

simple, low, cost technologies often can be more appropriate for small volume, limited resource commercial operations, farmers involved in direct marketing, as well as for suppliers to exporters in developing countries. (Lisa Kitinoja and Adel A. Kader, 2004)

Indeed, it is the postharvest handling activities that maintain fruit quality as fresh produce travels throughout the supply chain. However, depending on the size of the farming operation and its economic situation, different specific practices are most appropriate to achieve these ends. The objective of this publication is to provide postharvest storage, packaging, and handling recommendations for small farm specialty crop producers that sell directly to consumers and through institutional marketing channels. Regardless of where a product is sold, proper handling and food safety practices must be observed. With these considerations, this publication serves as a general guideline for small farm specialty crop producers involved in the short-term storage, packaging, and handling of a variety of specialty crops commonly grown within the state of Florida. The recommendations in this publication are not intended to replace a comprehensive postharvest food safety plan. (Jonathan Adam Watson, Danielle Treadwell, Steven A. Sargent, Jeffrey K. Brecht, and William Pelletier, 2018)

Efficient materials handling is 'the organised movement of materials in the correct quantities, to and from the correct place, accomplished with a minimum of time, labour, wastage and expenditure, and with maximum safety'. When establishing methods for materials handling, a systems approach that covers raw materials and ingredients, in-process stock and distribution of finished products to consumers is needed. This creates optimum flows of materials, in the correct sequence throughout the production process, and avoids bottlenecks or shortages. In summary, correct production planning should ensure that the raw materials, ingredients and packaging materials are scheduled to arrive at the factory at the correct time, in the correct quantities and in the required condition. Storage facilities are sufficient for the anticipated stocks of materials and are suitable to maintain the quality of materials for the required time and handling equipment has sufficient capacity to move materials in the required amounts also staff levels are adequate to handle the required amounts of materials. (P.J. Fellows – 2000)

There are few advantages of correct materials handling techniques and methods of achieving greater efficiency in materials handling such as savings in storage and operating space by only move materials when necessary and minimise all movements by placing related activities close together. Next is better stock control by a proper management that handle materials in bulk. Also, can improved products quality through use continuous handling techniques and minimise manual handling. (JE Johnston – 2016)

## 1.2 PROBLEM STATEMENT

Dry farming fresh crops are characterized by very low and highly variable and uncertain yields. Crop failures are quite common. These are mainly due to the following causes. Inadequate and uneven distribution of rainfall. In general, the rainfall is low and highly variable which results in uncertain crop yields. Besides its uncertainty, the distribution of rainfall during the crop period is uneven, receiving high amount of rain, when it is not needed and lack of it when crop needs it. Next, late onset and early cessation of rains. Due to late onset of monsoon, the sowing of crop are delayed resulting in poor yields. Sometimes the rain may cease very early in the season exposing the crop to drought during flowering and maturity stages which reduces the crop yields considerably.

These intervening dry spells when prolonged during crop period reduces crop growth and yield and when unduly prolonged crops fail. Low moisture retention capacity. The crops raised on red soils, and coarse textured soil suffer due to lack of moisture whenever prolonged dry spells occur due to their low moisture holding capacity. Loss of rain occurs as run off due to undulating and sloppy soils. Low Fertility of Soils. Dry lands are not only thirsty, but also hungry too. Soil fertility has to be increased, but there is limited scope for extensive use of chemical fertilizers due to lack of adequate soil moisture.

Although plastic crates were well designed to prevent physical damage and is easy to handle as packaging containers, it was not used by most consumer due to its limited distribution. It was only used for relatively delicate horticultural items. They use broken and dirty crates. Jute sacks were widely used for almost all types of horticultural crops primarily due to its least price and easy availability and strength.

The diverse types of containers and equipment used for packaging also served as a measuring unit during marketing. Most of the measuring units or containers used were not standardized and uniform size but rather it was based on conventional type. The measuring units or containers used for marketing were wooden box, plastic crates, aluminum and plastic bowl, jute sack, and bundle. The measuring units were categorized according to their size, which also serve as pricing unit in the marketing of the products.

Although packing, transport and storage are known to be used to mitigate the post-harvest loss and quality deterioration by minimizing a gap between producer and consumer and between harvesting and consumption, the producers did not have suitable storage facilities and marketing sites. In addition, their products were also exposed to direct sunlight until they were collected by the end users with a least price.

Until recently, materials handling has received relatively little attention, compared with optimization of process design, packaging developments, marketing. Most of the materials and equipment used were poor in quality. For harvesting they use hand picking or collecting with equipment such as sickle, spade, hoe, axe, ladder locally named 'baalla', cloth, basket, canvas, sack, plastic bucket, palm oil container, aluminum or plastic bowl, oil can and thatched and weaved baskets and containers

The problem is to define the best material handling for fresh crops to stay maintain within the certain period. It is because uncontrollable material handling can cause a bad effect to the fresh crops. Finding the best efficiency for fresh crops material handling is the most important issues because it will help the marketers and the business owner to manage their material handling for fresh crops and they can improve the freshness of the crops to stay longer than before.

### **1.3 RESEARCH OBJECTIVES**

1. To identify packaging effects the affective of fresh crops in material handling.
2. To identify the suitable storage method for fresh crops in material handling.
3. To identify the best transportation for fresh crops in material handling.

### **1.4 RESEARCH QUESTION**

1. What are the best type of packaging that effects the affective of fresh crops in material handling?
2. What are the suitable storage method for fresh crops in material handling?
3. What are the best transportation for fresh crops in material handling?

### **1.5 RESEARCH SCOPE**

Scope of this research is to figure out in which material handling that can bring efficiency to fresh crops. This research will be done to give efficiency on keeping the fresh crops fresh and in a good condition when handed to the consumers. The sample of this research is at a fruits farm in Benefigs', Sg. Tenggi. The importance of the research is to figure out which the affect the efficiency in Benefigs' fresh crops material handling. This research will help the management be clearer vision on choosing the right material handling for their products and production.

We also involved the fresh crops supplier and seller to expose them on how material handling can be influenced the freshness of the fresh crop. This research will give more information on how they operate the operational material handling in the proper way. Thus, this research will improved the fresh crops supplier and seller marketing opportunities and be able to compete in marketplace.

## **1.6 SIGNIFICANT OF RESEARCH**

This research will be show on how to understand the need of the commodity, particularly in terms of physical protection. In this research the management on Benefigs' can improve the production and will maximize the profits.

By selecting the right method and material, the fresh crops supplier and seller will economically satisfy the above needs and offers. The greatest protection to produce and is acceptable to the intended market and consumers will enjoying the good condition of the fresh crops.

In this research we can also create new methods to solve the problem. This research also can be used as guidance to the future researchers in Politeknik Sultan Salahuddin Abdul Aziz Shah that interested to develop agriculture field.

## **1.7 OPERATIONAL DEFINITION**

### **1.7.1 Fresh Crops**

A crop is a plant product that can be grown and harvested extensively for profit or subsistence. Crop may refer either to the harvested parts or to the harvest in a more refined state. Most crops are cultivated in agriculture. Most crops are harvested as food for humans or fodder for livestock. Some crops are gathered from the wild (including intensive gathering).

### **1.7.2 Arrangement**

In many situations it is necessary to establish a specific site for packing operations such as receiving produce where, the quantity and quality are checked on arrival before being transferred to a temporary storage area. Grading, where substandard items are removed, product is graded for factors such as maturity, colour and the separated grades are sized and packed and temporary shelter for product waiting for being loaded for dispatch. All arrangement or pack inghouse operations can be executed manually, mostly small scale, or with a range of mechanical devices of varying sophistication, mostly for larger operations. For packinghouse with small throughout, economics will favour manual operations with workers performing more or all the tasks

### **1.7.3 Storage**

The term “storage” as now applied to fresh produce is almost automatically assumed to mean the holding of fresh fruit and vegetables under controlled conditions. Although this includes the large-scale storage of some major crops, such as carrots and potatoes, to meet a regular continuous demand and provide a degree of price stabilization it also meets the demands of populations of developed countries and of the richer consumers of developing countries, providing year round availability of various local and exotic fruits and vegetables of acceptable quality.

### **1.7.4 Packaging**

Fruits, vegetables and roots vary widely in their susceptibility to physical damage and in the type of damage that is likely to be sustained. Some commodities are more susceptible to impact bruising, whereas others are more prone to compression or vibration bruising. Susceptibility to the different types of damage will require a different type of protection to be incorporated into the package. The choice of packaging material will be also be influenced by factors such as susceptibility to water losses and microbial infections or heat accumulation and may be the primary consideration in the type of package required.

### **1.7.5 Transportation**

Transportation is often most important and mostly costly factor in the marketing channel of the fresh crops. The method of transport of the fresh fruits and vegetables is determined by distance, perishability and value of the produce, all these factors being regulated by time.

### **1.7.6 Harvesting and field handling**

As fresh produce is alive, biological processes impact the quality and are responsible for the deterioration process. Biological factors include rate of respiration, sprouting, rooting, changes in colour, changes in flavour, and changes in texture, changes in nutrition, ethylene production, water loss, and pathological deterioration. While biological processes are innate to fresh fruits and vegetables, the rate of biological processes is affected by environmental factors such as relative humidity, temperature, velocity of the air, and composition of gases in the atmosphere.

## **1.8 SUMMARY**

This chapter explained about the issue or problem on fruit quality and efficiency in fresh crops materials handling in logistics. The scope of study of this research is at Benefigs' farm. Overall this research showing on factors that give efficiency material handling for fresh crops and the issues that has been showed in the efficiency in fresh crop materials handling towards the fig fruits that is less known and unpopular in Malaysia market and also international. Choosing the right method is the important key for the research in order to make sure the best alternative ways is used in order to handling fig fruits to international market

Material handling is in the process of producing high quality fresh produce. Being able to maintain a level of freshness from the field to the dinner table presents many challenges. A grower who can meet these challenges, will be able to expand his or her marketing opportunities and be better able to compete in the marketplace. This research is intended to serve as an introduction to the topic and a resource pointer.



# **CHAPTER 2**

## **LITERATURE REVIEW**

### **2.1 INTRODUCTION**

Materials handling for fresh crops are really important in harvesting that may affect the efficiency of the product itself. A proper way and method are imposed in order to make sure that the product reaches the marketplace. The misused of material handling and improper way could bring big effect to the company .This chapter involved with discussion on the concept or theory and following by previous research and summary

### **2.2 LITERATURE REVIEW**

Materials handling makes production flow possible, as it gives dynamism to static elements such as materials, products, equipment, layout and human re-sources (Stock & Lambert, 2001; Chopra & Meindl, 2001). However, other authors have perceived its relevance. During the period in which Shingo (2006) contributed to the development of the Toyota Production System, he developed the Production Function Mechanism that proposes to explain how the production phenomenon happens. Shingo (2006) indicated that, in the West, production was treated as a process of a sequence of operations. In the Production Function Mechanism, the concepts are directly related to a production analysis focus. A process analysis consists of an observation of the production flows that turn raw materials into final products. From this concept, the author highlights that the main analysis is the one associated with the process, because it follows the production object. The analysis of the operations comes later because it focuses on production subjects (operators and machines). When making this distinction, it is possible to perceive the relevance of materials handling. Groover (2001) highlights that despite its importance, materials handling is a topic that frequently is treated specially by the companies.

It was revealed that the postharvest quality and shelf life of the fruit in part will depend on some postharvest handling practices and treatments carried out after harvest. Handling practices like harvesting, precooling, cleaning and disinfecting, sorting and grading, packaging, storing, and transportation played an important role in maintaining quality and extending shelf life. Using appropriate postharvest treatments like refrigeration, heat treatment, modified atmosphere packaging (MAP), and 1-methylcyclopropene (1-MCP) and calcium chloride (CaCl<sub>2</sub>) application was also vital. It was concluded by this study that the quality of the harvested fruit can be maintained and shelf life extended by using appropriate postharvest handling practices and treatment methods. Failure to adhere to these practices will result in a high amount of loss.( Isaac Arah & Gerald Ahorbo, 2016)

Beyond the basic function of movement, it is also relevant to cite the functions of storage and information transfer, which occurs simultaneously and has both strategic and operational dimensions. Organizations are relying on information systems using tools like Electronic Data Interchange (EDI), or similar information technology resources, to gain in precision and reliability, in the interchange, and availability of information (Lambert & Stock, 2011; Laudon & Laudon, 2016; Milan, Basso & Pretto, 2017).

All businesses must store goods and materials safely, especially warehouses, factories, shops, food, agricultural and construction businesses. As well as ensuring you fulfil your legal duty to protect the health and safety of those affected by your business, the right approach to storage can also help you reduce pollution, unnecessary wastage and other costs. This guide explains how to assess and reduce the key risks of storing goods and materials, including hazardous substances.

Packaging and handling are important to businesses. Packaging is used to promote a product, protects the product and consumer, and informs the prospective consumer and handlers throughout the supply chain. In addition, with assistance from technology advancements, a well designed and constructed package aids in product handling throughout the supply chain (James Tallant, 2010). The way a product is packaged is important to how a customer looks at the product; it helps protect the customer as well as the product itself. Packaging also lets the handlers know how to handle throughout the supply chain. Along with the way it is packaged, assistance from technology will help a company as far as how the package is designed so it will aid in the handling through the supply chain (Jose Aguayo-Jimenez, 2016).

The dissemination of high quality economics research in the field of transportation. The content covers a wide variety of topics relating to the economic aspects of transportation, government regulatory policies regarding transportation, and issues of concern to transportation industry planners. The unifying theme throughout the papers is the application of economic theory and/or applied economic methodologies to transportation questions. (E.Marcucci, V. Gatta, 2017). Supplied figure for post-harvest loss estimates for fruits and vegetables are difficult to substantiate except on limited, controlled experimental basis. Nonetheless, it is noted that losses as high as 50% are common in fruits and vegetables between rural production and town consumption in the tropics (Oyeniran, 1988). These losses, it is noted, occurred during transportation, storage and marketing (Daramola 1998; Okhuoya 1995).

### 2.2.1 Storage

The term “storage” as now applied to fresh produce is almost automatically assumed to mean the holding of fresh fruit and vegetables under controlled conditions. Although this includes the large-scale storage of some major crops, such as carrots and potatoes, to meet a regular continuous demand and provide a degree of price stabilization it also meets the demands of populations of developed countries and of the richer consumers of developing countries, providing year round availability of various local and exotic fruits and vegetables of acceptable quality..

Fruit and vegetable growers work diligently to ensure that they bring the best quality products to market. They possess the necessary skills to improve the value of their crops during the growing season. However, once the harvest begins, good postharvest handling practices must be used to safeguard the product throughout the distribution environment. According to (Watkins and Nock, 2012), the primary objective of postharvest handling is to maintain quality by

- reducing metabolic rates that result in undesirable changes in color, composition, texture, flavor and nutritional status, and undesirable growth such as sprouting or rooting;
- reducing water loss that results in wilting, shriveling, softening, and loss of salable weight and crispness;
- minimizing bruising, friction damage, and other mechanical injuries;
- reducing spoilage caused by decay, especially of damaged or wounded tissues, and preventing contamination by human pathogens that can cause food poisoning; and
- preventing development of freezing injury or physiological disorders, such as chilling injury or senescent (i.e., aging-related) disorders.

In practice, “products must be harvested at optimum maturity or quality, handled carefully to avoid mechanical injury, cooled quickly to remove field heat, stored in modified atmospheres if appropriate for the product, and maintained at acceptable temperatures during storage, distribution and marketing” (Watkins and Nock 2012, 12). Products should always be harvested, if possible, when they are free of moisture, or they should be immediately dried off after harvest. Prolonged wetness almost always leads to a wide range of problems, such as excessive decay, mold, and cosmetic blemishes that render the product unsalable. Proper ventilation and maintaining proper relative humidity during storage are essential to maintaining the highest possible postharvest quality.

Fruit and vegetables are stored in cold storages, where the temperature is maintained between 0°C and 4°C. Refrigeration is one of the most effective methods of preserving the quality of many fruits and vegetables for several days. Low temperature storage can protect

nonappearance quality attributes like texture, nutrition, aroma, and flavor in many harvested fruits ( Harrison and Etonam, 2016 ). This discourages the growth of microorganisms. It also stops the enzymes present in the fruit and vegetables from spoiling them. However, if the temperature becomes too low, the stored fruit and vegetables can get destroyed. The other thing that has to be controlled in a cold storage is humidity. The humidity is kept pretty high because fruit and vegetables lose moisture when the humidity is low. Care has to be taken to see that the fruit and vegetables to be stored are absolutely clean and not damaged in any way. They are usually packed in crates, racks or trays, which are stacked one on top of the other with plenty of space for the circulation of air. The cold store has to be kept clean and the doors must not be opened too often.

Maintaining high humidity around harvested produce reduces water loss, which would result in decreased returns through poor quality (for example, wilting, shriveling) and loss of saleable weight. High humidity should be used with low temperature storage because humidity and warmth combined favor the growth of fungi and bacteria. Although the relative humidity of air increases when it is cooled, it is still necessary to check the relative humidity in a cool room is satisfactory ( Soonchye Tan, 2016 ).

### **2.2.2 Packaging**

A proper packaging of materials include of organize, select, measure. protect, seal, and labeling. Organizing a distribution center of packaging space can make a big difference. A workspace should be large enough to have room to move the package around, with all necessary packaging materials in reach Once your product is measured, add about 2 inches to each the width, the height, and the length to derive the ideal box size. This ensures that you will have room to wrap each product and fill your box with extra padding so your goods will be protected while in transit. Now that you have measured your product or products, it is time to select the right box. There are numerous types of protective packaging, so make sure to choose the one that best suits your company's needs. Do not use cellophane or duct tape, as neither is strong enough to properly seal your box. Instead, look for proper packaging tapes or adhesives. Make sure you have a full seal on your product before you send it off for shipping. Though labeling is the last step, it is one of the most important steps.

Packaging is also one of the important aspects to consider in addressing postharvest losses in fruits and vegetables. It is enclosing food produce or product to protect it from mechanical injuries, tampering, and contamination from physical, chemical, and biological sources. However, using unsuitable packaging can cause fruit damage resulting in losses . Some common packaging materials used in most developing countries include wooden crates, cardboard boxes, woven palm baskets, plastic crates, nylon sacks, jute sacks, and polythene bags. Most of the abovementioned packaging materials do not give all the protection needed by the commodity. Whilst the majority of these packaging materials like the nylon sacks do not allow good aeration within the packaged commodity causing a build-up of heat due to respiration, others like the woven basket have rough surfaces and edges which cause mechanical injuries to the produce (Gerald K. and Ernest Kodzo, 2016 ).

They are an option for growers, although their use has gradually diminished over time because they are relatively heavy, expensive, and abrasive to the fruits and vegetables, and because they can present disposal issues. Sustainable packaging options are becoming increasingly more common and offer many advantages over traditional packaging containers. While beneficial to some, they are not appropriate for every operation. While there are a variety of functional packaging options available to growers of fresh fruits and vegetables, it is important to select the appropriate format for each specific commodity. Regardless of the material used, for a given commodity, it is important to use standard packaging sizes during the postharvest process so that growers can readily calculate total harvest by weight, count, and volume and thus more easily communicate production volumes to their buyers (Daniels and Slama 2010). Also, some buyers require that packaging footprints conform to the dimensions of the standard grocery pallet, which measures 40 x 48 inches (101.60 x 121.92 cm).

Packaging plays an important role in the fruit and vegetable distribution chain. According to Watkins and Nock (2012), packaging serves four main functions:

1. **Containment.** Containment is the basic requirement for movement of a product from one point to another. The package type and size will be a function of the product and market requirements.
2. **Protection and Preservation.** Packages provide protection for the product against environmental factors such as dust and water, as well as impact and compression bruising, and friction injuries that can occur during handling and transport.
3. **Convenience.** Products are packaged in sizes convenient for handlers and for the consumer. Consumer packages are often contained within larger containers for transport because of economies of scale. The product may be removed from the container and placed in a display as single consumer units, or repackaged for sale.
4. **Communication.** In addition to advertising the type and source of the product, the package lists gross and net package weight, unit size of the product, and any additional information required by government regulations.

Another important feature of packaging for produce is that it should be designed with venting that facilitates cooling and temperature management during storage and transport so that field heat and respiratory heat can be efficiently removed.

### **Bulk Bins**

Bulk bins allow producers to store, handle, and transport a large amount of product with relative ease. Bulk bins are manufactured from plastic polymers, wood, or corrugated fibreboard. Plastic and wood bulk bins are often only used on the farm because they are quite heavy and bulky (Figure 1). In terms of transportation, this restricts the amount of product available for shipping because each state imposes weight limits on transported goods. All types of bulk bins require heavy lifting equipment, such as forklifts, to move the product

from field to packinghouse or storage because the contents often weigh in excess of 1,000 pounds.



Figure 1

Reusable plastic bulk bins (left) and wooden bulk bins (right) are used mostly on farms and at packinghouses. (Credit: Mark Ritenour)

Despite their weight, bulk bins have many advantages. They allow for easy movement of large quantities of product and are usually stackable. The ability to stack product is oftentimes essential for operations that are limited by the size of their packinghouse or floor space. Bulk bins also eliminate the waste that results from smaller, compartmentalized packaging containers that are single use and require more material to contain the same amount of product. Bulk bins produced from corrugated fibreboard (Figure 2) are typically used by wholesalers, retailers, or other repacking operations because they are lightweight, may be collapsible, and even sometimes reusable. Corrugated fibreboard bulk bins can also have graphics on the side walls that can be customized for a specific commodity or with producer information.



Figure 2

Corrugated fibreboard bulk bins are sometimes used to ship less perishable crops like potatoes or, as shown here, watermelons. (Credit: Jeffrey Brecht ).

For safety and sanitation, plastic bulk bins are preferred to wooden bulk bins and containers. The plastic surfaces are easier to clean, which should be done after every use. Because of their porous surface, wooden bulk bins and containers are very difficult, if not impossible, to clean and sanitize. If using a wooden container to transport product from the field to the packinghouse, you should wash the product after it has been removed from the wooden bulk bin. Alternatively, plastic liners may be used with wooden bins—both to reduce potential contamination and to minimize abrasion damage to the product from rough wood surfaces. Fasteners such as screws, nails, and bolts can also result in punctured and damaged product, requiring regular inspection of wooden bins. Corrugated fibreboard bins can be used more than once, but are more susceptible to damage than plastic and wooden bins. If reused, these bins should be inspected for cleanliness and covered in a plastic liner after the initial use in order to reduce the risk of cross-contamination. Alternatively, if the corrugated fibreboard bin has structural, water, or microbial damage, discard it immediately and use a new container in its place.

When determining whether to use bulk bins, consider the size and scale of an operation, the cost associated with the purchase and maintenance of the bins, as well as the commodity being packed. Smaller operations may have little use for large bulky bins or they may pack product directly into retail containers. Bulk bins, specifically those produced from plastic and wood, may be too expensive for some smaller producers. For commodities that are highly susceptible to bruising and mechanical damage during transportation and handling, the use of bulk bins would be inappropriate. However, other commodities, such as potatoes and watermelon, would be considered ideal candidates for bulk bins because they are able to resist most of the damage that occurs throughout the distribution chain. Considering these choices will help producers determine the best course of action for their specific operational needs.

### **Wooden Wirebound Containers**

Throughout history, wood has been used for packaging, transporting, and storing a variety of products, including fresh produce. Because they are porous and absorbent, many believe that wood containers are not hygienic and therefore not suitable for fresh food products. However, it has been shown that certain species of wood, such as oak and pine, exhibit excellent antibacterial properties (Milling, Kehr, Wulf, and Smalla 2005). While wooden wirebound containers will not completely eliminate the risk of product contamination from the spread of microorganisms, if properly maintained, they provide a cost-effective short-term option for packing some commodities. Therefore, wood containers are a viable alternative for packaging, transporting, and storing fresh produce.

Wood containers come with or without handles and in a variety of sizes, shapes, and colours. Wood containers are available in several forms: barrels, baskets, hampers, or trays. Depending on the container, there may be a weave or specific design that can facilitate airflow for ventilation and rapid cooling. One of the most common forms of wood containers are the 1 1/9-bushel wirebound containers (Figure 3). This type of container is commonly used for commodities such as beans, sweetcorn, and potatoes.



Figure 3. Wooden wirebound produce containers (1 1/9 bushel). (Credit: Mark Ritenour)

Wood containers have many advantages that make them an excellent material for fresh produce. Wood containers are sturdy and thus able to endure mechanical stress and support heavier products in stacked loads. Wood containers are reusable if properly handled, maintained, cleaned, and sanitized, providing significant savings for the growers. Compared to fibreboard, wood containers are a better option for products that come into contact with water because they are more resistant to moisture. However, dry wood can absorb moisture from produce, causing items to shrivel when they come into contact with the dry wood. Compared to plastic, wood containers are more affordable and result in significant savings from that of reusable plastic containers (RPCs). Wooden wirebound containers should be packed correctly by an experienced worker; otherwise, overpacking may cause bulging and present problems for transporting. Unfortunately, wood will eventually deteriorate and decay and must be replaced. Depending on the commodity, a wood container may be a good alternative for small farmers who sell locally and can easily retrieve used containers, assuming that the distribution environment, application, and cost factors are also favourable.

### **Corrugated Fiberboard Cartons**

Corrugated fibreboard cartons are comprised of a paper-based material manufactured from the Kraft paper pulping process. As seen in Figure 4, corrugated fibreboard cartons are commonly made of single wall design with an inside and outside liner surrounding a fluted medium. The size of the flute determines the thickness of the corrugated fibreboard carton. Double wall and triple wall cartons are sometimes used for heavier and bulkier products because they provide added strength and rigidity. Traditionally, the strength of corrugated fibreboard cartons was measured using a burst test. However, burst tests measure the paper tensile strength whereas the stiffness and compression are typically the more desirable characteristics of corrugated fibreboard cartons. As a result, edge crush compression tests offer more valuable means of determining the performance of a corrugated fibreboard carton under compressive loads, which is important for containers holding products like fruits and vegetables that are commonly stacked.





Figure 4. Corrugated fiberboard cartons for tomatoes. (Credit: Jeffrey Brecht)

Some produce is packaged into fiberboard cartons fitted with anti-moisture barriers to prevent the liquids from penetrating the fiberboard. As a result, corrugated fiberboard cartons with anti-moisture barriers are ideal for products that may be exposed to water at some point during postharvest handling. Traditionally, wax has been the primary substance applied to the fiberboard to prevent moisture from either entering or leaving the carton. However, it is rather difficult to recycle corrugated fiberboard that is saturated with wax. RPCs are an alternative method of packaging for a variety of fruits and vegetables, especially those that are commonly exposed to water.

Corrugated fiberboard varies in flute size, burst strength, and edge crush strength, as well as surface treating and coatings. A few examples of products that are packaged into corrugated fiberboard include tomatoes, cucumbers, and sweet peppers; corrugated fiberboard is also used for the master containers of products like strawberries and grape tomatoes that are commonly packed first into plastic clamshells.

Custom-ordered corrugated fiberboard cartons may be too expensive for some producers. However, generic versions are available for lower cost. Some small farmers re-use cartons from larger operations, dismantling them, turning them inside-out to hide the original company's identity, and reconstructing them. This practice is not advised because the corrugated fiberboard cartons are prone to decay and there are food safety risks related to the cross-contamination of microbes carried on the re-used cartons.

### **Reusable Plastic Containers (RPCs)**

Reusable plastic containers (Figure 5) are becoming more prevalent in the fresh produce distribution system because producers and companies are trying to minimize their carbon footprint while simultaneously reducing costs. For many, RPCs have replaced corrugated fiberboard cartons as the preferred container for shipping fresh produce. Reusable plastic containers come in a wide variety of shapes and sizes, chosen primarily for their application to a specific commodity. Products that are hydrohandled or hydrocooled are especially suitable for packing in RPCs because RPCs are unaffected by moisture exposure. Reusable plastic containers are more durable and more rigid than their corrugated fiberboard counterparts. They are also weather resistant. As the name implies, RPCs can be utilized over and over again with very little wear, compared to most corrugated fiberboard cartons, which are used only once and then discarded. Most RPCs fold flat to minimize required space for storage and transport. Reusable plastic containers are produced from recyclable polymers, such as polypropylene (PP) or high density polyethylene (HDPE), and therefore can be melted and reformed into new products.



Figure 5. Zucchini summer squash in reusable plastic containers (RPCs).  
Credit: Jeffrey Brecht

RPCs can either be purchased or leased. Depending on the frequency of use, purchased RPCs can provide a significant cost savings over single-use corrugated fiberboard or wooden containers. While the initial cost of purchase and maintenance may seem too expensive, frequent use and economies of scale can allow for lower, long-term savings. Decide whether to use RPCS by considering the size and scale of the farming, packing, or shipping operation and the types of commodities with which the operation deals. Produce handlers must also have either closed distribution systems or return agreements with their receivers in order to utilize purchased RPCs. Otherwise, it will not be possible to recover the RPCs after they have been used (i.e., shipped).

RPCs must be cleaned between each use because residues from previous crops can lead to contamination of new harvests. Adhering to strict sanitization and cleaning procedures is necessary in order to reduce the risk of contamination when RPCs are reused. Chemicals, such as detergents, acids, or alkalis, can be used to remove dust, dirt, product residues, and various other debris items from the surface. Scrubbing while also using chemicals increases the probability of eliminating any contaminants that may lead to foodborne illnesses. Note that cleaning procedures alone cannot guarantee the complete removal of all microorganisms. In order to reduce or eliminate microorganisms, the RPCs must also be treated with sanitizers or disinfectants. Sanitizing agents, such as chlorine-based compounds, iodine compounds, or ammonium compounds, are most often applied to food contact surfaces to destroy or reduce the number of microorganisms.

While RPCs can provide significant savings to some producers, not all operations justify their utilization. The choice to purchase RPCs is dependent on the ability of the handler to maintain and clean those containers. Some producers may have the equipment and capacity to maintain and clean RPCs, while others may not. If a distribution system does not allow a handler's RPCs to be easily recovered, or if cleaning, sanitizing, and maintaining purchased RPCs is not feasible for an operation, then leasing is the better option. Leased RPCs are returned to the supplier by the receiver; the supplier is then responsible for cleaning and sanitizing the containers before reintroducing them into the distribution system. Producers should conduct a thorough cost analysis that considers customer (receiver) buy-in, material requirements, labor, transportation, inspections, maintenance, and cleaning before purchasing RPCs.

## Insert Trays

Insert trays are used for a variety of reasons when packing fresh produce. Insert trays are typically formed from molded plastic or pulp to create an insert for a master container that has multiple cavities to contain individual fruit (Figure 6). The cavity is designed to accommodate a specific size and/or variety of commodity as well as to maximize the number of fruit per tray. Insert trays are relatively inexpensive, costing only pennies per tray and providing additional protection to the product to minimize damage.



Figure 6. Thermoformed 28-count produce insert tray for peaches. (Credit: Jeffrey Brecht)

Plastic insert trays are usually thermoformed by placing large, heated, pliable sheets of plastic into molds where they conform to a customer's specified dimensions. This process is very similar to clamshell thermoforming. However, the sheets of plastic thermoformed for insert trays are much thinner than those used for clamshells. Plastic insert trays are typically formed from polypropylene (PP). Foam trays manufactured from expanded polyethylene (EPE) and other polymers are common as well. Molded paper pulp insert trays are produced by combining water and recycled or reclaimed newsprint or corrugated paper to form slurry. The slurry is then formed in a mold to produce a tray with cavities for the intended commodity.

Insert trays provide additional physical protection to the product, facilitate hand sizing of produce items in field-packing operations, and prevent fruit-to-fruit spread of decay. Plastic insert trays help minimize abrasion damage, localize decay to individual fruit, and reduce moisture loss. Conversely, paper pulp insert trays do not perform well when wet. On the other hand, moisture retention in plastic trays, as a result of condensation or improper drying before or during the time of packing, can create areas of free moisture that encourage decay. This is a problem when the product rests in water trapped in the bottom of the plastic tray. Whether plastic or paper pulp, each tray is often used only once and then discarded. Therefore, the risk of food contamination is relatively low.

While plastic and pulp trays both serve to separate the products and keep them from coming into contact with one another, paper pulp and plastic foam insert trays have an additional benefit. Molded-pulp and foam insert trays provide more cushioning and support than plastic sheet insert trays. By absorbing shocks, the molded-pulp and foam insert trays protect the product from bruising during transportation and handling, therefore further minimizing postharvest losses. Both plastic sheet and foam insert trays exhibit disposal

issues. Paper pulp insert trays are oftentimes produced from recycled materials, making them a more eco-friendly choice. However, if a producer's distribution system allows retrieval, plastic insert trays can be cleaned, sanitized and re-used. Overall, insert trays are an attractive option for packers and producers because they are low cost, hygienic, can be environmentally friendly, and result in fewer postharvest losses.

## Clamshells

Clamshell containers (Figure 7) are used extensively as consumer packages for a wide variety of commodities such as strawberries, blueberries, kumquats, and cherry tomatoes. A clamshell is a one-piece container consisting of two halves, forming the top and bottom, joined by a hinge with interlocking fasteners or snaps designed for closure. Clamshell containers are manufactured from a variety of different polymers such as polystyrene (PS) and polyvinyl chloride (PVC). However, one of the most common polymers used in clamshell containers is polyethylene terephthalate (PET) because it is highly transparent and easily recycled. Properly designed clamshells have a sufficient number of vent holes to facilitate cooling, to allow the product to "breathe" (i.e., allow exchange of respiratory heat and gases), and to allow for excess moisture to escape. The structure is often made using thermoforming or injection molding and can be customized into a variety of desired shapes and sizes.



Figure 7. Polyethylene terephthalate thermoformed (PET) clamshell containers for strawberries. (Credit: Jeffrey Brecht)

Clamshell containers also provide an area for attaching labels that include required information such as nutrition, weight, and manufacturer identification in addition to marketing and consumer information. Some of the advantages of clamshell containers include complete product visibility, product security, and increased perceived value. The container also prevents the contents from being handled by multiple individuals throughout the distribution chain, providing an extra degree of food safety. Although they are recyclable, clamshell containers are produced from non-renewable fossil fuels. Therefore, the polymers used to manufacture the containers are not the most environmentally friendly. However, clamshells made from biodegradable biopolymers such as polylactic acid (PLA), which is derived from corn starch or sugar cane dextrose, are available.

Choosing clamshell containers as the preferred method of packaging is often dependent on the commodity, industry standards, and consumer demand. Historically, smaller, open-air containers were used before clamshells. However, clamshells are the preferred choice for producers and packers alike.

Clamshells may be too expensive, however, for small farm operations. An alternative to clamshells might be perforated plastic bags with hand-punched holes for ventilation. Although bags do not provide protection from physical injuries like clamshells, they do protect produce from moisture loss and abrasion. A master container of some sort would also be required to hold consumer-size bags during handling between the farm and point-of-sale. However, perforated plastic bags would not be acceptable for many types of products grown by small farmers. For example, with tomatoes and peppers, the weight of the product would limit use of perforated plastic bags because the bags may stretch, damaging their integrity, and ultimately breaking. However, perforated plastic bags would be an ideal choice for leafy greens, grapes, or radishes.

## **Sustainable Packaging**

Sustainable produce packaging is becoming increasingly more common in the marketplace, driven, in part, by consumer demand and government regulation for environmentally friendly materials. While fresh produce is healthy and good for human consumption, many packaging options used to protect fresh products do not contain environmentally friendly materials. Much of that packaging is used only once and then discarded, never to be recycled or reused.

Broadly, sustainable packaging is intended to be functional, but it should also be cost effective. A drastic increase in costs, relative to traditional packaging options, may render it too expensive for use. Sustainable packaging may also fulfil more specific objectives in its design and functionality. For example, reducing or minimizing materials will reduce the weight or volume that the packaging occupies while maintaining logistics efficiency throughout the products' life cycle in the distribution chain will reduce waste. Logistics efficiency involves efficient transportation, design space utilization, and reduced tare weight. The use of biodegradable materials or reusable packaging can minimize the amount of packaging destined for landfills or recycling streams, ultimately resulting in a lower amount of accumulated waste.

There are many reasons why producers choose sustainable packaging options. Economic, environmental, or even ethical concerns can justify choosing sustainable packaging over other options.

### **2.2.3 Transportation**

Transport is part of the economic activity, which is associated with an increase in the degree of satisfaction of people and businesses by changing the geographical location of goods and people. Transport - means of satisfying needs through transportation of goods and passengers. Transportation - one of the key logistics functions associated with moving goods vehicle on a particular technology in the supply chain, consisting of logistics operations and functions, including forwarding, cargo handling, packaging, and transfer of ownership of the goods, risk insurance, customs procedures, and so on. From an economic point of view, transport is one of the defining elements of the production process. The production and use of goods, there are two limiting factors - the time factor and the spatial factor. (Sarkisov, 2001) The time factor is that the product produced today may only be required after a certain period. Solve this problem by storing. The content of the spatial factor is that the producers

and consumers of goods are rarely found in one place, and some distance from each other. Linking production and consumer, transport allows expanding the boundaries of production. Transport itself becomes gradually because the spatial factor - the development of transport and transport technology allows you to build further away from the production sites of consumption goods.

Under market conditions, transport is always profitable. (Sarkisov, 2001) Movement of goods, a change of location, subject to the principle of efficiency. This process should be economically justified, since the movement of goods spent money, time and environmental resources. Transportation requires financial resources - in the form of internal costs for transportation of goods own rolling stock, and external costs for this purpose commercial or public transport. Thus, function defines the main transport its goal - delivery of goods to their destination as quickly as possible, cheaper, and with the least damage to the environment. It is also necessary to minimize the loss and damage of goods transported while fulfilling customer requirements for timely delivery and to provide information about the goods in transit. (Sarkisov, 2001) 14 Storage of goods as a function of the transport takes place in order to save.

Transporting produce can present a challenge because of temperatures that are maintained during the cold chain logistics process. The fragile nature of fruits and vegetables is a major part to consider whenever goods are loaded for shipment. Remember this is not one temperature fits all. The need to have regulated temperatures set while delivering produce is necessary to maintain quality. In addition, the delivery must arrive on time. Altering either situation may jeopardize the produce shipment. So just a slight degree or two difference in the truck could be a negative move for sensitive produce. Suggested temperatures for transporting produce range from freezing at 32 degrees to as high as 50-60 degrees depending on the item. The bill of lading with each shipment should detail the exact temperature required for the trailer. Drivers should be aware of the type of produce and keep a close eye on gauges to avoid any problems during transit. The driver can adjust temperatures as needed.

In the range of 32-36 degrees is good to ship items like apples, blueberries, broccoli, cantaloupes, grapes, oranges (Florida), peaches, packaged salad greens, and strawberries. Avocados and cranberries are safe to travel at temperatures between 38-40 degrees. At between 40-45 degrees late crops of potatoes, honeydews and green beans ship well. Take temperatures to an even warmer range of 45-50 and cucumbers are happy along with watermelon, eggplant lemons and grapefruit grown in Florida and Texas. The warmest temperature advised for produce to ship is 55 degrees to 60 degrees. Here is where early crops of potatoes remain fresh during transit. The temperature range is also good to ship bananas, tomatoes, and grapefruit from Arizona and California. Refrigerated trucks or reefers are ideal to transport produce. The ability to adjust the temperature as needed makes it suitable to ship a variety of freight that requires a chilly ride (FMSA,2017).

## 2.3 THEORETICAL FRAMEWORK

The research framework is outlined in figured 1.The dependent variable is the efficiency in fresh crops material handling. Furthermore, there are three outlined research framework such as packaging, storage and transportation. This study to examine the level independence variables and dependent variables that are mentioned earlier.

Material handling

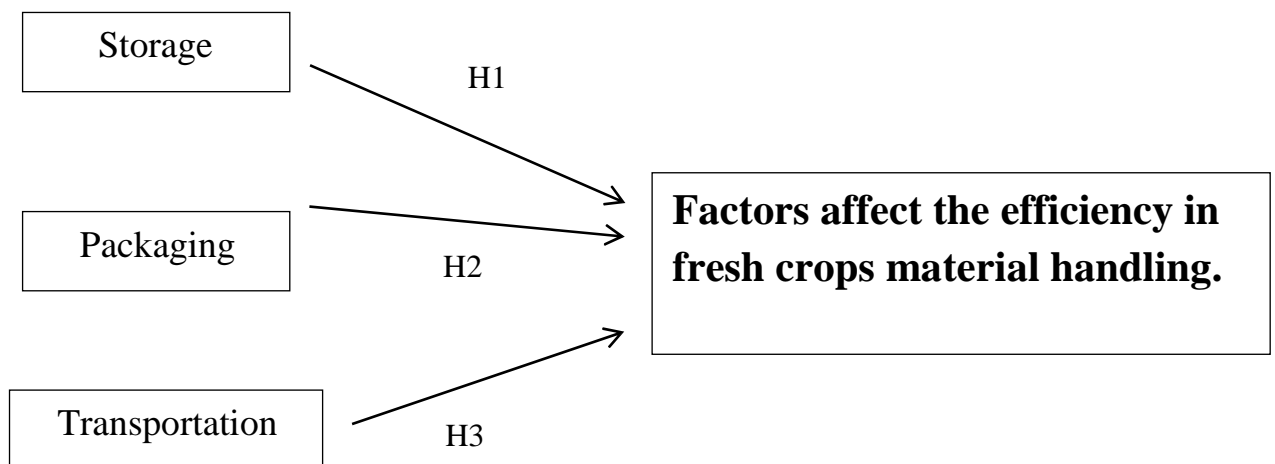


Figure 2.1 Efficiency in fresh crops material handling

Based on the theoretical frame work from above, hypothesis developed are:

- **Hypothesis 1:** There is a relationship between storage and the factors that affect the efficiency in fresh crops material handling.
- **Hypothesis 2:** There is a relationship between packaging and the factors that affect the efficiency in fresh crops material handling.
- **Hypothesis 3:** There is a relationship between transportation and the factors that affect the efficiency in fresh crops material handling.

## **2.5 SUMMARY**

In this chapter explained about the fresh crops and the cultivation of fresh fruits in Malaysia. This chapter also provide some research and journal from other researcher about the in fresh crops. Specification towards the others research on efficiency of material handling are the important equipment on this research. This chapter provide more detailed information about material handling systems. This chapter also provide some information about the storage, transportation and packaging towards the fresh crops in terms of materials handling. Next chapter will be focusing on the method of the research towards the fresh crops.



# **CHAPTER 3**

## **RESEARCH METHODOLOGY**

### **3.1 INTRODUCTION**

This chapter discuss about the overview of the research methodology .It includes the nature of study, research design, methods of collection data, sampling process, sampling design, questionnaire design, pilot testing, constructs measurement, data processing and methods of data analysis. After that, the sources of both primary and secondary data were being identified.

### **3.2 RESEARCH DESIGN**

This study is a cross-sectional where data are gathered once, to answer study's research question. The framework of research methods and techniques chosen by a researcher. The design allows researchers to hone in on research methods that are suitable for the subject matter and set up their studies up for success ( Adi Bhat, 2020). The unit for study will be fresh crops suppliers in Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs.

### **3.3 DATA COLLECTION METHODS**

Data usually can be gathered through one or more methods. Data can also be collected from many sources of places and carefully select the method of gathering the data by considering a few perspectives such as the outcome and result get from this method so that the research only can be carry out in valid and recognized. Generally, there have two types of data which is primary data and secondary data. Primary data consists of information gathered for some specific purposes and primary data is also collects through surveys and research. Secondary data is consists of information that already exists somewhere having being collected for some purposes. In order ensure that valid and trusted of research, it normally will use both primary and secondary data.

#### **3.3.1 PRIMARY DATA**

Primary data refers to data observed or collected directly from first – hand experience. Primary data are collected for this research. Questionnaire are used to collect data from respondents to make research study on the factors that affect the efficiency in fresh crops in material handling at fresh crops suppliers in Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs. The questionnaires will be distributed to 350 target respondents in Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani

Stadium Shah Alam, Pasar Moden SS15 and Benefigs. Respondents are required to answer all the 30 questions stated in questionnaires.

### **3.3.2 SECONDARY DATA**

Secondary data analysis can be literally defined as –second- hand analysis. It refers as the information analysis that was either gathered by someone ( e.g., researcher ) or for some other purpose, or often a combination of the two ( Novak & Thomas P, 1996 ). Secondary data can be classified in two sources, which is electronic based sources and paper based sources. In this research, it concentrated more on electronic based sources and paper based sources. In this research, it concentrated more on electronic based sources to search secondary data. These sources are internet and PPAS Raja Tun Uda Shah Alam library and online database. These sources are used to search for electronic relevant articles and journals. Besides that, the researchers also referred several reference books in PPAS library. By go through all of the steps above, the researchers are able to have in- depth understanding to the theoretical concept. By using secondary data, several advantages will obtain by researchers.

### **3.4 SAMPLING TECHNIQUE**

Sampling helps a lot in research. It is one of the most important factors which determine the accuracy of the research or survey result (Seema Singh, 2018). Sampling technique is divided into two categories which is probability and non-probability (Churchill & Lacobucci, 2009). Probability sample is a subset of a population that ensures a representative cross section by giving every element in the population a known nonzero chance being selected. In this research, only probability technique is used. Exploring the effectiveness of fresh crops material handling among fresh crops suppliers in Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs attempt is made to ensure a representative cross section. Types of probability sample include simple random samples, stratified samples and cluster samples. Therefore, on this study, the simple random sampling was used.

### **3.5 RESEARCH INSTRUMENTS**

Research instruments are tools developed by researchers to achieved their stated objectives when carrying out a research study. In other words, research instruments are designed tools that aid the collection of data for the purpose of analysis (Julius Edekin, 2012). This section explains the details of instrument used to conduct this study. Survey method is used and hence, it involves disturbing a set of questionnaires to respondents to collect primary data.

### 3.5.1 QUESTIONNAIRE

A questionnaire is a research instrument consisting of a series of questions for the purpose of gathering information from respondents. Questionnaires can be thought of as a kind of written interview. They can be carried out face to face, by telephone, computer or post. Questionnaires provide a relatively cheap, quick and efficient way of obtaining large amounts of information from a large sample of people. Data can be collected relatively quickly because the researcher would not need to be present when the questionnaires were completed. This is useful for large populations when interviews would be impractical.

SECTION	EXPLANATION
A	<b>Demographic</b>  In this research , the demographic included age ,gender, races and academic level in Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs company.
B	<b>Storage in Material Handling</b>  - To identify the suitable storage method for fresh crops in material handling.
C	<b>Packaging in Material Handling</b>  - To identify the suitable packaging method for fresh crops in material handling.
D	<b>Transportation in Material Handling</b>  - To identify the suitable transportation method for fresh crops in material handling.
E	<b>Material Handling</b>  -To determine the efficiency of material handling in fresh crops in terms of storage, packaging and transportation.

### 3.6 LIKERT SCALE

Likert (1932) developed the principle of measuring attitudes by asking people to respond to a series of statements about a topic, in terms of the extent to which they agree with them, and so tapping into the cognitive and affective components of attitudes. Likert-type or frequency scales use fixed choice response formats and are designed to measure attitudes or opinions (Bowling, 1997; Burns, & Grove, 1997). These ordinal scales measure levels of agreement/disagreement.

A Likert-type scale assumes that the strength/intensity of experience is linear, i.e. on a continuum from strongly agree to strongly disagree, and makes the assumption that attitudes can be measured. From section B until section E, all variables were rated on a five point likert scale, which examine how strongly do the respondents agree or disagree with the statement ask in the questionnaires. Furthermore, this scale have five point which consist (1) Strongly Disagree, (2) Disagree, (3) Slightly disagree, (4) Agree, and lastly (5) Strongly Agree.

<b>SCALE</b>	<b>LEVEL</b>
1	Strongly Disagree
2	Disagree
3	Slightly Disagree
4	Agree
5	Strongly Agree

Table 3.1 : Likert Rating Scale Analysis



## **QUESTIONNAIRES ON FACTORS THAT AFFECT THE EFFICENCY OF FRESH CROP IN MATERIAL HANDLING**

Dear respondent,

We are undergraduate students of Politeknik Sultan Salahuddin Abdul Aziz presently pursuing our Diploma in International Business. We are currently conducting a research project entitle – factors that affect the efficiency of fresh crops in material handling.

The purpose of this research is to identify the factors that affect the efficiency of fresh crops in material handling. This research was base on Benefig's company in order to understand what factors that affect the efficiency of fresh crops in material handling.

Thank you for your cooperation participation. If you have any inquires please do not hesitate to contact us.

Sincerely,

SITI NOR ALFEZATY BINTI AL MANAN                      08DPI17F2020

SITI NUR AISYAH BINTI MARLIS                              08DPI17F2001

NUR ARFAH ALYA BINTI ROHIMI                            08DPI17F2004

NURUL AININ SOFIYA BINTI SARIFUDDIN                08DPI17F2003

### **NAMA PENYELIA:**

MAZRUL HISYAM BIN ABDUL MALIK                      0196076700

## SECTION A

### (Demographic Profile)

Please **TICK** (/) your answer and your answers will be kept strictly confidential.

*Tandakan (/) jawapan anda dan jawapan anda akan disimpan secara sulit.*

Gender / *Jantina*

1.	Male	
2.	Female	

Race / *Kaum*

1	Malay / <i>Melayu</i>	
2	Chinese / <i>Cina</i>	
3	Indian / <i>India</i>	
4	Others / <i>Lain-lain</i>	

Age/ *Umur*

1	17 - 27 years old / <i>tahun</i>	
2	28 – 37 years old / <i>tahun</i>	
3	38 – 47 years old / <i>tahun</i>	
4	48 – 57 years old / <i>tahun</i>	
5	58 – 67 years old / <i>tahun</i>	

Tahap pendidikan / *Level of education*

1	PhD	
2	Master	
3	Degree / <i>Ijazah</i>	
4	Diploma	
5	Certificate / <i>Sijil</i>	
6	STPM	
7	SPM	
8	SRP/PMR/PT3	
9	Tiada Pendidikan Formal	



	<i>tercemar oleh tangan anda atau dengan menyentuh permukaan tercemar seperti pisau dan papan pemotong, semasa penyediaan atau penyimpanan.</i>					
B6	The storage area for fruits and vegetables should be in a good and clean condition.  <i>Kawasan penyimpanan haruslah berada dalam keadaan yang baik dan bersih.</i>					
B7	Fresh fruits and vegetables should not store under raw meat, which could drip on them and contaminate the produce of bacteria.  <i>Buah buahan dan sayuran segar haruslah tidak disimpan di bawah daging mentah, yang boleh menitiskannya dan mencemari buah dan sayuran dengan bakteria.</i>					
B8	Healthy fruits and vegetables must be stored separately from injured and spoiled fruits and vegetables.  <i>Buah buahan dan sayur sayuran yang segar mestilah disimpan secara berasingan daripada buah buahan dan sayur sayuran yang rosak</i>					
B9	Do not wash your fruits and vegetables right away before store them in order to keep the moisture.  <i>Buah buahan haruslah tidak dicuci sebelum disimpan untuk mengekalkan kelembapan buah.</i>					
B10	Any produce that has been pre-cut or peeled should be keep refrigerated.  <i>Sebarang produk yang sudah dipotong atau dikupas haruslah disimpan dalam peti sejuk.</i>					





C6	Using plastic box is suitable for fresh crops. <i>Pembungkusan menggunakan kotak plastik adalah sesuai untuk tanaman segar.</i>					
C7	The quality of fresh crop affects the packaging cost. <i>Kualiti tanaman segar memberi kesan terhadap kos pembungkusan.</i>					
C8	Proper packaging of fresh crops could minimize the wastage of fresh crops. <i>Pembungkusan tanaman segar yang baik dapat mengurangkan pembaziran terhadap tanaman segar.</i>					
C9	Packaging accessories help in protecting fresh crops from physical damage during shipping. <i>Aksesori pembungkusan dapat membantu melindungi tanaman segar daripada kerosakan fizikal.</i>					
C10	A good packaging should have a nice air circulation in order to prevent from damage. <i>Pembungkusan yang baik haruslah mempunyai peredaran udara yang baik untuk mengelakkan kerosakan.</i>					



	<i>mengelak sebarang pencemaran.</i>					
D6	<p>Driver should be aware of the type of fresh crop and keep a close eye on gauges to avoid any problems during transit.</p> <p><i>Pemandu harus mengetahui jenis tanaman segar dan sentiasa menumpu perhatian untuk mengelakkan sebarang masalah semasa transit.</i></p>					
D7	<p>All fresh crops must be kept at safe temperature during transportation.</p> <p><i>Semua tanaman segar mesti disimpan pada suhu yang selamat semasa perjalanan.</i></p>					
D8	<p>Do you think transportation problem contributes to the rise in the cost of fresh crops product in the market?</p> <p><i>Adakah anda berfikir masalah pengangkutan menyumbang kepada kenaikan kos produk tanaman segar dipasaran?</i></p>					
D9	<p>Does effectiveness road transport system gives impact on availability of fresh crops product?</p> <p><i>Adakah keberkesanan system pengangkutan jalan memberi kesan kepada ketersediaan produk tanaman segar?</i></p>					
D10	<p>Proper training required by the fresh crops carrier.</p> <p><i>Latihan yang bersesuaian diperlukan oleh pembawa tanaman segar.</i></p>					

**SECTION E**

**DEPENDENT VARIABLE / PEMBOLEHUBAH BERSANDAR**

**MATERIAL HANDLING / PENGENDALIAN BAHAN**

**Instruction / Arahan:**

**Tick (/) your answer on the statement that describe packaging in material handling**  
*tandakan (/) pada pilihan jawapan anda bagi pernyataan yang menerangkan pembungkusan dalam pengendalian bahan*

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b><i>STRONGLY DISAGREE / SANGAT TIDAK BERSETUJU</i></b>	<b><i>DISAGREE / TIDAK BERSETUJU</i></b>	<b><i>SLIGHTLY DISAGREE / TIDAK PASTI</i></b>	<b><i>AGREE / SETUJU</i></b>	<b><i>STRONGLY AGREE / SANGAT BERSETUJU</i></b>

<b>Material handling / Pengendalian bahan</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
E1	<p>Material handling is the movement, protection, storage and control of materials and products.</p> <p><i>Pengendalian bahan adalah pergerakan, perlindungan, penyimpanan dan kawalan terhadap bahan dan produk.</i></p>					
E2	<p>Material handling involves short distance movement within the confines of a building or between a building and a transportation vehicle.</p> <p><i>Penegendalian bahan melibatkan pergerakan jarak pendek dalam batasan bangunan atau antara bangunan dan kenderaan pengangkutan.</i></p>					
E3	<p>Material handling plays an important role in manufacturing and logistic.</p> <p><i>Pengendalian bahan memainkan peranan yang penting dalam pembuatan dan logistik.</i></p>					
E4	<p>When designing a material handling system, it is important to refer the best practices to ensure than all equipment and processes in a facility work together as a unified system.</p> <p><i>Apabila mereka bentuk sistem pengendalian bahan adalah penting untuk merujuk kepada amalan terbaik untuk memastikan semua peralatan dan proses berfungsi sebagai satu sistem yang bersama.</i></p>					

E5	<p>Efficient material handling is the organize movement of materials in the correct quantities, correct place and accomplished with a minimum of time and labour.</p> <p><i>Keberkesanan pengendalian bahan adalah pergerakan bahan yang tersusun di dalam kuantiti yang betul, tempat yang betul dan mencapai masa dan tenaga buruh yang minima.</i></p>					
E6	<p>A system that covers raw materials and ingredients of finished products to consumers is needed.</p> <p><i>Sistem yang meliputi bahan mentah dan barang siap terhadap keperluan pengguna.</i></p>					
E7	<p>Achieving greater efficiency in material handling such as operating space and minimize all movements activities close together.</p> <p><i>Mencapai keberkesanan dalam pengendalian bahan seperti ruang operasi dan pergerakan aktiviti yang minima.</i></p>					
E8	<p>A better stock control but a proper management could improve product quality.</p> <p><i>Kawalan stok yang baik serta pengurusan yang bersesuaian dapat meningkatkan kualiti produk.</i></p>					
E9	<p>Storage is a space and a place for storing.</p> <p><i>Penyimpanan adalah ruang atau tempat untuk menyimpan.</i></p>					
E10	<p>Packaging refers to the process of designing, evaluating and producing packages.</p> <p><i>Pembungkusan merujuk kepada proses mereka, menilai dan penghasilan bungkusan.</i></p>					
E11	<p>Transportation is a movement of humans, animals and goods from one location to another.</p> <p><i>Pengangkutan adalah pergerakan manusia, haiwan dan barang dari satu tempat ke satu tempat.</i></p>					

### 3.7.2 PILOT TEST

Pilot test is the best way to see whether a questionnaire is working as expected, and also to test the sampling procedure, field force and other resources (Bradley, 2007). Pilot test is being conducted for the survey in order to fully gain insights on whether the respondents will be able to answer for all the questions and whether there are any grammatical errors. 30 sets of questionnaires are distributed for pilot test purposes before the actual test is conducted.

The pilot test is carried out on the respondents located in Pasar Borong Selangor, Pasar Chow Kit, and Benifigs to identify whether there are any problems in the instrument build for the respondent. Through this pilot test study, researchers were able to consider the appropriate length of the time for the actual study to be conducted.

Table 3.1 Pilot Test

CONSTRUCT	STATEMENTS	NO. ITEMS	NO. ITEMS DELETED	CRONBACH ALPHA
	1. Arrangement in storage for fruits and vegetables are important.			
	2. Care has to be taken to see that the fruits and vegetables to be stored are absolutely clean and not easy to damage.			
	3. Fruits and vegetables are stored in cool storage between 0c to 4c			
	4. Washing fresh fruits and vegetables are important.			
<b>Storage in Material Handling</b>	5. Fruits and vegetables can become contaminated by your hands or by touching contaminated surfaces such as knives and cutting board, during preparation or storage.	10	-	0.706
	6. The storage area for fruits and vegetables should be in good and clean condition.			
	7. Fresh fruits and vegetables should not be stored either raw meat, which could drip on them and contaminate the produce with bacteria			
	8. Healthy fruits and vegetables must be stored separately from injured and spoiled fruits and vegetables.			
	9. Do not wash your fruits and vegetables right away before storing them in order to keep the moisture.			
	10. Any produce that has to be pre-cut or pre-pilled should be kept refrigerated.			

	<ol style="list-style-type: none"> <li>1. Packaging must be appropriately designed to maintain the quality and prolog the shelf-life fresh produce.</li> <li>2. Fresh produce should be packed in either bulk or retailed packaging formats.</li> <li>3. Washing fresh fruits and vegetables before packing could prevent the fruits and vegetables from damage.</li> <li>4. Using plastic packaging is suitable for fresh crops.</li> </ol>			
<b>Packaging in Material Handling</b>	<ol style="list-style-type: none"> <li>5. Using box packaging is suitable for fresh crops.</li> </ol>	10	-	0.877
	<ol style="list-style-type: none"> <li>6. Using plastic box is suitable for fresh crops.</li> <li>7. The quality of fresh crops affects the packaging cost.</li> <li>8. Proper packaging of fresh crops could minimize the wastage of fresh crops.</li> <li>9. Packaging accessories help in protecting fresh crops from physical damage during shipping.</li> <li>10. A good packaging should have a nice air circulation in order to prevent from damage.</li> </ol>			
	<ol style="list-style-type: none"> <li>1. Transportation system plays a vital role in marketing fresh crops product.</li> <li>2. Transportation system create market for fresh crops product</li> <li>3. Good transportation system helps in reducing spoilage of fresh crop products.</li> <li>4. Poor transportation facility affect the effective marketing of fresh crops product.</li> </ol>			
<b>Transportation in Material Handling</b>	<ol style="list-style-type: none"> <li>5. Vehicle must be clean ; be able to be cleaned to prevent contamination.</li> </ol>	10	-	0.875
	<ol style="list-style-type: none"> <li>6. Driver should be aware of the fresh crop and keep a close eye on gauge to avoid any problems during transit.</li> <li>7. All fresh crops must be kept at safe temperature during transportation.</li> <li>8. Transportation problem contributes to the rise in the cost of fresh crops product in the market.</li> <li>9. Effectiveness road transport system gives impact on availability of fresh crops product.</li> </ol>			



	10. Proper training required by the fresh crops carrier.			
	1. Material handling is the movement, protection, storage and control of materials and products.			
	2. Material handling involves short distance movement within the confines of a building or between a building and a transportation vehicle.			
	3. Material handling plays an important role in manufacturing and logistic.			
	4. When designing a material handling system, it is important to refer the best practices to ensure than all equipment and processes in a facility work together as a unified system.			
<b>Material Handling</b>	5. Efficient material handling is the organize movement of material in the correct quantities, correct place and accomplished with a minimum of time and labor.	11	-	0.857
	6. A system that cover raw materials and ingredients of finished products to consumers is needed.			
	7. Achieving greater efficiency in material handling such as operating space and minimize all movements' activities close together.			
	8. A better stock control and a proper management could improve product quality.			
	9. Storage is a space and a place for storing			
	10. Packaging refers to the process of designing, evaluating and producing packages.			
	11. Transportation is a movement of humans, animals and goods from one location to another.			

### **3.8 CHAPTER SUMMARY**

This chapter discusses the research design of the study, participants, instruments, procedure and data analysis studies. This quantitative study which is consistent with the objectives of the study that aimed the factors that affect the efficiency of fresh crops in material handling. Which is the survey is conducted area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs. Participants consisted of 310 respondents in that area which is including farmers. The pilot studies are conducted before the actual research.

This chapter consists of the documentation of a comprehensive review of the published and unpublished information from the secondary resources that related to factors that would affect the respondents. In this chapter, the tasks that completed are the literature review and relevant theoretical model review. Exploring the factors that affect the efficiency of fresh crops in material handling and constructed conceptual framework and formulated hypothesis regarding this research topic. This chapter was able to be completed by gaining useful information and references that made by other researches to support the research topic and fill up the blank of the studies. Besides that, the others things that was included in this chapter was extracted by the relevant information, identify the problem and opportunities, generated new ideas and argued on the relevant statement. In the next chapter, the researchers has proceeded the research methodology to ensure that the methods of study that has been carried out.

## **CHAPTER 4**

### **ANALYSIS AND RESULT**

#### **4.1 INTRODUCTION**

This chapter represents the result of the study from the statistical analysis conducted on the collected data and hypothesis testing. In the first part of this chapter the representation would be on the characteristic of the respondent goodness of measured is determined by analyzing factor analysis, reliability analysis on the measurement and descriptive analysis. The final part of this chapter would be focused on hypothesis testing, correlation testing, multiple regression analysis and hierarchical regression. Data gathered from respondent were analyzed using Statistics Package for social science (SPSS). SPSS is a data management and analysis, including descriptive statistics as well as sophisticated inferential statistical procedures. A frequency analysis was run and data were cleaned to ensure that 44 data were correctly coded and entry. Descriptive statistics that consist of means, percentages and frequencies. Inferential statistical procedure conducted includes Correlation. Correlation is used to study the relationship between a dependent variable and an independent variable for explanation. Multiple regressions is to study the relationship between a dependent variable and two or more independent variables for explanation and eventually predict a model relating the different variable (Pallant, 2011).

#### **4.2 DESCRIPTIVE ANALYSIS**

The purpose of descriptive analysis is a branch of analysis, which is focused on summarization and description data that collected from the survey (Weiers, 2008). This part is to provide analysis on the demographic characteristics of the respondents that obtained from the survey, and used the analysis to make general observation on the data, such as gender, age marital status and so on. The demographic profile of the respondents contains their personal information and question related to their behavior. The question that are related to the' behavior are intended to assess their ability to recall the information (Bryman,2012).This study also requested for the respondents' personal information such as gender ,age education qualification and nationality.

##### **4.2.1 RESPONDENT DEMOGRAPHIC PROFILE**

Researchers had distributed 310 copies of survey questionnaire and had received 100% responses from the respondents. There is no data outlier, thus the researchers fully utilizes the 310 copies or survey questionnaire and analyzed it.

Table 4.1 Demographic Profile

Demographic profile	Frequency	Percentage (%)
<b>Gender</b>		
Male	167	55.7
Female	133	44.3
<b>Age</b>		
17-27 years old	111	37.0
28-37 years old	85	28.3
38-47 years old	52	17.3
48-57 years old	46	15.3
58-67 years old	6	6
<b>Race</b>		
Malay	193	64.3
Chinese	45	15.0
Indian	42	14.0
Others	20	6.7
<b>Education</b>		
PHD	1	0.3
Master	-	7.0
Degree	21	-
Diploma	81	27.0
Certificate	22	7.3
STPM	25	8.3
SPM	120	40.0
SRP/PMR/PT3	14	4.7
Tiada Pendidikan Formal	16	5.3

#### 4.2.2 CENTRAL TENDENCIES MEASUREMENT OF CONSTRUCTS

Table 4.2 Statistical Summary

Variables	Items	Means	Standard deviation
Storage	B1	4.63	0.631
	B2	4.68	0.619
	B3	4.24	1.153
	B4	4.40	0.870
	B5	4.45	0.793
	B6	4.70	0.464
	B7	4.75	0.541
	B8	4.70	0.533
	B9	4.13	1.135
	B10	4.51	0.875

Packaging	C1	4.53	0.624
	C2	4.00	0.998
	C3	4.39	0.734
	C4	4.10	0.927
	C5	3.98	0.953
	C6	3.94	1.085
	C7	4.12	0.866
	C8	4.23	0.974
	C9	4.34	0.875
	C10	4.57	0.615
Transportation	D1	4.55	0.606
	D2	4.51	0.619
	D3	4.50	0.720
	D4	4.32	0.856
	D5	4.68	0.587
	D6	4.51	0.671
	D7	4.46	0.660
	D8	4.31	0.624
	D9	4.22	0.750
	D10	4.33	0.681
Material Handling	E1	4.41	0.695
	E2	4.00	1.001
	E3	4.17	0.730
	E4	4.39	0.692
	E5	4.47	0.724
	E6	4.30	0.622
	E7	4.45	3.313
	E8	4.46	0.602
	E9	4.64	0.538
	E10	4.66	0.527
	E11	4.51	0.692

Source: Developed for the research

According to Gravetter and Wallnaw (2000), central tendency refers to statistical measure that identify a single value which act as a representative of an entire distribution and aims to provide accurate description of the entire collected data. In this study mean is used to measure the central tendency while dispersion is described by using standard deviation (Saunders, Lewis & Thornhill, 2009).

B7 recorded the highest mean value (4.75) with standard deviation of 0.541. While B9 has the lowest mean value (4.13) with standard deviation of 1.135

C10 recorded the highest mean value (4.57) with standard deviation of 0.615. While C6 has the lowest mean value (3.94) with standard deviation of 1.085

D5 recorded the highest mean value (4.68) with standard deviation of 0.587. While D9 has the lowest mean value (4.22) with standard deviation of 0.750

E10 recorded the highest mean value (4.66) with standard deviation of 0.527. While E2 has the lowest mean value (4.00) with standard deviation of 1.001

## 4.3 MEASUREMENT SCALE

### 4.3.1 ANALYSIS

The rule of thumb for the reliability test is that 0.7 or higher suggest good reliability and may be acceptable is between 0.6 - 0.7. Based on the result in Table 3.1 storage, packaging, transportation and material handling recorded excellent reliability with Cronbach Alpha of 0.706, 0.877, 0.875 and 0.857 respectively.

Table 4.3 Result of Analysis

CONSTRUCT	STATEMENTS	NO. ITEMS	NO. ITEMS DELETED	CRONBACH ALPHA
	1. Arrangement in storage for fruits and vegetables are important.			
	2. Care has to be taken to see that the fruits and vegetables to be storage is absolutely clean and not easy damage.			
	3. Fruits and vegetables are stored in cool storage between 0c to 4c			
	4. Washing fresh fruits and vegetables are important.			
<b>Storage in Material Handling</b>	5. Fruits and vegetables can become contaminated by your hands or by touching contaminated surfaces such as knives and cutting board, during preparation or storage.	10	-	0.706
	6. The storage area for fruits and vegetables should be in good and clean condition.			
	7. Fresh fruits and vegetables should not store either raw meat, which could drip on them and contaminate the produce of bacteria			
	8. Healthy fruits and vegetables must be stored separately from injured and spoiled fruits and vegetables.			
	9. Do not wash your fruits and vegetables right away before store them in order to keep the moisture.			
	10. Any produce that has to pre- cut or pilled should be keep refrigerated.			

	1. Packaging must be appropriately designed to maintain the quality and prolog the shelf-life fresh produce.			
	2. Fresh produce should be packed in either bulk or retailed packaging formats.			
	3. Washing fresh fruits and vegetables before packing could prevent the fruits and vegetables from damage.			
	4. Using plastic packaging is suitable for fresh crops.			
<b>Packaging in Material Handling</b>	5. Using box packaging is suitable for fresh crops.	10	-	0.877
	6. Using plastic box is suitable for fresh crops.			
	7. The quality of fresh crops affects the packaging cost.			
	8. Proper packaging of fresh crops could minimize the wastage of fresh crops.			
	9. Packaging accessories help in protecting fresh crops from physical damage during shipping.			
	10. A good packaging should have a nice air circulation in order to prevent from damage.			
	1. Transportation system plays a vital role in marketing fresh crops product			
	2. Transportation system create market for fresh crops product			
	3. Good transportation system helps in reducing spoilage of fresh crop products			
	4. Poor transportation facility affects the effective marketing of fresh crops product.			
Transportation in Material Handling	5. Vehicle must be clean ; be able to be cleaned to prevent contamination.			
	6. Driver should be aware of the fresh crop and keep a close eye on gauge to avoid any problems during transit.			
	7. All fresh crops must be kept at safe temperature during transportation.			
	8. Transportation problem contributes to the rise in the cost of fresh crops product in the market.			
	9. Effectiveness road transport system gives impact on availability of fresh crops product.			

	10. Proper training required by the fresh crops carrier.			
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	1. Material handling is the movement, protection, storage and control of materials and products.			
	2. Material handling involves short distance movement within the confines of a building or between a building and a transportation vehicle.			
	3. Material handling plays an important role in manufacturing and logistic.			
	4. When designing a material handling system, it is important to refer the best practices to ensure than all equipment and processes in a facility work together as a unified system.			
<b>Material Handling</b>	5. Efficient material handling is the organize movement of material in the correct quantities, correct place and accomplished with a minimum of time and labor.	11	-	0.857
	6. A system that covers raw materials and ingredients of finished products to consumers is needed.			
	7. Achieving greater efficiency in material handling such as operating space and minimize all movements' activities close together.			
	8. A better stock control and a proper management could improve product quality.			
	9. Storage is a space and a place for storing			
	10. Packaging refers to the process of designing, evaluating and producing packages.			
	11. Transportation is a movement of humans, animals and goods from one location to another.			



#### 4.4 INFERENCE ANALYSIS

Inferential analysis is a branch of analysis that goes beyond more description, and based on sample data seeks to generalize from the sample to the population from which the sample was drawn (Weiers, 2008). Such analysis is used to provide the generation of conclusions regarding the characteristics of the population based on the sample data. Besides that, inferential analysis also aims to examine individual variables and its relationships with other variables (Sekraran & Bougie, 2010).

##### 4.4.1 PEARSON CORRELATION COEFFICIENT

Hair et al. (2007) noted that Pearson Correlation Coefficient indicates the direction, strength and significance of the vicariate relationships among all the variables that were measured on interval scale.

Table 4.4 shows that the correlations between independent variables which include storage, packaging and transportation with dependent variable which is material handling.

Table 4.4 Pearson Correlation

		<b>Correlations</b>			
		Storage	Packaging	Transportation	MH
Storage	Pearson Correlation	1	.636**	.628**	.460**
	Sig. (2-tailed)		.000	.000	.000
	N	300	300	300	300
Packaging	Pearson Correlation	.636**	1	.600**	.593**
	Sig. (2-tailed)	.000		.000	.000
	N	300	300	300	300
Transportation	Pearson Correlation	.628**	.600**	1	.580**
	Sig. (2-tailed)	.000	.000		.000
	N	300	300	300	300
MH	Pearson Correlation	.460**	.593**	.580**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	300	300	300	300

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 4.4 shows that the correlations between independent variables which storage, packaging and transportation with the dependent variable which is a factor that affect the efficiency of fresh crops in material handling which is survey is conducted in area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs.

**Table 4.4.1 Relationship between Storage and Material Handling**

		Correlations	
		Storage	MH
Storage	Pearson Correlation	1	.460**
	Sig. (2-tailed)		.000
	N	300	300
MH	Pearson Correlation	.460**	1
	Sig. (2-tailed)	.000	
	N	300	300

\*\* . Correlation is significant at the 0.01 level (2-tailed).

H1: There is a significant positive relationship between Storage and Material Handling

Based on the Table 4.4.1, the relationship between Storage and Material Handling is strong ( $r=0.460$ ). The relationship is also significant at level of 0.01. Therefore, we accept the hypothesis that there is a significant positive relationship between storage and material handling.

**Table 4.4.2 Relationship between Packaging and Material Handling**

		Correlations	
		Packaging	MH
Packaging	Pearson Correlation	1	.593**
	Sig. (2-tailed)		.000
	N	300	300
MH	Pearson Correlation	.593**	1
	Sig. (2-tailed)	.000	
	N	300	300

\*\* . Correlation is significant at the 0.01 level (2-tailed).

H2: There is a significant positive relationship between Packaging and Material Handling

Based on the Table 4.4.2, the relationship between Packaging and Material Handling is strong ( $r=0.593$ ). The relationship is also significant at level of 0.01. Therefore, we accept the hypothesis that there is a significant positive relationship between packaging and material handling

**Table 4.4.3 Relationship between Transportation and Material Handling**

		Correlations	
		Transportation	MH
Transportation	Pearson Correlation	1	.580**
	Sig. (2-tailed)		.000
	N	300	300
MH	Pearson Correlation	.580**	1
	Sig. (2-tailed)	.000	
	N	300	300

\*\* . Correlation is significant at the 0.01 level (2-tailed).

H2: There is a significant positive relationship between Packaging and Material Handling

Based on the Table 4.4.2, the relationship between Transportation and Material Handling is strong ( $r=0.580$ ). The relationship is also significant at level of 0.01. Therefore, we accept the hypothesis that there is a significant positive relationship between transportation and material handling.

#### 4.4.2 MULTIPLE REGRESSION ANALYSIS

Multiple regression (regression models with multiple explanatory variables), typically correspond to very different biological questions. The former use regression lines to describe univariate associations. The latter describe the partial, or direct, effects of multiple variables, conditioned on one another. We suspect that the superficial similarity of simple and multiple regression leads to confusion in their interpretation. (MB Morrissey & GD Ruxton - 2018)

Table 4.5 Model Summary

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.656 <sup>a</sup>	.430	.424	.41226

a. Predictors: (Constant), Transportation, Packaging, Storage

Based on the table above, it shows that the value of correlation coefficient (R value) is 0.656. Independent variables can explain 65.6% of the variation in independent variable. However, it still left 34.4% unexplained in this study.

#### 4.6 ANOVA

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.931	3	12.644	74.390	.000 <sup>b</sup>
	Residual	50.309	296	.170		
	Total	88.239	299			

a. Dependent Variable: MH

b. Predictors: (Constant), Transportation, Packaging, Storage

Table 4.6 shows that p-value (Sig 0.000) is less than alpha value 0.05. The alternative hypothesis as the three independent variables are significantly explains the variance in respondents' level is supported by the data and will be accepted.

Table 4.7 Coefficients

Coefficients <sup>a</sup>						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	.946	.275		3.444	.001
	Storage	-.007	.079	-.006	-.094	.925
	Packaging	.375	.059	.385	6.383	.000
	Transportation	.430	.073	.352	5.887	.000

a. Dependent Variable: MH

Based on the Table 4.7 above (Coefficients) that shows storage, packaging and transportation is significant to predict dependent variable (material handling in fresh crops) this is because p-value is less than the alpha value 0.05. On the other hand, the only independent variable that is not significant to predict the dependent variable is relative advantage; the p-value is equal to 0.291 which is more than alpha value 0.05.

#### 4.4.3 TEST OF SIGNIFICANT

##### Hypothesis 1

**H1:** There is an impact from storage towards factors that affects the efficiency of fresh crops in material handling in area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs.

Reject H<sub>0</sub>, if  $p < 0.05$

The p-value of storage according to the table above is more than 0.05 which is 0.925. Thus, H<sub>0</sub> rejected. It indicates that storage has impact on the efficiency of fresh crops in material handling.

##### Hypothesis 2

**H1:** There is an impact from packaging towards factors that affects the efficiency of fresh crops in material handling in area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs.

Reject H<sub>0</sub>, if  $p < 0.05$

The p-value of packaging according to the table above is 0.000 which is less than the significant level of 0.05. Then, H<sub>0</sub>, rejected, which means packaging has an impact towards the factors that affects the efficiency of fresh crops in material handling in area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs

### **Hypothesis 3**

**H1:** There is an impact from transportation towards factors that affects the efficiency of fresh crops in material handling in area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs.

Reject  $H_0$ , if  $p < 0.05$

The p-value of transportation\ according to the table above is 0.000 which is less than the significant level of 0.05. Then,  $H_0$ , rejected, which means packaging has an impact towards the factors that affects the efficiency of fresh crops in material handling in area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs

### **4.5 RESEARCH LIMITATION AND CAVEATS**

There are several limitations in this research. The result may not be generalized for the managerial because the samples only collect on a few places in Malaysia which is located Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs.

Next, some of the main journals and referrals which is adopted overseas may be not suitable for Malaysia. The variable that used to test in overseas may not suitable for Malaysia. Furthermore, researchers may not fully utilize the journal from portals because it is necessary to pay and in order to access the journal.

Last but not least, another limitation for the researchers will be only used of questionnaires survey. Minority of respondents may not understand the question and therefore may be a randomly answer the question. Moreover, the respondents could not spend much time and effort in this contribution of survey. Questionnaire survey also very judgemental and different people would have different view based on their understanding and knowledge. All of this could reduce the accuracy and preciseness of result.

## **4.6 CONCLUSION**

In conclusion this chapter serves to present the results and findings in order to obtain from data gathering of this study. All the data collected from the questionnaires have been transformed into the SPSS program. The output would obtain from the SPSS would show the result from this research, which is to study the factor that affect the efficiency of fresh crops in material handling. Furthermore, inferential analyses are also conducted and are demonstrated in this chapter to answer the research question, as well as to determine the significance of the hypothesis for this research. This subsequence chapter contains discussion on major findings as well as conclusion to this research.

From this chapter we can conclude that single variable is a factor that affects the efficiency of fresh crops in material handling which is located at Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs. However, after the result are obtained and being converted into mean and standard deviation, the highest mean is storage in material handling and the least mean is packaging in material handling.

## **CHAPTER 5**

### **DISCUSSION AND CONCLUSION**

#### **5.1 INTRODUUCTION**

This chapter discusses the statistical results in Chapter 4. The recapitulates the main findings of the study and discuss in the next section. Implication and limitations of study are discussed and suggestions for the future research will be highlighted for the future use.

#### **5.2 SUMMARY OF STATISTICAL ANALYSIS**

##### **5.2.1 SUMMARY OF DESCRIPTIVE ANALYSIS**

Descriptive analysis identifies patterns in data to answer questions about who, what, where, when, and to what extent. This guide describes how to more effectively approach, conduct, and communicate quantitative descriptive analysis. The primary audience for this guide includes members of the research community who conduct and publish both descriptive and causal studies, although it could also be useful for policymakers and practitioners who are consumers of research findings. The guide contains chapters that discuss the important role descriptive analysis plays; how to approach descriptive analysis; how to conduct descriptive analysis; and how to communicate descriptive analysis findings.( S Loeb, S Dynarski, D McFarland, 2017)

##### **5.2.1.1 DEMOGRAPHIC PROFILE OF THE RESPONDENTS**

Based on the descriptive analysis in Chapter 4, out of 300 respondents participated in the survey, result of gender analysis consists of 167 male and 133 of female. The percentage of male is 55.7%, whereas female 44.3% with differences 11.4%.

The respondents were majority from age 17–27 years old which are 111 respondents (37%). It followed by the age 28-37 years old with a frequency 85 of respondents (28.3%). The third highest were came from the age 38-47 years old which constituted (17.3%) of 52 respondents. The second last were come from age 48-57 years old with a frequency of 46 respondents (15.3%). Lastly, the lowest came from age 58-67 years old which constituted (6%) of 6 respondents.

Majority of the respondents come from several of race which is the highest frequency is Malay with 193 and the percentage is (64.3%). Second, Chinese with frequency of the respondents 45 gained with the percentage (15%). Followed by the Indian with the frequency of 42 respondents with the percentage of (14%) and the others race with the frequency of 20 gained the percentage of (6.7%).

Other than that, Chapter 4 also shows how often the respondents that come from the level of education. The highest frequency for the level of education was from SPM with the frequency of 120 followed by the percentage of (40%). The second highest is from Diploma with the frequency of 81 and the percentage is 27% and third level of education is from STPM with the frequency of 25 and the percentage is (8.3%). The lowest frequency is from PHD level education with 1 and the percentage is (0.3).



### **5.2.1.2 SUMMARY OF CENTRAL TENDACIES MEASUREMENT OF CONSTRUCTS**

B7 has the highest mean value at 4.75 with standard deviation of 0.541 while B9 has the lowest mean value at 4.13 with standard deviation of 1.135. C10 has the highest mean value at 4.57 while the lowest mean value is C6 which is 3.94 with the standard deviation is 1.085. D5 recorded the highest mean value for transportation which is 4.68 with the standard deviation at 0.587 and D9 is the lowest mean value at 4.22 and the standard deviation at 0.750. E10 recorded the highest mean value for material handling which is at 4.66 with the standard deviation at 0.527 and E2 recorded the lowest mean value at 4.00 with the standard deviation at 1.001.

### **5.2.2 SUMMARY OF SCALE MEASUREMENT**

For the reliability test, question for independent (storage, packaging & transportation) and the dependent variable (material handling) are reliable since each test indicates its value to be more than 0.5. Thus, all of the variables (storage, packaging & transportation) are reliable.

### **5.2.3 SUMMARY OF INFERENTIAL ANALYSIS**

#### **5.2.3.1 PEARSON CORRELATION TEST**

All the three independent variables are free from multicollinearity problems as all correlation values are less than 0.9. Pearson correlation test also used to measure the relationship between individual independent variables and dependent variables. All of these three independent variables establish significant relationship with the factors that affect the efficiency of fresh crop in material handling as their p-values are less than 0.5 All independent variables which is storage, packaging and transportation establish positive relationship towards the factors that affect the efficiency of fresh crops in material handling.

#### **5.2.3.2 MULTIPLE LINEAR REGRESSIONS (MLR)**

According to the output of MLR, the  $R^2 = 0.430$  implies that 43% of the variation on factors that affects the efficiency of fresh crops in material handling that the research is conducted in area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs can be explained by the three independent variables in this recent research. B (Storage), C (Packaging) and D (Transportation) establish significant positive relationship with the material handling. Meanwhile MLR are also concluded that B has the strongest influence towards material handling.

### **5.3 DISCUSSIONS OF MAJOR FINDINGS (SIGNIFICANT)**

While the previous section of this chapter focuses more onto the summary description of the entire descriptive and inferential analyses, this section is more into the discussion inti major findings in order to validate the research objective and hypothesis.

Table 5.1 Summary of Statistical Analysis

Hypothesis	Significant	Conclusion
H1: There is an impact from storage in material handling in fresh crops.	0.925	Not supported
H2: There is an impact from packaging in material handling in fresh crops.	0.000	Supported
H3: There is an impact from transportation in material handling	0.000	Supported

Source: Developed for the research

### **5.3.1 RELATIONSHIP BETWEEN STORAGE AND MATERIAL HANDLING IN FRESH CROPS**

H1 indicates that storage has no significant influences on factor that affect the efficiency of fresh crops in material handling. Results shows P-value is 0.925 and  $\beta$ -value is -0.07 which expressed H1 is not supported

### **5.3.2 RELATIONSHIP BETWEEN PACKAGING AND MATERIAL HANDLING IN FRESH CROPS**

H2 indicates that storage has significant influences on factor that affect the efficiency of fresh crops in material handling. Result shows P-value is 0.000 and  $\beta$ -value is 0.375 which expressed H2 is supported.

### **5.3.3 RELATIONSHIP BETWEEN PACKAGING AND MATERIAL HANDLING IN FRESH CROPS**

H3 indicates that transportation has significant influences on factor that affect the efficiency of fresh crops in material handling. Result shows P-value is 0.000 and  $\beta$ -value is 0.430 which expressed H3 is supported.

## **5.4 IMPLICATIONS OF THE STUDY**

### **5.4.1 MANAGERIAL IMPLICATIONS (SIGNIFICANT)**

Based on the information gathered from the factor that impact the efficiency of fresh in material handling among the farmers that located at Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs. The researches have established a few implications that might be useful in assisting the difficulties towards the efficient methods on how to handle the fresh crops in material handling. In agriculture sector, the farmers may be not received a formal education towards the agriculture management. The lack of knowledge in terms of agriculture may lead the misleading of arrangement in material handling. A better improvement of knowledge is important towards farmer in order to improve the quality of product.

According to the research done, storage has the highest significant impact among others independent variables in influencing the factors that affect the efficiency of fresh crops in material handling that located at Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs. Storage also plays an important role in material handling because it is important to keep the product safe and sound from anything that can harm the product. Proper ventilation and maintaining proper relative humidity during storage are essential to maintaining the highest possible postharvest quality. For every company who handle fresh crops commodities, it is important to establish a good storage management to avoid from any misleading storage.

For packaging in terms of fresh crops in material handling, a better quality of packaging could improve the efficiency of fresh crops and make the product easier to pack. A proper packaging could reduce the wastage rates and the company can produce more products from time to time. Reducing the wastage also could make the company gained more profit. Making the flexibility of handling fresh crops

## **5.5 LIMITATION OF THE STUDY**

There are several limitations in this research. The result may be not generalized for the managerial because the sample collected in area Pasar Borong Selangor, Pasar Chow Kit, Pasar Tani Stadium Shah Alam, Pasar Moden SS15 and Benefigs. It cannot represent whole population in Malaysia. Besides that, the statistic of demographic elements shows that the highest percentage of younger people in the demographic graph.

Next, some of the main journals and referrals which is adopted overseas may be not suitable for Malaysia. The variable that used to test in overseas may not suitable for Malaysia. Furthermore, researchers may not fully utilize the journal from portals because it is necessary to pay and in order to access the journal.

Lastly, another limitation for the researchers will be only used of questionnaires survey. Minority of respondents may not understand the question and therefore may be a randomly answer the question. Moreover, the respondents could not spend much time and effort in this contribution of survey. Questionnaire survey also very judgemental and different people would have different view based on their understanding and knowledge. All of this could reduce the accuracy and preciseness of result.

## **5.6 RECOMMENDATION**

There are a few recommendations for the researchers in the future. First of all, it is recommended to done the research in whole country if time is allowed because it is more accurate instead of just pick one state to do it such as by including all the state in whole Malaysia. It is also advisable to include all the states in the country when conducting the research because it tends to reduce the people in different demographic will have difference of thinking about efficient way of handling the fresh crops.

Furthermore, the future research can further their study incorporate other dependent variables that can determine the factor that affect that effect the efficiency of fresh crops in material handling. However, researchers have to more cautions choosing the dependent variable as inly the right variable can improve the values.

Lastly, the researchers are recommended to use interview to conducting the survey. The purpose of having will reduce the limitation by using questionnaires where people can directly understand the question asked by the researcher rather than interpret the questionnaires. This will reduce the misunderstanding of the people while interpreting the question in the questionnaires.

## **5.7 CONCLUSION**

Previous studies have contributed to the factors that affect the efficiency of fresh crops material handling and its measurement. This study provide practical knowledge for management to take effective action to improve the identify product quality dimension, especially those dimension that directly affect the material handling in fresh crops.

This study shows that the entire dimension namely material handling, storage, packaging, transportation and as all core related. The findings of this study have been made to discuss the factors that affect the efficiency of fresh crops material handling. Result of this study gives confidence to the fresh crops distributor to practice the right material handling.

To develop strategies of the handling fresh crops, it can encourage the farmers and distributor to improve their product and quality. It is very important to have an improvement towards the independent variables as it will enhance this ongoing research that will provide more inside and understanding of material handling in fresh crops.

## REFERENCES

- Arah, Kojo, I., Ahorbo, K., G., Kumah, Kodzo, E., ... Harrison. (2016, May 11). Postharvest Handling Practices and Treatment Methods for Tomato Handlers in Developing Countries: A Mini Review. Retrieved from <https://www.hindawi.com/journals/aag/2016/6436945/>
- Kasso, M., & Bekele, A. (2016, January 18). Post-harvest loss and quality deterioration of horticultural crops in Dire Dawa Region, Ethiopia. Retrieved from <https://www.sciencedirect.com/science/article/pii/S1658077X15300837>
- Garcia, quero. (2017). posharvest biology and handling for fresh markets. Retrieved from [https://books.google.com.my/books?hl=en&lr=&id=5xsxDwAAQBAJ&oi=fnd&pg=PA460&dq=material+handling+in+fresh+crops&ots=CDYGutFNT3&sig=JbKVhTIBh\\_68JRbw-f9VKE2WG\\_M&redir\\_esc=y#v=onepage&q&f=false](https://books.google.com.my/books?hl=en&lr=&id=5xsxDwAAQBAJ&oi=fnd&pg=PA460&dq=material+handling+in+fresh+crops&ots=CDYGutFNT3&sig=JbKVhTIBh_68JRbw-f9VKE2WG_M&redir_esc=y#v=onepage&q&f=false)
- Sudheer, D. K. P., & Indira, D. V. (2007). Post Harvest Technology of Horticultural Crops. Retrieved from [https://books.google.com.my/books?hl=en&lr=&id=Ws\\_SQUB5tj0C&oi=fnd&pg=PR5&dq=material+handling+in+fresh+crops&ots=BHxUJkgNAr&sig=e6ae6\\_noxvPFKLqHtCJil8Qgmww&redir\\_esc=y#v=onepage&q=material+handling+in+fresh+crops&f=false](https://books.google.com.my/books?hl=en&lr=&id=Ws_SQUB5tj0C&oi=fnd&pg=PR5&dq=material+handling+in+fresh+crops&ots=BHxUJkgNAr&sig=e6ae6_noxvPFKLqHtCJil8Qgmww&redir_esc=y#v=onepage&q=material+handling+in+fresh+crops&f=false)
- Pereira, Cristina, Corrales, L., Margarita, Martín, Alberto, ... Joaquín, M. (2017, January 16). Physicochemical and Nutritional Characterization of Brebas for Fresh Consumption from Nine Fig Varieties (*Ficus carica* L.) Grown in Extremadura (Spain). Retrieved from <https://www.hindawi.com/journals/jfq/2017/6302109/>
- Watson, J. A., Treadwell, D., Sargent, S. A., Brecht, J. K., & Pelletier, W. (2019, April 29). Postharvest Storage, Packaging and Handling of Specialty Crops: A Guide for Florida Small Farm Producers. Retrieved from <https://edis.ifas.ufl.edu/hs1270>
- Singh, S. (2018, December 25). Sampling Techniques. Retrieved from <https://towardsdatascience.com/sampling-techniques-a4e34111d808?gi=c80fa91c8240>
- Methods Involved in Harvesting and Storage of Crops (with diagram). (2014, March 28). Retrieved from <http://www.yourarticlelibrary.com/crops/methods-involved-in-harvesting-and-storage-of-crops-with-diagram/31474>
- Government of Western Australia. (2020, March 19). Storage of fresh fruit and vegetables: Page 3 of 3. Retrieved March 19, 2020, from <https://www.agric.wa.gov.au/fruit/storage-fresh-fruit-and-vegetables?page=0,2>
- ABCO Transportation. (2018, November 6). Shipping Fresh Produce: What You Need to Know. Retrieved from <https://www.shipabco.com/shipping-fresh-produce-what-you-need-to-know/>
- Juri Kondratjev. (2015, March). Logistics. Transportation and warehouse in supply chain. Retrieved March 19, 2020, from [https://www.theseus.fi/bitstream/handle/10024/91465/Eng\\_Thesis\\_Final.pdf?sequence=1](https://www.theseus.fi/bitstream/handle/10024/91465/Eng_Thesis_Final.pdf?sequence=1)

Niguse, B. (2018, February 12). Assess and Prioritize the Problems Related Postharvest Management of Horticultural Crops in Jimma Town, the Case of Bishishe Market. Retrieved from <https://www.omicsonline.org/open-access/assess-and-prioritize-the-problems-related-postharvest-management-of-horticultural-crops-in-jimma-town-the-case-of-bishishe-market-2376-0214-1000168-97984.html>

Thomann, L., & Michaels, M. (2019, May 7). The Best Way to Store Vegetables to Maximize Freshness. Retrieved from <https://www.lifestorage.com/blog/storage/best-way-to-store-vegetables/>





## APPENDIX B: QUESTIONNAIRE



### QUESTIONNAIRES ON FACTORS THAT AFFECT THE EFFICENCY OF FRESH CROP IN MATERIAL HANDLING

Dear respondent,

We are undergraduate students of Politeknik Sultan Salahuddin Abdul Aziz presently pursuing our Diploma in International Business. We are currently conducting a research project entitle – factors that affect the efficiency of fresh crops in material handling.

The purpose of this research is to identify the factors that affect the efficiency of fresh crops in material handling. This research was base on Benefig’s company in order to understand what factors that affect the efficiency of fresh crops in material handling.

Thank you for your cooperation participation. If you have any inquires please do not hesitate to contact us.

Sincerely,

SITI NOR ALFEZATY BINTI AL MANAN 08DPI17F2020

SITI NUR AISYAH BINTI MARLIS 08DPI17F2001

NUR ARFAH ALYA BINTI ROHIMI 08DPI17F2004

NURUL AININ SOFIYA BINTI SARIFUDDIN 08DPI17F2003

**NAMA PENYELIA:**

MAZRUL HISYAM BIN ABDUL MALIK 0196076700

## PART 1: DEMOGRAPHIC PROFILE

### SECTION A

#### (Demographic Profile)

Please **TICK (/)** your answer and your answers will be kept strictly confidential.

*Tandakan (/) jawapan anda dan jawapan anda akan disimpan secara sulit.*

Gender / *Jantina*

1.	Male	
2.	Female	

Race / *Kaum*

1	Malay / <i>Melayu</i>	
2	Chinese / <i>Cina</i>	
3	Indian / <i>India</i>	
4	Others / <i>Lain-lain</i>	

Age/ *Umur*

1	17 - 27 years old / <i>tahun</i>	
2	28 – 37 years old / <i>tahun</i>	
3	38 – 47 years old / <i>tahun</i>	
4	48 – 57 years old / <i>tahun</i>	
5	58 – 67 years old / <i>tahun</i>	

Tahap pendidikan / *Level of education*

1	PhD	
2	Master	
3	Degree / <i>Ijazah</i>	
4	Diploma	
5	Certificate / <i>Sijil</i>	
6	STPM	
7	SPM	
8	SRP/PMR/PT3	
9	Tiada Pendidikan Formal	

## APPENDIX C: 30 SETS OF PILOT TEST RESULT

CONSTRUCT	STATEMENTS	NO. ITEMS	NO. ITEMS DELETED	CRONBACH ALPHA
	<ol style="list-style-type: none"> <li>1. 1. Arrangement in storage for fruits and vegetables are important.</li> <li>2. Care has to be taken to see that the fruits and vegetables to be storage are absolutely clean and not easy damage.</li> <li>3. Fruits and vegetables are stored in cool storage between 0c to 4c</li> <li>4. Washing fresh fruits and vegetables are important.</li> </ol>			
<b>Storage in Material Handling</b>	<ol style="list-style-type: none"> <li>5. Fruits and vegetables can become contaminated by your hands or by touching contaminated surfaces such as knives and cutting board, during preparation or storage.</li> </ol>	10	-	0.706
	<ol style="list-style-type: none"> <li>6. The storage area for fruits and vegetables should be in good and clean condition.</li> <li>7. Fresh fruits and vegetables should not stored either raw meat, which could drip on them and contaminate the produce of bacteria</li> <li>8. Healthy fruits and vegetables must be stored separately from injured and spoiled fruits and vegetables.</li> <li>9. Do not wash your fruits and vegetables right away before store them in order to keep the moisture.</li> <li>10. Any produce that has to pre- cut or pilled should be keep refrigerated.</li> </ol>			

	1. Packaging must be appropriately designed to maintain the quality and prolong the shelf-life of fresh produce.			
	2. Fresh produce should be packed in either bulk or retail packaging formats.			
	3. Washing fresh fruits and vegetables before packing could prevent the fruits and vegetables from damage.			
	4. Using plastic packaging is suitable for fresh crops.			
<b>Packaging in Material Handling</b>	5. Using box packaging is suitable for fresh crops.	10	-	0.877
	6. Using plastic box is suitable for fresh crops.			
	7. The quality of fresh crops affects the packaging cost.			
	8. Proper packaging of fresh crops could minimize the wastage of fresh crops.			
	9. Packaging accessories help in protecting fresh crops from physical damage during shipping.			
	10. A good packaging should have a nice air circulation in order to prevent from damage.			
	1. Transportation system plays a vital role in marketing fresh crops product.			
	2. Transportation system create market for fresh crops product			
	3. Good transportation system helps in reducing spoilage of fresh crop products.			
	4. Poor transportation facility affect the effective marketing of fresh crops product.			
<b>Transportation in Material Handling</b>	5. Vehicle must be clean ; be able to be cleaned to prevent contamination.	10	-	0.875
	6. Driver should be aware of the fresh crop and keep a close eye on gauge to avoid any problems during transit.			
	7. All fresh crops must be kept at safe temperature during transportation.			
	8. Transportation problem			

	contributes to the rise in the cost of fresh crops product in the market.			
	9. Effectiveness road transport system gives impact on availability of fresh crops product.			
	10. Proper training required by the fresh crops carrier.			
	1. 1. Material handling is the movement, protection, storage and control of materials and products.			
	2. Material handling involves short distance movement within the confines of a building or between a building and a transportation vehicle.			
	3. Material handling plays an important role in manufacturing and logistic.			
	4. When designing a material handling system, it is important to refer the best practices to ensure than all equipment and processes in a facility work together as a unified system.			
<b>Material Handling</b>	5. Efficient material handling is the organize movement of material in the correct quantities, correct place and accomplished with a minimum of time and labor.	11	-	0.857
	6. A system that cover raw materials and ingredients of finished products to consumers is needed.			
	7. Achieving greater efficiency in material handling such as operating space and minimize all movements' activities close together.			
	8. A better stock control and a proper management could improve product quality.			
	9. Storage is a space and a place for storing			
	10. Packaging refers to the process of designing, evaluating and producing packages.			
	11. Transportation is a movement of humans, animals and goods from one location to another.			

## Pearson Correlations Coefficient

### Correlations

		Storage	Packaging	Transportation	MH
Storage	Pearson Correlation	1	.636**	.628**	.460**
	Sig. (2-tailed)		.000	.000	.000
	N	300	300	300	300
Packaging	Pearson Correlation	.636**	1	.600**	.593**
	Sig. (2-tailed)	.000		.000	.000
	N	300	300	300	300
Transportation	Pearson Correlation	.628**	.600**	1	.580**
	Sig. (2-tailed)	.000	.000		.000
	N	300	300	300	300
MH	Pearson Correlation	.460**	.593**	.580**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	300	300	300	300

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## Multiple Regression Analysis

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.656 <sup>a</sup>	.430	.424	.41226

a. Predictors: (Constant), Transportation, Packaging, Storage

## ANOVA

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.931	3	12.644	74.390	.000 <sup>b</sup>
	Residual	50.309	296	.170		
	Total	88.239	299			

a. Dependent Variable: MH

b. Predictors: (Constant), Transportation, Packaging, Storage

## Coefficients

Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.946	.275		3.444	.001
Storage	-.007	.079	-.006	-.094	.925
Packaging	.375	.059	.385	6.383	.000
Transportation	.430	.073	.352	5.887	.000

a. Dependent Variable: MH

## Frequencies

Statistics

		gender	race	age	education
N	Valid	300	300	300	300
	Missing	0	0	0	0

## Frequency Table

Respondent's Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	167	55.7	55.7	55.7
	female	133	44.3	44.3	100.0
	Total	300	100.0	100.0	



## Respondent's Race

Respondent's Race					
	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	malay	193	64.3	64.3	64.3
	chinese	45	15.0	15.0	79.3
	indian	42	14.0	14.0	93.3
	others	20	6.7	6.7	100.0
	Total	300	100.0	100.0	

## Respondent's Age

Respondent's Age					
	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	17-27	111	37.0	37.0	37.0
	28-37	85	28.3	28.3	65.3
	38-47	52	17.3	17.3	82.7
	48-57	46	15.3	15.3	98.0
	58-67	6	2.0	2.0	100.0
	Total	300	100.0	100.0	

## Respondent's Education Level

Respondent's Education Level					
	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	PHD	1	.3	.3	.3
	ijazah	21	7.0	7.0	7.3
	diploma	81	27.0	27.0	34.3
	sijil	22	7.3	7.3	41.7
	STPM	25	8.3	8.3	50.0
	SPM	120	40.0	40.0	90.0
	SRP/ PMR / PT3	14	4.7	4.7	94.7
	Tiada pendidikan formal	16	5.3	5.3	100.0
	Total	300	100.0	100.0	

**INDEPENDENT VARIABLES**

**STORAGE FREQUENCY**

**Statistics**

	B1 Arrangement in storage for fruits and vegetables are important	B2 Care has to be taken to see that the fruits and vegetables are absolutely clean and not easy damage	B3 Fruits and vegetables are stored in cool storage between 0c to 4c	B4 Washing fresh fruits and vegetables are important	B5 Fruits and vegetables can become contaminated by your hands or by touching contaminated surfaces such as knives and cutting board, during preparation or storage	B6 The storage area for fruits and vegetables should be in good and clean condition	B7 Fresh fruits and vegetables should not stored either raw meat, which could drip on them and contaminate the produce of bacteria	B8 Healthy fruits and vegetables must be stored separately from injured and spoiled fruits and vegetables	B9 Do not wash your fruits and vegetables right away before store them in order to keep the moisture	B10 Any produce that has tu pre-cut or pilled should be keep refrigerated
N	Valid Missing	300 0	300 0	300 0	300 0	300 0	300 0	300 0	300 0	300 0

**B1 Arrangement in storage for fruits and vegetables are important**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	6	2.0	2.0	2.0
slightly disagree	7	2.3	2.3	4.3
Valid agree	77	25.7	25.7	30.0
strongly agree	210	70.0	70.0	100.0
Total	300	100.0	100.0	

**B2 Care has to be taken to see that the fruits and vegetables to be storage are absolutely clean and not easy damage**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	2	.7	.7	.7
Valid slightly disagree	13	4.3	4.3	5.0
Valid agree	61	20.3	20.3	25.3
Valid strongly agree	224	74.7	74.7	100.0
Total	300	100.0	100.0	

**B3 Fruits and vegetables are stored in cool storage between 0c to 4c**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	26	8.7	8.7	8.7
Valid disagree	1	.3	.3	9.0
Valid slightly disagree	12	4.0	4.0	13.0
Valid agree	95	31.7	31.7	44.7
Valid strongly agree	166	55.3	55.3	100.0
Total	300	100.0	100.0	

**B4 Washing fresh fruits and vegetables are important**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	5	1.7	1.7	1.7
Valid disagree	9	3.0	3.0	4.7
Valid slightly disagree	20	6.7	6.7	11.3
Valid agree	91	30.3	30.3	41.7
Valid strongly agree	175	58.3	58.3	100.0
Total	300	100.0	100.0	

**B5 Fruits and vegetables can become contaminated by your hands or by touching contaminated surfaces such as knives and cutting board, during preparation or storage**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	10	3.3	3.3	3.3
slightly disagree	27	9.0	9.0	12.3
Valid agree	81	27.0	27.0	39.3
strongly agree	182	60.7	60.7	100.0
Total	300	100.0	100.0	

**B6 The storage area for fruits and vegetables should be in good and clean condition**

	Frequency	Percent	Valid Percent	Cumulative Percent
slightly disagree	1	.3	.3	.3
Valid agree	87	29.0	29.0	29.3
strongly agree	212	70.7	70.7	100.0
Total	300	100.0	100.0	

**B7 Fresh fruits and vegetables should not stored either raw meat, which could drip on them and contaminate the produce of bacteria**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	3	1.0	1.0	1.0
slightly disagree	7	2.3	2.3	3.3
Valid agree	51	17.0	17.0	20.3
strongly agree	239	79.7	79.7	100.0
Total	300	100.0	100.0	

**B8 Healthy fruits and vegetables must be stored separately from injured and spoiled fruits and vegetables**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	3	1.0	1.0	1.0
slightly disagree	2	.7	.7	1.7
Valid agree	77	25.7	25.7	27.3
strongly agree	218	72.7	72.7	100.0
Total	300	100.0	100.0	

**B9 Do not wash your fruits and vegetables right away before store them in order to keep the moisture**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	11	3.7	3.7	3.7
disagree	23	7.7	7.7	11.3
slightly disagree	40	13.3	13.3	24.7
agree	66	22.0	22.0	46.7
strongly agree	160	53.3	53.3	100.0
Total	300	100.0	100.0	

**B10 Any produce that has tu pre- cut or pilled should be keep refrigerated**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	2	.7	.7	.7
disagree	15	5.0	5.0	5.7
slightly disagree	20	6.7	6.7	12.3
agree	53	17.7	17.7	30.0
strongly agree	210	70.0	70.0	100.0
Total	300	100.0	100.0	

# PACKAGING

## Statistic

### Statistics

	C1 packaging must be appropriately designed to maintain the quality and prolog the shelf-life fresh produce.	C2 Fresh produce should be packed in either bulk or retailed packaging formats.	C3 Washing fresh fruits and vegetables before packing could prevent the fruits and vegetables from damage.	C4 Using plastic packaging is suitable for fresh crops.	C5 Using box packaging is suitable for fresh crops.	C6 Using plastic box is suitable for fresh crops.	C7 The quality of fresh crops affects the packaging cost.	C8 Proper packaging of fresh crops could minimize the wastage of fresh crops.	C9 Packaging accessories help in protecting fresh crops from physical damage during shipping.	C10 A good packaging should have a nice air circulation in order to prevent from damage
Valid	300	300	300	300	300	300	300	300	300	300
Missing	0	0	0	0	0	0	0	0	0	0

## Frequency Table

### C1 packaging must be appropriately designed to maintain the quality and prolog the shelf-life fresh produce.

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	1	.3	.3	.3
slightly disagree	18	6.0	6.0	6.3
Valid agree	101	33.7	33.7	40.0
strongly agree	180	60.0	60.0	100.0
Total	300	100.0	100.0	

**C2 Fresh produce should be packed in either bulk or retailed packaging formats.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	12	4.0	4.0	4.0
disagree	8	2.7	2.7	6.7
slightly disagree	52	17.3	17.3	24.0
agree	122	40.7	40.7	64.7
strongly agree	106	35.3	35.3	100.0
Total	300	100.0	100.0	

**C3 Washing fresh fruits and vegetables before packing could prevent the fruits and vegetables from damage.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	6	2.0	2.0	2.0
slightly disagree	27	9.0	9.0	11.0
agree	111	37.0	37.0	48.0
strongly agree	156	52.0	52.0	100.0
Total	300	100.0	100.0	

**C4 Using plastic packaging is suitable for fresh crops.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	1	.3	.3	.3
disagree	14	4.7	4.7	5.0
slightly disagree	67	22.3	22.3	27.3
agree	90	30.0	30.0	57.3
strongly agree	128	42.7	42.7	100.0
Total	300	100.0	100.0	

**C5 Using box packaging is suitable for fresh crops.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	7	2.3	2.3	2.3
disagree	10	3.3	3.3	5.7
slightly disagree	67	22.3	22.3	28.0
agree	114	38.0	38.0	66.0
strongly agree	102	34.0	34.0	100.0
Total	300	100.0	100.0	

**C6 Using plastic box is suitable for fresh crops.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	7	2.3	2.3	2.3
disagree	24	8.0	8.0	10.3
slightly disagree	71	23.7	23.7	34.0
agree	75	25.0	25.0	59.0
strongly agree	123	41.0	41.0	100.0
Total	300	100.0	100.0	

**C7 The quality of fresh crops affects the packaging cost.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	7	2.3	2.3	2.3
disagree	5	1.7	1.7	4.0
slightly disagree	39	13.0	13.0	17.0
agree	142	47.3	47.3	64.3
strongly agree	107	35.7	35.7	100.0
Total	300	100.0	100.0	



**C8 Proper packaging of fresh crops could minimize the wastage of fresh crops.**

	Frequency	Percent	Valid Percent	Cumulative Percent
strongly disagree	6	2.0	2.0	2.0
disagree	17	5.7	5.7	7.7
slightly disagree	28	9.3	9.3	17.0
agree	99	33.0	33.0	50.0
strongly agree	150	50.0	50.0	100.0
Total	300	100.0	100.0	

**C9 Packaging accessories help in protecting fresh crops from physical damage during shipping.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	20	6.7	6.7	6.7
slightly disagree	21	7.0	7.0	13.7
agree	96	32.0	32.0	45.7
strongly agree	163	54.3	54.3	100.0
Total	300	100.0	100.0	

**C10 A good packaging should have a nice air circulation in order to prevent from damage**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	1	.3	.3	.3
slightly disagree	17	5.7	5.7	6.0
agree	91	30.3	30.3	36.3
strongly agree	191	63.7	63.7	100.0
Total	300	100.0	100.0	

# TRANSPORTATION

## Statistic

### Statistics

	D1 Transportation system plays a vital role in marketing fresh crops product.	D2 Transportation system create market for fresh crops product.	D3 Good transportation system helps in reducing spoilage of fresh crop products.	D4 Poor transportation facility affect the effective marketing of fresh crops product.	D5 Vehicle must be clean ; be able to be cleaned to prevent contamination.	D6 Driver should be aware of the fresh crop and keep a close eye on gauge to avoid any problems during transit.	D7 All fresh crops must be kept at safe temperature during transportation.	D8 Transportation problem contributes to the rise in the cost of fresh crops product in the market.	D9 Effectiveness road transport system gives impact on availability of fresh crops product.	D10 Proper training required by the fresh crops carrier.
Valid	300	300	300	300	300	300	300	300	300	300
Missing	0	0	0	0	0	0	0	0	0	0

## Frequency Table

### D1 Transportation system plays a vital role in marketing fresh crops product.

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	2	.7	.7	.7
slightly disagree	12	4.0	4.0	4.7
Valid agree	103	34.3	34.3	39.0
strongly agree	183	61.0	61.0	100.0
Total	300	100.0	100.0	

**D2 Transportation system create market for fresh crops product**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	1	.3	.3	.3
slightly disagree	17	5.7	5.7	6.0
Valid agree	108	36.0	36.0	42.0
strongly agree	174	58.0	58.0	100.0
Total	300	100.0	100.0	

**D3 Good transportation system helps in reducing spoilage of fresh crop products.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	9	3.0	3.0	3.0
slightly disagree	13	4.3	4.3	7.3
Valid agree	97	32.3	32.3	39.7
strongly agree	181	60.3	60.3	100.0
Total	300	100.0	100.0	

**D4 Poor transportation facility affect the effective marketing of fresh crops product.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	14	4.7	4.7	4.7
slightly disagree	35	11.7	11.7	16.3
Valid agree	92	30.7	30.7	47.0
strongly agree	159	53.0	53.0	100.0
Total	300	100.0	100.0	

**D5 Vehicle must be clean ; be able to be cleaned to prevent contamination.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	2	.7	.7	.7
slightly disagree	13	4.3	4.3	5.0
Valid agree	64	21.3	21.3	26.3
strongly agree	221	73.7	73.7	100.0
Total	300	100.0	100.0	

**D6 Driver should be aware of the fresh crop and keep a close eye on gauge to avoid any problems during transit.**

	Frequency	Percent	Valid Percent	Cumulative Percent
strongly disagree	2	.7	.7	.7
disagree	1	.3	.3	1.0
Valid slightly disagree	15	5.0	5.0	6.0
agree	106	35.3	35.3	41.3
strongly agree	176	58.7	58.7	100.0
Total	300	100.0	100.0	

**D7 All fresh crops must be kept at safe temperature during transportation.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	2	.7	.7	.7
slightly disagree	22	7.3	7.3	8.0
Valid agree	112	37.3	37.3	45.3
strongly agree	164	54.7	54.7	100.0
Total	300	100.0	100.0	

**D8 Transportation problem contributes to the rise in the cost of fresh crops product in the market.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	2	.7	.7	.7
slightly disagree	20	6.7	6.7	7.3
Valid agree	160	53.3	53.3	60.7
strongly agree	118	39.3	39.3	100.0
Total	300	100.0	100.0	

**D9 Effectiveness road transport system gives impact onn availability of fresh crops product.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	8	2.7	2.7	2.7
slightly disagree	34	11.3	11.3	14.0
Valid agree	140	46.7	46.7	60.7
strongly agree	118	39.3	39.3	100.0
Total	300	100.0	100.0	

**D10 Proper training required by the fresh crops carrier.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	1	.3	.3	.3
slightly disagree	33	11.0	11.0	11.3
Valid agree	130	43.3	43.3	54.7
strongly agree	136	45.3	45.3	100.0
Total	300	100.0	100.0	

# MATERIAL HANDLING

## Statistic

### Statistics

	E1	E2	E3	E4	E5	E6 A	E7	E8 A	E9	E10	E11
	Material handling is the movement, protection, storage and control of materials and products.	Material handling involves short distance movement within the confines of a building or between a building and a transportation vehicle.	Material handling plays an important role in manufacturing and logistic.	When designing a material handling system, it is important to refer the best practices to ensure than all equipment and processes in a facility work together as a unified system	Efficient material handling is the organization of material in the correct quantities, correct place and accomplished with a minimum of time and labour.	system that cover raw materials and ingredients of finished products to consumers is needed.	Achieving greater efficiency in material handling such as operating space and minimize all movements activities close together	better stock control and a proper management could improve product quality.	Storage is a space and a place for storing	Packaging refers to the process of designing, evaluating and producing packages.	Transportation is a movement of humans, animals and goods from one location to another.
Valid	300	300	300	300	300	300	300	300	300	300	300
Missing	0	0	0	0	0	0	0	0	0	0	0

### E1 Material handling is the movement, protection, storage and control of materials and products.

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	1	.3	.3	.3
slightly disagree	33	11.0	11.0	11.3
Valid agree	108	36.0	36.0	47.3
strongly agree	158	52.7	52.7	100.0
Total	300	100.0	100.0	

**E2 Material handling involves short distance movement within the confines of a building or between a building and a transportation vehicle.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	12	4.0	4.0	4.0
disagree	15	5.0	5.0	9.0
slightly disagree	32	10.7	10.7	19.7
agree	141	47.0	47.0	66.7
strongly agree	100	33.3	33.3	100.0
Total	300	100.0	100.0	

**E3 Material handling plays an important role in manufacturing and logistic.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid slightly disagree	58	19.3	19.3	19.3
agree	131	43.7	43.7	63.0
strongly agree	111	37.0	37.0	100.0
Total	300	100.0	100.0	

**E4 When designing a material handling system, it is important to refer the best practices to ensure than all equipment and processes in a facility work together as a unified system**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid slightly disagree	36	12.0	12.0	12.0
agree	111	37.0	37.0	49.0
strongly agree	153	51.0	51.0	100.0
Total	300	100.0	100.0	

**E5 Efficient material handling is the organize movement of material in the correct quantities, correct place and accomplished with a minimum of time anf labour.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	2	.7	.7	.7
slightly disagree	35	11.7	11.7	12.3
agree	83	27.7	27.7	40.0
strongly agree	180	60.0	60.0	100.0
Total	300	100.0	100.0	

**E6 A system that cover raw materials and ingredients of finished products to consumers is needed.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid slightly disagree	26	8.7	8.7	8.7
Valid agree	156	52.0	52.0	60.7
Valid strongly agree	118	39.3	39.3	100.0
Total	300	100.0	100.0	

**E7 Achieving greater efficiency in material handling such as operating space and minimize all movements activities close together.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid slightly disagree	44	14.7	14.7	14.7
Valid agree	155	51.7	51.7	66.3
Valid strongly agree	99	33.0	33.0	99.3
44.00	2	.7	.7	100.0
Total	300	100.0	100.0	

**E8 A better stock control and a proper management could improve product quality.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid slightly disagree	17	5.7	5.7	5.7
Valid agree	127	42.3	42.3	48.0
Valid strongly agree	156	52.0	52.0	100.0
Total	300	100.0	100.0	

**E9 Storage is a space and a place for storing**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	1	.3	.3	.3
Valid slightly disagree	6	2.0	2.0	2.3
Valid agree	92	30.7	30.7	33.0
Valid strongly agree	201	67.0	67.0	100.0
Total	300	100.0	100.0	



**E10 Packaging refers to the process of designing, evaluating and producing packages.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	1	.3	.3	.3
slightly disagree	5	1.7	1.7	2.0
Valid agree	89	29.7	29.7	31.7
strongly agree	205	68.3	68.3	100.0
Total	300	100.0	100.0	

**E11 Transportation is a movement of humans, animals and goods from one location to another.**

	Frequency	Percent	Valid Percent	Cumulative Percent
disagree	4	1.3	1.3	1.3
slightly disagree	23	7.7	7.7	9.0
Valid agree	88	29.3	29.3	38.3
strongly agree	185	61.7	61.7	100.0
Total	300	100.0	100.0	

