Factors on Choosing Modes of Freight Transport and the Most Suitable Mode

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Abstract

There are currently numerous types of freight transport offered by logistics providers. It is known that different goods would implement into different types of freight transport modes. Consequently, the decision-making would dominantly rely on many factors or variables that cause logistics providers and logistic users to make their suitable mode choices. Therefore, data were collected from surveys distributed to potential logistics providers based on the study. The result is filled into the Statistical Package for the Social Sciences (SPSS LAB) to decompose the correlation between fright transport mode and logistics provider's choices. The data analysis was done in three different ways such as descriptive statistics, Independent Sample T-Test, and One-Way ANOVA analysis depending on the variables condition. The analysis shows that all the 9 factors affect responders' choice of choosing modes of freight transport. The best mode of transport for short-medium transport is Road only for both Perishable and Non-Perishable product. However, for long transport distance, the most suitable mode for Perishable product is Road-Air, while Non-Perishable Products is Road –Sea. The further analysis shows that most of segmentation questions, either nominal or ordinal, have some difference in means of Scale questions which is around 2-3 scales with difference in means.

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Mr. Bhumirat Tuaijaroen and Mr. Pitiwat Sirilertmakasakul

Organizers

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Chapter 1: Introduction

1.1 Research Background

For freight transport, containers are used. This makes it possible to move a significant volume of product within the container. Transportation can be carried out according to consumer requirements, such as road, rail, sea, and air freight transport, by various means. Nonetheless, there are several variables that can be manipulated by logistics providers to select their appropriate modes. Therefore, this project aims to examine on the factors or variables effecting logistics providers' choices on their suitable modes in each transportation cases.

1.2 Research Objective

1. To determine how much does each factor affect Logistics Providers on choosing modes of freight transport
2. To determine the most suitable mode of freight transport for different types of products and conditions
3. What is behind their different point of view

1.3 Research Scope

In this research, it would focus on the factors that affect the freight transport mode choice which include road, rail, sea, and air freight transport. The research will be done through the survey which will be sent to different logistics parties.

1.4 Method of Operation

The overall process of this project is divided into 9 major steps. The flow chart of the process can be seen in the fig 1.1 below.

Step 1: Collect the theory and research paper related to topic and project scope. The paper and theories would be used as a reference for this project.

Step 2: Study the theory and research paper related to topic and project scope to get the idea behind how each factor can affect logistics provider's decision in picking which transport mode they will be using

Step 3: Interpret information and data, and form the outline of the project

Step 4: Compose the draft survey questions

Step 5: Test the survey question to check whether or not the survey question is precise and easy to understand while maintaining the goal of the project.

Step 6: Collect the data from logistics provider and customers by the survey

Step 7: Analyze the data and identify the outcomes leading to conclusion making

Step 8: Compose and conclude the data

Step 9: Establish the Thesis

Chapter 2: Literature Review

2.1. Types of Freight Transport

2.1.1. Unimodal

The products are delivered using a single mode of transportation, primarily by road, since it is the most effective for door-to-door deliveries.

2.1.2. Multimodal

Multimodal transportation is the use of multiple modes of transportation (more than one mode of transportation) to facilitate movement or shipment of individual cargo.

2.1.3. Intermodal Freight Transport

Intermodal Freight Transport is a transportation of freight in an intermodal container using multiple modes (2 or more modes) of transportation without handling the freight itself when changing the mode. In other words, it is the changing of modes or moving container from one mode to another while not requiring the container to open and move the goods inside it.

2.2 Containers

Containers are storage space uses in freight transport to carry products or goods. There are many types of container which users can pick according to their functions or applications.

2.2.1 Intermodal container

Is a large, standardized shipping container, designed and build for intermodal, meaning these containers can be used across different modes of transport without unloading and reloading their cargo

2.2.1.1 Dry Storage Container

The first type or the most common type is known as Dry Storage Container or Dry Freight Container. It is a standard container which can come in a variety of sizes used for

transporting common products without any specification, except liquids.

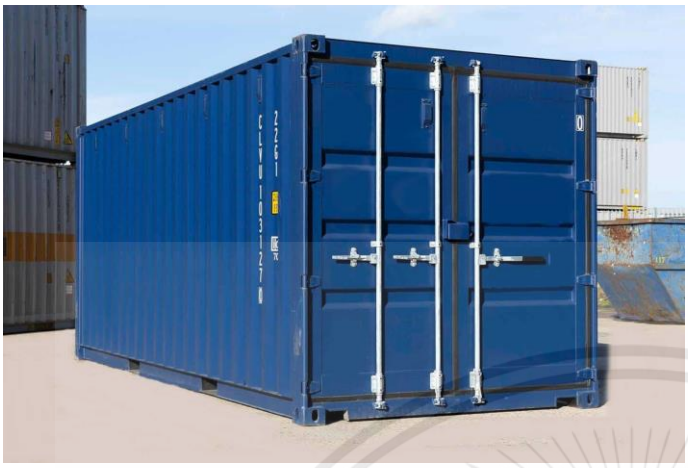

Figure 1: Dry Storage Containers

2.2.1.2 Refrigerated Container

These types of container are temperature-controlled container and therefore are suitable for perishable products.

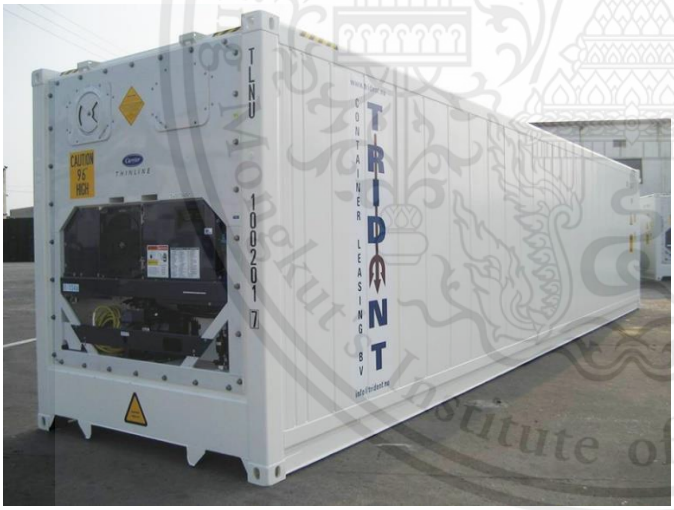

Figure 2: Refrigerated Container

2.2.1.3 Flat Rack Container

The third type is a specialized container specially designed for the transportation of tall or wide materials which must be needs to be loaded from the top or sides. The container is

built with only a bottom floor and 2 walls at the short end of the container.

Figure 3:Flat Rack Containers

2.2.1.4 Open Top or Open Side Containers

Forth, the Open Top or Open Side Containers which known for its ability to section out its part, providing ease for loading and unloading product or goods. It is separated into two major types including the Open top container and Open side container. The Open top containers have Tarpaulin (a type of blanket) covered on top as there is no roof. It is mainly used for over height cargo. Contradictory, Open side containers would have doors on the side which can be opened, beneficial for wide products.

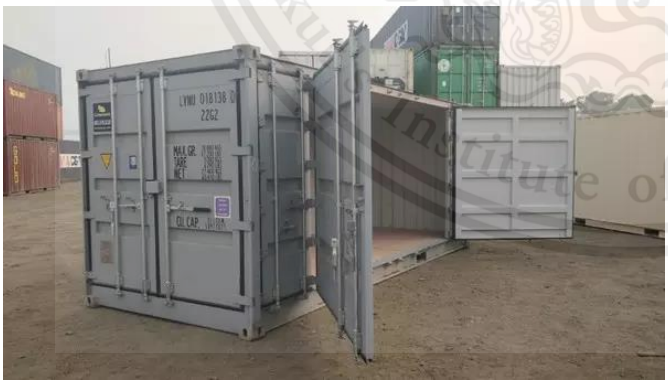

Figure 4:Open Side Containers

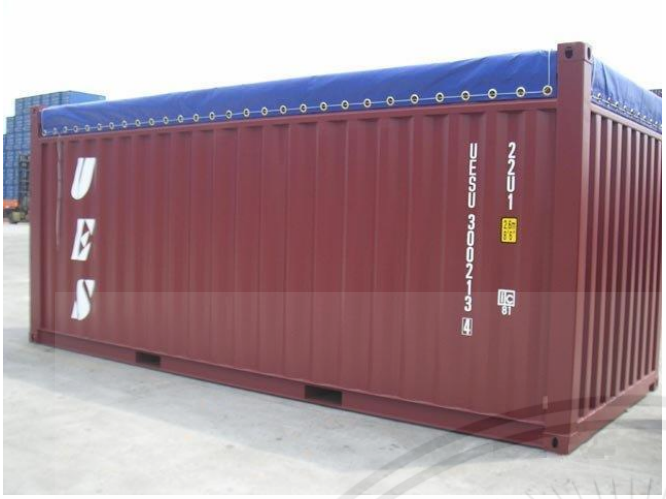

Figure 5: Open Top Container

2.2.1.5 Tank and Bulk Containers

The last types are mainly used for bulk cargos known as Tank/Bulk Containers. The type consists of two sub-types such as Dry Bulk Container with Liner, and Tank/Liquid Bulk Container. The Dry Bulk Container with Liner (DBCLs) is used internationally for dry bulk goods because of how it is easy to install, fill and discharge. The Tank/Liquid Bulk Container, on the other hand, is used for liquid bulk.

Figure 6: Dry Bulk Container with Liner

Figure 7:Tank Containers

2.2.2. Unit Load Device (ULD)

Unit load device is a pallet or container used to load luggage, freight, and mail on wide-body aircraft and specific narrow-body aircraft. It allows a large quantity of cargo to be bundled into a single unit.

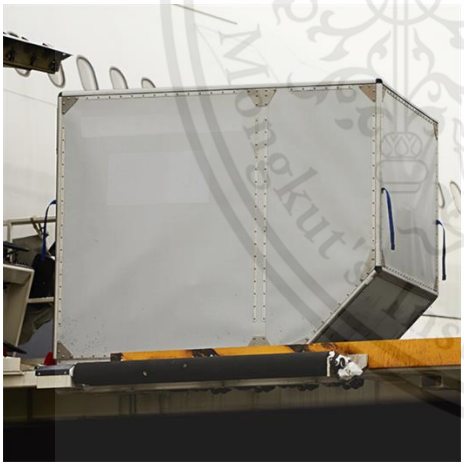

Figure 8:ULD (Container)

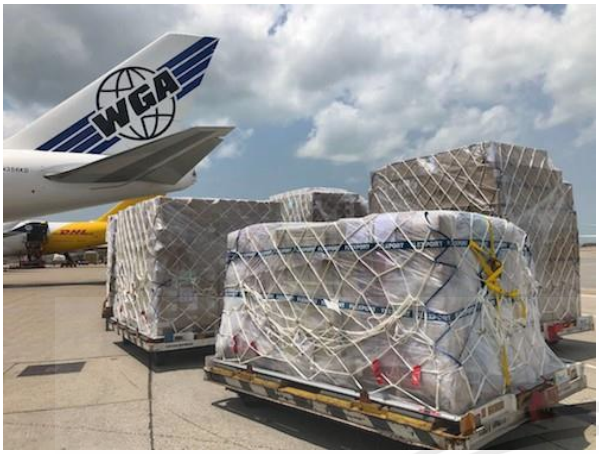

Figure 9:ULD (Pallet)

2.3 Products

In freight transport, the transportation of good can be arranged in group according to their specific requirement. From the data acquired, it can be classified into six major groups constructed with perishable products, non-perishable products, durable products, non-durable products, bulk cargos, and others product.

2.3.1. Perishable product

Product that can spoil easily, require temperature controlled

ex. Fruit & Vegetables, Meat & Poultry, Fish and Seafood

2.3.2. Non-Perishable products

Products that do not spoil, do not require temperature-controlled

ex. Dried/Canned Instant Foods, Bottled/Canned Beverage, and Bottled Banking

2.3.3. Durable Products

Products that are expected to last at least 3 years, long products life and not consumed quickly

ex. Furniture, Home Appliance, and Electronic Devices

2.3.4. Non-Durable Products

Products that are expected to last less than 3 years

ex. Disposable product, Clothing and Textiles, and Footwear

2.3.5. Bulk Cargos

Commodity cargos that are transported unpackaged in large quantities. There is no package of products

2.3.5.1 Solid/Dry Bulk

any cargoes that are transported in a loose form without any packaging and can be dispatched in the factory itself, at mine field or location of the material

2.3.5.2 Liquid bulk

Any materials that can flow freely, normally loaded and unloaded from the ship using pipelines and pumping station

2.3.6.Other Products

Any product not categorized in the former types

ex. Timber, Steel, Paper, Machinery, and Vehicles

2.4. Logistics Parties

Overall, there are 5 parties of logistics provider.

2.4.1. 1PL (First Party Logistics Provider)

This type of service provider sends their own product from one location to another, acting as both the sender and receiver (Consignor and Consignee) of the materials. Some of the examples include manufacturers, retailers, importers, exporters, traders, and wholesalers.

2.4.2. 2PL (Second Party Logistics Provider)

This type of service provider owns the means of transportation vehicle required to use for the distribution or transportation of products from one place to another. For instance, trucking companies that lease or own trucks, airlines that lease or own planes, and shipping lines that lease or charter their ships.

2.4.3. 3PL (Third Party Logistics Provider)

The Third-Party Logistics Provider is the groups of people who help manage your supply chain and distribution needs by offering their unique services to your business. These companies offer many different logistics services using logistics experts rather than in-house staff. For examples, contract management, logistics optimization, transportation, freight forwarding, warehousing, packaging, management consulting, and order fulfillment.

2.4.4. 4PL (Fourth Party Logistics Provider)

The 4PL integrates all the companies along the supply chain to control, plan and steer all logistics procedures to better achieve long-term strategic objectives. It offers a "control tower" view of its supply chains to its customers, supervising the combination of warehouses, distribution firms, freight forwarders and agents. Moreover, these providers are used in the service in-house. An example may be a non-asset owning company that works with multiple resources, including 3PL to manage planning and technology for a client's logistics system.

2.4.5. 5PL (Fifth Party Logistics Provider)

5PL manages and coordinates the activities of 3PL and 4PL through information solutions related to supply and demand in e-commerce delivery market as they have an extensive focus on e-business solution. The 5PL role is to plan, organize and implement logistics solutions on behalf of the contracting company with a focus on utilizing the most appropriate technology. It is the most popular and developed logistics service for e-commerce.

2.5. Factors

Factors are things that we think can influence a person’s choice in mode in transportation.

2.5.1. Intermodal Terminal

The terminal areas corresponding to modal change points.

This includes the interface between the different transport mode which are the interfaces between roadway freight and air, rail, or water shipping modes.

2.5.2. Transport Distance

The distance of freight transport

1.) Pre-Haulage: The transport of goods from shipper to terminal

2.) Long-Haul Shipment: The transport of goods between two terminals.

3.) Post-Haulage: The transport of goods from terminal to receiver.

Intermodal Freight Transport Procedure can be sectioned into three major steps:

Pre-Haulage (Road) → Long-Haul Shipment (Rail/Sea/Air) → Post-Haulage (Road)

Unimodal Freight Transport (road only) Procedure can be sectioned into two major steps:

Pre-Haulage → Post-Haulage.

2.5.3. Transport Time

Everything that is related to time in transportation, including time use in transportation, punctuality, and frequency. This is also related to the speed of Transportation where each transport modes have different speed. It means that the faster the transportation rate, the more time can be saved.

Example: Average delivery time and delivery time reliability

2.5.4. Manpower

One's working ability or hours available for work or service by a vehicle driver

Example. Resting time of vehicle's driver especially for 1-man driver in road freight transport with long transport distance

2.5.5. Cost

Payment requires for transportation.

2.5.6. Types of Product

Group of transportation goods

2.5.7. Transport Mode

the different ways by which goods or people are moved (or transported) from one place to the other through land, air or sea

2.5.8. Reliability of Carrier/Vehicle/Container

Chances of causing damage to the consignment or product

2.5.9. Capacity

The maximum amount of product or cargo each mode can contain.

Chapter 3: Procedure

In this project, survey research was used as a medium to collect data to determine the factors that causes logistics users and logistic providers to pick their suitable transport modes. To achieve the project goal, the instruction of the project has been set as following:

3.1 Set the sample group

3.2 Data collection tool

3.3 Build the testing instrument

3.4 Surveying process

3.5 Data Analysis

3.1. Set the Sample Group

The purposive sampling was used in the project to set the target of survey at specific group of people. The target of this survey includes the logistic providers who use container in transportation.

3.2. Data Collection Tools

The data collection tool that was used is the survey questions. The questions were designed to have only close-ended questions to get the most specific, precise, and accurate answers from the logistic providers. The survey is constructed with three-part which are

Part 1: Personal and Company/Organization Information

Part 2: Factors on Choosing Modes of Freight Transport

Part 3: Products Which Related to Company/Organization and Suitability of Each Mode of Freight Transport

3.3. Build the Testing Instrument

To compose the survey, which is the data collection tool, the following process was done.

Step 1: Set up the 3 parts which will be include in the survey

Step 2: Identify the question that will be ask in each part

Step 3: Examine and gain confirmation on the survey question with the assistant professor

Step 4: Set up initial testing where the survey question is tested with a small number of a sample group

Step 5: Optimize the survey question in accordance with the tested sample group opinion and feedbacks

3.4. Surveying Process

In the surveying process, the surveys were sent out the survey to different companies/organizations that have freight transport as a part of their business. The survey is done by different level employees in each company to get their opinion on suitable mode choice in freight transport. The survey is then collected and rechecked to see whether the survey is useable in the analysis part of the project.

3.5. Data Analysis

For data analysis, the program used was called Statistical Package for the Social Sciences (SPSS LAB), the most frequently used software among psychologists, sociologists, and linguists (and probably in many other fields) to perform statistical computations. The program can show the number of selected choices, and then calculate the number to pick rate percentage. According to the program functions, it can be used to determine how much each factor affect logistic provider to pick their prefer mode. The program can, moreover, show which mode the logistic provider will pick in difference condition.

Chapter 4: Result Analysis

From the survey sent to the logistic providers who use intermodal freight transport in order to study the factors or variables that cause logistics providers to make their choice to pick their suitable mode. Individuals from 38 companies were surveyed where in three different parts where all the information is analyzed by statistical analysis.

Data Grouping for Data Analysis

General data analysis – Descriptive statistic for scale, frequency analysis nominal/ ordinal
This section uses scale as the rating factor.

The forms in which variables/numbers can be classified by.

1. Nominal - a naming scale in which variables are simply "named" or "labeled," with no particular order. According to the research, the nominal variables are all general data except “Level in organization”.
2. Ordinal - a naming scale in which variables are simply "named" or "labeled," with particular order definition. According to the research, the only ordinal variable includes “Level in organization”.
3. Scale - renders a quantitative symbolization of an attribute. According to the research the scale variables includes all choices from the Descriptive Statistics (Scale) Section (which is section 4.1.2).

Further data analysis – Difference in “Scale” with specified “Nominal/Ordinal”

1. Independent Samples T-Test - compares the means of two (and only two) separate populations to see whether statistical proof exists that the related population means are significantly different. Sig. value of “Levene’s Test for Equality Variances” defines which condition (Equal variances assumed/not assumed) will be used.
2. One-Way ANOVA (For Nominal with more than 2 Groups): used to determine whether there are any statistically significant differences between the means of three or more independent (unrelated) groups.

2.1 Least significant difference (LSD) test: used in the context of the analysis of variance when the difference between the population means is significant. This test helps to identify the populations whose means are statistically different.

4.1. Frequencies Analysis

4.1.1. Gender

According to the questionnaire answered from 38 participants, it been found that there are 12 males and 26 females' respondent, thus, the percentage of answered participants based on gender is 31.6% and 68.4% respectively. The following result is shown in table 4.1 below.

Gender	Frequency	Percentage (%)
Male	12	31.6
Female	26	68.4
Total	38	100

Table 1:Frequencies Analysis of Responder's Gender

4.1.2. Age

According to the questionnaire 4 different age ranges were provided to the respondent. As a result, 8 respondents are aged between 20-30 years old, accounting for 21.1% of the responds. Moreover, 13 respondents are aged between 31-40 years old, and 7 respondents are aged between 41-50 years old, contributing to 34.2% and 18.4% of the responds, respectively. Lastly, 10 respondents are aged between 51-60 years old, accounting for 26.3% of the responds. The overall result is shown in the table 4.2.

Age	Frequency	Percent (%)
20-30 years	8	21.1
31-40 years	13	34.2
41-50 years	7	18.4

51-60 years old	10	26.3
Total	38	100

Table 2: Frequencies Analysis of Responder's Age

4.1.3. Department

Based on the questionnaire provided, 5 departments were provided to the respondents to answer based on their current working position. The departments provided are transport/shipping, import/export, warehousing, supply chain, and others where the frequency found was 11, 3, 4, 4, and 16 respectively. This also account to the overall percentage as 28.9%, 7.9%, 10.5%, 10.5%, and 42.1% accordingly. The overall result is displayed in table 4.3.

Departments	Frequency	Percent (%)
Transport/Shipping	11	28.9
Import/Export	3	7.9
Warehousing	4	10.5
Supply Chain	4	10.5
Others	16	42.1
Total	38	100.0

Table 3: Frequencies Analysis of Responder's Department

4.1.4. Level in Organization

4 different organizational levels were provided in the questionnaire for the respondent to answer based on their current position. The result has shown that there are 3 respondents in Top Manager Level, 9 in Middle Manager level, 5 in First-Line Manager and 21 in Non-Supervisory Employee, contributing to the percentage of 7.9%, 23.7%, 13.2%, and 55.3% respectively. The table 4.4 is used to show the results.

Level in Organization	Frequency	Percent (%)
Top Manager	3	7.9

Middle Manager	9	23.7
First-Line Manager	5	13.2
Non-Supervisory Employee	21	55.3
Total	38	100

Table 4:Frequencies Analysis of Responder's Level in Organization

4.1.5. Experience

From the questionnaire, experience can be categorized into 3 categories such as less than 5 years, 5 - 10 years and more than 10 years. The result has been found that there are 7 respondents who have less than 5 years of experience, 11 with 5 - 10 years of experience and 20 with more than 10 years of experience, accounting as 18.4%, 28.9% and 52.6% accordingly. The result is presented in the table 4.5 below.

Experience	Frequency	Percent (%)
Less than 5 years	7	18.4
5 - 10 years	11	28.9
More than 10 years	20	52.6
Total	38	100

Table 5: Frequencies Analysis of Responder's Experience

4.1.6. Types of Company/Organization

According to the questionnaire answered from 38 participants, it been found that there are 31 respondents are from company limited contributing to 81.6% of the overall responds. On the other hand, 7 participants are from public company limited which accounts for 18.4% of the responds. The total result can be seen in the table 4.6 below.

Types of Company/Organization	Frequency	Percent (%)

Company Limited	31	81.6
Public Company Limited	7	18.4
Total	38	100

Table 6: Frequencies Analysis of Responder's Types of Company/Organization

4.1.7. Establishment

As stated in the questionnaire, the length of company establishment was asked with the choices ranging from 5 - 10 years or more than 10 years establishment. Consequently, the result has shown that there is only 2.6% or 1 company established within 5 - 10 years while the rest is categorized into company with 'more than 10 years' establishment, contributing up to 97.4% or 37 responders. The result is exhibited in the table 4.7.

Establishment	Frequency	Percent (%)
5 - 10 years	1	2.6
More than 10 years	37	97.4
Total	38	100

Table 7: Frequencies Analysis of Responder's Establishment

4.1.8. Logistic Parties

According to the research, there are 5 parties of logistics provider such as 1PL, 2PL, 3PL, 4PL and 5PL. The respondents have answered based on their current logistic parties where the result have shown that there are 10, 21, 4, 2, and 1 logistic parties in the category of 1PL, 2PL, 3PL, 4PL and 5PL respectively. The results can be shown in the percentage of 26.3% for 1PL, 55.3% for 2PL, 10.5% for 3PL, 5.3% for 4 PL and 2.6% for 5PL. Table 4.8 is used to demonstrate the overall result.

Logistic Parties	Frequency	Percent (%)
1PL	10	26.3

2PL	21	55.3
3PL	4	10.5
4PL	2	5.3
5PL	1	2.6
Total	38	100

Table 8: Frequencies Analysis of Responder's Logistic Parties

4.1.9. Use of Container

The questionnaire has asked the respondents to indicate whether or not their company uses containers for logistic transport. According to the answers all 38 responders or 100% uses container as a part of their logistic transport. Table 4.9 is used to summarize the results.

Use of Container	Frequency	Percent (%)
Yes	38	100
Total	38	100

Table 9: Frequencies Analysis of Responder's Use of Container

4.1.10. Import and Export

According to the questionnaire answered from 38 participants, it is found that there are 15 responders who both import and export product, 1 company who import product only, 6 responders who export products only, and 16 responders who neither import nor export product. This is accounted in percentage as 39.5%, 2.6%, 15.8%, and 42.1% accordingly. The overall result is presented in the table 4.10 below.

Import and Export	Frequency	Percent (%)
Both Import and Export	15	39.5
Import only	1	2.6

Export only	6	15.8
Neither Import nor Export	16	42.1
Total	38	100

Table 10: Frequencies Analysis of Responder's Import and Export related

4.1.11. Use of Intermodal Freight Transport

From 38 respondent, it was found that 35 responders use Intermodal Freight Transport as a part of the transport, yet 3 of the responders stated that they do not use Intermodal Freight Transport. This can be accounted as 92.1% and 7.9% out of 100% of responds, respectively.

Use of Intermodal Freight Transport	Frequency	Percent (%)
Yes	35	92.1
No	3	7.9
Total	38	100

Table 11: Frequencies Analysis of Responder's Relation with Intermodal Freight Transport

4.1.12. Relation with Perishable Products

According to the respond from 38 responders, 36 responders or 94.7% of the respond has informed that they work in relation with perishable products. On the other hand, 2 responders don't work with perishable product, thus, is not accounted for the perishable products sections (4.2.2 and 4.2.3) below.

Relation with Perishable Products	Frequency	Percent (%)
Yes	36	94.7
No	2	5.3
Total	38	100

Table 12: Frequencies Analysis of Responder's Relation with Perishable Product

4.1.13. Container Used in Perishable Products

Out of 36 responders stated that they work with perishable products, 24 responders also stated that they use ULD or a unit load device for the transportation. Thus, it accumulated up to 63.2% responders using ULD and 31.6% responders not using ULD.

Container Used in Perishable Products	Frequency	Percent (%)
Do not use ULD	12	33.3
Uses ULD	24	66.7
Total	36	100

Table 13: Frequencies Analysis of Container Used in Perishable Products

4.1.14. Freight Modes Used in Perishable Products

Based on the responds on freight modes used in perishable products, it is found that the freight mode which is least used in perishable products is air freight transport (intermodal container) only. While other mode choices such as not using air freight transport, using air freight transport (ULD), and using both air freight transport (intermodal container and ULD) are used in similar range. This can imply that only using air freight transport (intermodal container) might not suit the product well, thus, is not preferred.

Freight Modes Used in Perishable Products	Frequency	Percent (%)
Not using Air Freight Transport	12	33.3
Using Air Freight Transport (Intermodal Container)	1	2.8
Using Air Freight Transport (ULD)	11	30.6

Using Both Air Freight Transport (Intermodal Container and ULD)	12	33.3
Total	36	100

Table 14: Frequencies Analysis of Freight Modes Used in Perishable Product

4.1.15. Relation with Non-Perishable Products

According to the respond from 38 responders, only 27 responders or 71.1% of the respond has informed that they work in relation with non-perishable products. On the other hand, up to 11 responders stated that they do not work with non-perishable product, thus, is not accounted for the non-perishable products sections (4.2.5 and 4.2.6) below.

Relation with Non-Perishable Products	Frequency	Percent (%)
Yes	27	71.1
No	11	28.9
Total	38	100

Table 15: Frequencies Analysis of Responder's Relation with Non-Perishable Products

4.1.16. Container Used in Non-Perishable Products

Out of 27 responders stated that they work with non-perishable products, it was found that up to 22 responders stated that they use do not ULD or a unit load device for the transportation which accounted as 81.5% of responds. Thus, only 5 responders or 18.5% stated that they use ULD for the transportation of non-perishable products.

Container Used in Perishable Products	Frequency	Percent (%)
Do not use ULD	22	81.5
Uses ULD	5	18.5
Total	27	100

Table 16: Frequencies Analysis of Container Used in Non-Perishable Products

4.1.17. Freight Modes Used in Non-Perishable Products

Based on the responds on freight modes used in perishable products, it is found that the mostly used freight mode in the transportation of non-perishable products is not using air freight transport. While other mode choices such as air freight transport (intermodal container), using air freight transport (ULD), and using both air freight transport (intermodal container and ULD) are used in similar range with only minor differences. This can imply that non-perishable products might not require the use of air freight transport or air freight transport may damage the product.

Freight Modes Used in Perishable Products	Frequency	Percent (%)
Not using Air Freight Transport	21	77.8
Using Air Freight Transport (Intermodal Container)	1	3.7
Using Air Freight Transport (ULD)	2	7.4
Using Both Air Freight Transport (Intermodal Container and ULD)	3	11.1
Total	27	100

Table 17: Frequencies Analysis of Freight Modes Used in Non-Perishable Products

4.2.Descriptive statistics (Scale)

4.2.1. Factors effecting mode choices

A total of 9 factors were given to the 38 respondents to rate on the importance of each factors' effect on mode choices. The scale provided ranged from 1 to 5 where 1 means not an important factor and 5 means a significantly important factor. Overall, it can be seen that the maximum rating for all factors is 5 implying that all of the factors is significantly important to the majority of the responders. However, the minimum rating has display that the factor with least rating or the least important factor is "manpower". The minimum rating has further display that the factors with highest minimum ratings are transport time, punctuality and frequency, and reliability of vehicle and container. Yet, when analyzing the mean of factors' ratings, it can be seen that the most important factor influencing mode choices is actually

"cost" followed by reliability of vehicle and container. This may result from the fact that some responders may pay low attention to cost, hence, rating the factor as 3 but actually the majority of responders thinks that cost is a significantly important factor. On the other hand, the least important factor is still "manpower" which is exactly the same as the minimum significant factor stated above. In conclusive, it can be conclude that the most important factors effecting mode choices are cost and reliability of vehicle and container while the least important factor is manpower.

	Minimum	Maximum	Mean
Intermodal Terminal Location	3	5	4.18
Transport Distance	3	5	4.24
Transport Time, Punctuality and Frequency	4	5	4.42
Speed of Transport	3	5	4.21
Manpower	2	5	4.03
Cost	3	5	4.61
Types of Product	3	5	4.34
Reliability of Vehicle and Container	4	5	4.53
Capacity of each Transport Modes	3	5	4.21

Table 18: Descriptive Statistic of 9 Factors

4.2.2. Suitability score of each mode for Perishable Product (N = 36)

From 36 responders that has relation with perishable product; a scale based questionnaire was asked under the topic of freight mode suitability for perishable product. The

scale provided ranged from 1 to 5 where 1 means not suitable and 5 means a significantly suitable.

4.2.2.1 Perishable with Short to Medium Transport Distance

According to short to medium transport distance of perishable product, it can be seen that the maximum rating for all factors is 5 implying that all of the factors is suitable or is preferred by certain responders. Yet, the minimum rating has displayed that the least suitable transport mode is all the modes except “Road-Sea” transport which has the highest minimum rating of 2. Contradictory, when examining the mean, it is observed that the most suitable transport mode is "Road Only" while the least suitable transport mode is "Road - Air". Thus, out of 36 responders, "Road Only" is the transport mode most likely used for short to medium transport distance of perishable product.

	Minimum	Maximum	Mean
"Road - Rail" for Short - Medium Transport Distance	1	5	3.22
"Road - Sea" for Short - Medium Transport Distance	2	5	3.33
"Road - Air" for Short - Medium Transport Distance	1	5	2.78
"Road Only" for Short - Medium Transport Distance	1	5	3.81

Table 19: Descriptive Statistics of Mode Choice Rating, Perishable Products with Short-Medium Transport Distance

4.2.2.2 Perishable with Long Transport Distance

From the data collect on perishable with long transport distance, it is found that the maximum rating for all modes is 5 implying that all of the factors is suitable for certain responders. Yet, the minimum rating has displayed that the least suitable transport mode is all the modes. This also implies that some transport mode is highly unsuitable or not preferred by

certain responders. Thus, when analyzing the mean, it is observed that the most suitable transport mode is "Road - Air" while the least suitable transport mode is "Road - Rail". It can be further assumed that the choice may be related with the time it takes for each transport mode since it is perishable product. In conclusive, out of 36 responders, "Road - Air" is the transport mode most likely used for long transport distance of perishable product.

	Minimum	Maximum	Mean
"Road - Rail" for Long Transport Distance	1	5	2.53
"Road - Sea" for Long Transport Distance	1	5	3.47
"Road - Air" for Long Transport Distance	1	5	4.11
"Road Only" for Long Transport Distance	1	5	2.83

Table 20: Descriptive Statistics of Mode Choice Rating, Perishable Products with Long Transport Distance

4.2.3. Suitability score of each mode for Non-Perishable Product (N = 27)

From 27 responders that has relation with non-perishable product; a scale-based questionnaire was asked under the topic of freight mode suitability for non-perishable product. The scale provided ranged from 1 to 5 where 1 means not suitable and 5 means a significantly suitable.

4.2.3.1 Non-Perishable with Short to Medium Transport Distance

According to the results, the "Road - Air" mode of transportation is the least suitable for this mode of transportation because it has the lowest maximum rating of 4 and the lowest minimum rating of 1, with a mean of only 2.19. However, while both "Road Only" and "Road - Rail" modes received a maximum of 5 and a minimum of 1, "Road Only" has the highest mean rating. As a result, it is the most suitable mode of transportation in this section. In comparison, despite having the highest minimum score of 2 and maximum score of 5, "Road -

Sea" is ranked as the third most suitable mode of transportation. This may occur due how it is suitable to an acceptable level but is not significantly suitable as much as "Road Only" and "Road - Rail" modes.

	Minimum	Maximum	Mean
"Road - Rail" for Short - Medium Transport Distance	1	5	3.56
"Road - Sea" for Short - Medium Transport Distance	2	5	3.26
"Road - Air" for Short - Medium Transport Distance	1	4	2.19
"Road Only" for Short - Medium Transport Distance	1	5	4.33

Table 21: Descriptive Statistics of Mode Choice Rating, Non-Perishable Products with Short-Medium Transport Distance

4.2.3.2 Non-Perishable with Long Transport Distance

From 27 responders, the overall ranking for all modes is 5, meaning that all the modes are suitable for some firms. Despite this, the minimum scale has shown that the least appropriate mode of transportation is all modes. This also means that certain modes of transportation are unsuitable or unflavored by certain responders. When evaluating the mean, it is discovered that "Road - Sea" mode is the most suitable mode of transportation with mean rating of 4.00, whereas "Road - Rail", "Road - Air", and "Road Only" can be accounted as the least suitable mode with the mean rating of 2.81, 2.89 and 2.59 respectively. It is assumed that the outcomes are reasonable since the option is influenced by the cost for each mode of transportation.

	Minimum	Maximum	Mean

"Road - Rail" for Long Transport Distance	1	5	2.81
"Road - Sea" for Long Transport Distance	1	5	4.00
"Road - Air" for Long Transport Distance	1	5	2.89
"Road Only" for Long Transport Distance	1	5	2.59

Table 22: Descriptive Statistics of Mode Choice Rating, Non-Perishable Products with Long Transport Distance

4.3. Independent Sample T Test

Test Conditions

From the Levene's Test for Equality of Variances, two conditions can be met:

a. If Sig. value of “Levene’s Test” is greater than 0.05 then the Sig. Value from “Equal variances assumed” for T-Test would be used
b. If Sig. value of “Levene’s Test” is less than 0.05 then the Sig. Value from “Equal variances not assumed” for T-Test would be used

After we check Levene’s Test condition and acquire sig of T Test, two conditions can be met:

a. If Sig. value of either “equal assumed” or “equal not assumed” condition from “T Test” is lesser than 0.05, it can be concluded as an unequal variance. In other words, there is a difference between 2 groups.
b. If Sig. value of either “equal assumed” or “equal not assumed” condition from “T Test” is greater than 0.05, it can be concluded as insignificant or equal variances. In other words, there is no difference between 2 groups.

4.3.1. Gender and 9 Factors

This Independent Sample T Test was done in order to compares the means of gender and factors to see whether statistical proof exists that the related population means are

significantly different. From the results, it can be seen that all Sig. Value from T Test has a value greater than 0.05 in all factors except “Manpower” and “Reliability of Vehicle and Container”. Thus, it can conclude that “Gender” has an unequal variances on “Manpower” (Sig value = 0.016) and “Reliability of Vehicle and Container” (Sig value = 0.02). Therefore, gender has effect on manpower and reliability of vehicle and container.

Independent Samples T Test

		Sig. (2-tailed)
Intermodal Terminal Location	Equal variances assumed	0.273
Transport Distance	Equal variances assumed	0.556
Transport Time, Punctuality and Frequency	Equal variances assumed	0.155
Speed of Transport	Equal variances assumed	0.732
Manpower	Equal variances assumed	0.016
Cost	Equal variances assumed	0.869
Types of Product	Equal variances assumed	0.566
Reliability of Vehicle and Container	Equal variances assumed	0.02
Capacity of each Transport Modes	Equal variances assumed	0.732

Table 23: Independent Sample T-Test of “Gender and 9 factors”

4.3.2. Gender and Mode Choice Ratings: Perishable Products

The aim of this Independent Sample T Test was to compare the gender and mode choice ratings on perishable products means to see if statistical evidence exists that the relevant population means are significantly different. All Sig. Values from T Test have a value greater than 0.05 in all factors but "Road Only" for Long Transport Distance (Perishable

Products), as can be seen from the results. Therefore, it can be assumed that “Gender” has an unequal variance on “Road Only [Long Transport Distance of Perishable Products]” (T value = -2.376 and Sig value = 0.023) or that Road Only [Long Transport Distance of Perishable Products] is affected by gender.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.243
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.258
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.64
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.92
"Road - Rail" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.494
"Road - Sea" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.326
"Road - Air" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.393
"Road Only" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.023

Table 24: Independent Sample T-Test of “Gender and Mode Choice Ratings of perishable product”

4.3.3. Gender and Mode Choice Ratings: Non-Perishable Products

Gender and mode choice ratings on non-perishable products were tested by Independent Sample T Test to compare the means to see if statistical evidence exists that the relevant population means are significantly different. All Sig. Values from T Test have a value greater than 0.05 in all factors. Consequently, “Gender” has equal variances on all mode choice rating of Non-Perishable Products; therefore, there is no difference between 2 groups and gender does not affect all mode choice rating of Non-Perishable Products.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.174
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.629
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.166
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.293
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.653
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.702
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.514

"Road Only" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.39

Table 25: Independent Sample T-Test of “Gender and Mode Choice Ratings of Non-Perishable Product”

4.3.4. Types of Company and 9 Factors

The Independent Sample T Test was used to compare the means of the types of companies and the 9 factors and see whether there was statistical evidence that the related population means were significantly different. In all variables, all Sig. Values from T Test have a value greater than 0.05. As a result, there is no difference between the two groups since "Types of Company" has insignificant or equal variances on all variables. This means the types of companies do not affect the 9 factors.

Independent Samples T Test

		Sig. (2-tailed)
Intermodal Terminal Location	Equal variances assumed	0.089
Transport Distance	Equal variances assumed	0.159
Transport Time, Punctuality and Frequency	Equal variances assumed	0.966
Speed of Transport	Equal variances assumed	0.682
Manpower	Equal variances assumed	0.924
Cost	Equal variances assumed	0.087
Types of Product	Equal variances assumed	0.762
	Equal variances not assumed	0.824

Reliability of Vehicle and Container	Equal variances assumed	0.579
Capacity of each Transport Modes	Equal variances assumed	0.682

Table 26: Independent Sample T-Test of “Types of Company and 9 Factors”

4.3.5. Types of Company and Mode Choice Ratings: Perishable Products

The Independent Sample T Test was used to compare the means of the types of companies and the mode choice ratings: perishable products and see whether there was statistical evidence that the related population means were significantly different. It is observed that “Types of Company” has unequal variances on “Road-Air [Short-Medium Transport Distance of Perishable Products]” from its Sig value of 0.004. Moreover, the “Types of Company” also has unequal variances “Road Only [Short-Medium Transport Distance of Perishable Products]” and “Road-Rail [Long Transport Distance of Perishable Products]” from its Sig value of 0.003 and 0.041 respectively. Thus, it is assumed that Types of Company has effect on Road-Air [Short-Medium Transport Distance of Perishable Products], Road Only [Short-Medium Transport Distance of Perishable Products], and Road-Rail [Long Transport Distance of Perishable Products.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.08
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.096
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.004

"Road Only" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.003
"Road - Rail" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.041
"Road - Sea" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.649
"Road - Air" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.923
"Road Only" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.494

Table 27: Independent Sample T-Test of Types of "Company and Mode Choice Ratings: Perishable Products"

4.3.6. Types of Company and Mode Choice Ratings: Non-Perishable Products

Types of companies and the mode choice ratings: non-perishable products were evaluated by Independent Sample T Test to see whether the related population means is significantly different proven by statistical evidence. It is observed that "Types of Company" has equal variances on all mode choices except "Road Only [Short-Medium Transport Distance of Non-Perishable Products]". Thus, it can be concluded that the "Types of Company" has an unequal variance on "Road Only [Short-Medium Transport Distance of Non-Perishable Products]" meaning that Types of Company does affect Road Only [Short-Medium Transport Distance of Non-Perishable Products] and no other mode choices.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.145

"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.986
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.072
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.009
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Equal variances not assumed	0.947
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	1
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.5
"Road Only" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.504

Table 28: Independent Sample T-Test of "Types of Company and Mode Choice Ratings: Non-Perishable Products"

4.3.7. Established and 9 Factors

The aim of this Independent Sample T Test was to compare the means of the Established and 9 Factors to see whether statistical proof exists that the related population means are significantly different. Yet, it is found that "Established" has an equal variance on all factors, meaning that there is no difference between 2 groups and Established does not affect all 9 Factors.

Independent Samples T Test

	Sig. (2-tailed)

Intermodal Terminal Location	Equal variances assumed	0.745
Transport Distance	Equal variances assumed	0.63
Transport Time, Punctuality and Frequency	Equal variances assumed	0.246
Speed of Transport	Equal variances assumed	0.659
Manpower	Equal variances assumed	0.974
Cost	Equal variances assumed	0.472
Types of Product	Equal variances assumed	0.524
Reliability of Vehicle and Container	Equal variances assumed	0.35
Capacity of each Transport Modes	Equal variances assumed	0.659

Table 29: Independent Sample T-Test of "Established and 9 Factors"

4.3.8. Established and Mode Choice Ratings: Perishable Products

This Independent Sample T Test was done to compare and see whether or not a statistical proof exists between the significantly different of Established and Mode Choice Ratings: Perishable Products means. Accordingly, it is found that "Established" has an equal variance on all mode choices except on "Road-Air [Short-Medium Transport Distance of Perishable Products]". This means that there is no difference between 2 groups and Established does not affect 7 mode choices while effecting "Road-Air [Short-Medium Transport Distance of Perishable Products]". Therefore, "Established" has an unequal

variance on “Road-Air [Short-Medium Transport Distance of Perishable Products]” with Sig value of 0.02.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.841
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.721
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.02
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.295
"Road - Rail" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.692
"Road - Sea" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.657
"Road - Air" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.35
"Road Only" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.292

Table 30: Independent Sample T-Test of “Established and Mode Choice Ratings: Perishable Products”

4.3.9. Established and Mode Choice Ratings: Non-Perishable Products

According to the Independent Sample T Test between Established and Mode Choice Ratings: Perishable Non-Products, it is found that “Established” has an equal variance on all factors, meaning that there is no difference between 2 groups. Overall, established does not affect all Mode Choice Ratings: Non-Perishable Products.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.711
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.501
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.23
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.563
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.876
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.336
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.077
"Road Only" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.709

Table 31: Independent Sample T-Test of “Established and Mode Choice Ratings: Non-Perishable Products”

4.3.10. Use of Intermodal and 9 Factors

This Independent Sample T Test was done in order to compares the means of Use of Intermodal and 9 factors to see whether statistical proof exists that the related population means are significantly different. From the results, it can be seen that all Sig. Value from T Test has a value greater than 0.05 in all factors except “Intermodal Terminal Location”, “Transport Distance” and “Speed of Transport”. Thus, Use of Intermodal has an unequal variance on “Intermodal Terminal Location”, “Transport Distance”, and “Speed of Transport” with Sig value = 0.005, 0.034, and 0.037 respectively. This can also mean that Use of Intermodal has effect on Intermodal Terminal Location”, “Transport Distance”, and “Speed of Transport”.

Independent Samples T Test

		Sig. (2-tailed)
Intermodal Terminal Location	Equal variances assumed	0.005
Transport Distance	Equal variances assumed	0.034
Transport Time, Punctuality and Frequency	Equal variances assumed	0.756
Speed of Transport	Equal variances assumed	0.037
Manpower	Equal variances assumed	0.953
Cost	Equal variances not assumed	0.702
Types of Product	Equal variances assumed	0.253

Reliability of Vehicle and Container	Equal variances assumed	0.623
Capacity of each Transport Modes	Equal variances assumed	0.646

Table 32: Independent Sample T-Test of "Use of Intermodal and 9 Factors"

4.3.11. Use of Intermodal and Mode Choice Ratings: Perishable Products

Use of Intermodal and Mode Choice Ratings: Perishable Products were tested by Independent Sample T Test in order to compares the means and see whether statistical proof exists that the related population means are significantly different. According to the Sig value of "Road-Sea [Short-Medium Transport Distance of Perishable Products]" and "Road-Rail [Long Transport Distance of Perishable Products]" which are 0.038 and 0.011 respectively, it is found that the "Use of Intermodal" has an unequal variance on both choices. Therefore, Use of Intermodal has effect on Road-Sea [Short-Medium Transport Distance of Perishable Products]" and "Road-Rail [Long Transport Distance of Perishable Products]". Yet, Sig. Value from T Test of any other choices has a value greater than 0.05 therefore, they are not affected by Use of Intermodal.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.346
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Equal variances not assumed	0.038
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.071
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.703

"Road - Rail" for Long Transport Distance (Perishable Products)	Equal variances not assumed	0.011
"Road - Sea" for Long Transport Distance (Perishable Products)	Equal variances not assumed	0.253
"Road - Air" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.868
"Road Only" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.389

Table 33: Independent Sample T-Test of "Use of Intermodal and Mode Choice Ratings: Perishable Products"

4.3.12. Use of Intermodal and Mode Choice Ratings: Non-Perishable Products

To compares the means and see whether statistical proof exists that the related population means are significantly different, an Independent Sample T Test between Use of Intermodal and Mode Choice Ratings: Non-Perishable Products were tested. According to the result, it is found that "Use of Intermodal" has an unequal variance on "Road-Rail [Short-Medium Transport Distance of Non-Perishable Products]" with Sig value of 0.025 and "Road Only [Short-Medium Transport Distance of Non-Perishable Products]" with Sig value of 0.001. Thus, it can imply that the Use of Intermodal has effect on "Road-Rail [Short-Medium Transport Distance of Non-Perishable Products]" and "Road Only [Short-Medium Transport Distance of Non-Perishable Products]". For other mode choices, all Sig value has a value greater than 0.05 therefore, they are not affected by Use of Intermodal.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.025
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.106

"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.788
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.001
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.118
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.336
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.363
"Road Only" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.137

Table 34: Independent Sample T-Test of "Use of Intermodal and Mode Choice Ratings: Non-Perishable Products"

4.3.13. Relation with Perishable and 9 Factors

This Independent Samples T Test was tested between Relation with Perishable and 9 Factors to compares the means and see whether statistical proof exists that the related population means are significantly different. As a result, it is found that the only two factors which has Sig value below 0.05 is "Transport Distance" with Sig value of 0.005 and "Transport Time, Punctuality and Frequency" with Sig value of 0.000. Thus the "Relation with Perishable" has an unequal variance on "Transport Distance" and "Transport Distance". Yet, during the test, the Relation with Perishable and Mode Choice Ratings: Perishable Products are skipped as all answers are 'yes'. Moreover, Relation with Perishable and Mode Choice Ratings: Non-Perishable Products)" are skipped as it has a different type of product. Otherwise, the other factors are not affected by the "Relation with Perishable".

Independent Samples T Test

	Sig. (2-tailed)

Intermodal Terminal Location	Equal variances assumed	0.077
Transport Distance	Equal variances not assumed	0.005
Transport Time, Punctuality and Frequency	Equal variances not assumed	0
Speed of Transport	Equal variances assumed	0.526
Manpower	Equal variances assumed	0.39
Cost	Equal variances assumed	0.784
Types of Product	Equal variances assumed	0.674
Reliability of Vehicle and Container	Equal variances assumed	0.941
Capacity of each Transport Modes	Equal variances assumed	0.526

Table 35: Independent Sample T-Test of "Relation with Perishable and 9 Factors"

4.3.14. Container Used in Perishable Products and 9 Factors

From the Independent Samples T Test was tested between Container Used in Perishable Products and 9 Factors, which compares the means and see whether statistical proof exists that the related population means are significantly different, it is seen that the "Container Used in Perishable Products" has insignificant or equal variances to all factors. Therefore, "Container Used in Perishable Products" has no effect on any of the 9 Factors.

Independent Samples T Test

		Sig. (2-tailed)
Intermodal Terminal Location	Equal variances assumed	0.282
Transport Distance	Equal variances assumed	0.487
Transport Time, Punctuality and Frequency	Equal variances assumed	0.819
Speed of Transport	Equal variances assumed	0.812
Manpower	Equal variances assumed	0.074
Cost	Equal variances assumed	0.834
Types of Product	Equal variances assumed	1
Reliability of Vehicle and Container	Equal variances assumed	0.648
Capacity of each Transport Modes	Equal variances assumed	0.812

Table 36: Independent Sample T-Test of "Container Used in Perishable Products and 9 Factors"

4.3.15. Container Used in Perishable Products and Mode Choice Ratings of Perishable Products

Container Used in Perishable Products and Mode Choice Ratings: Perishable Products were tested by Independent Sample T Test in order to compares the means and see whether statistical proof exists that the related population means are significantly different. According to the Sig value of all mode choice, it is found that the "Container Used in Perishable Products" only has an unequal variances on "Road Only [Long Transport Distance of

Perishable Products]" with Sig value of 0.009. Accordingly, it can imply that "Container Used in Perishable Products" only has effect on "Road Only [Long Transport Distance of Perishable Products]" and not any other mode choice ratings of perishable products. Note that Container Used in Perishable Products and Mode Choice Ratings : Non-Perishable Products" are skipped as it has a different types of product.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.916
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.453
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.559
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Equal variances assumed	0.478
"Road - Rail" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.433
"Road - Sea" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.433
"Road - Air" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.627

"Road Only" for Long Transport Distance (Perishable Products)	Equal variances assumed	0.009

Table 37: Independent Sample T-Test of "Container Used in Perishable Products and Mode Choice Ratings of Perishable Products"

4.3.16. Relation with Non-Perishable and 9 Factors

This Independent Samples T Test was tested between Relation with Non-Perishable and 9 Factors to compares the means and see whether statistical proof exists that the related population means are significantly different. As a result, it is found that the only one factor which has Sig value below 0.05 is "Speed of Transport "with Sig value of 0.003. Thus the "Relation with Non-Perishable" has an unequal variance on "Speed of Transport" while there is no effect on other factors. However, the "Relation with Non-Perishable and Mode Choice Ratings: Perishable Products" are skipped as it has a different type of product" as well as "Relation with Non-Perishable and Mode Choice Ratings: Non-Perishable Products" are skipped as all answers are 'yes'.

Independent Samples T Test

		Sig. (2-tailed)
Intermodal Terminal Location	Equal variances assumed	0.202
Transport Distance	Equal variances assumed	0.246
Transport Time, Punctuality and Frequency	Equal variances not assumed	0.238
Speed of Transport	Equal variances not assumed	0.003

Manpower	Equal variances assumed	0.565
Cost	Equal variances assumed	0.082
Types of Product	Equal variances assumed	0.876
Reliability of Vehicle and Container	Equal variances assumed	0.21
Capacity of each Transport Modes	Equal variances not assumed	0.683

Table 38: Independent Sample T-Test of "Relation with Non-Perishable and 9 Factors"

4.3.17. Container Used in Non-Perishable Products and 9 Factors

According to the Independent Sample T Test between Container Used in Non-Perishable Products and 9 Factors, it is found that “Container Used in Non-Perishable Products” has an equal variance on all factors, meaning that there is no difference between 2 groups. Overall, Container Used in Non-Perishable Products does not affect any factors. Remark that “Container Used in Non-Perishable Products and Mode Choice Ratings: Perishable Products” are skipped as it has a different type of products.

Independent Samples T Test

		Sig. (2-tailed)
Intermodal Terminal Location	Equal variances assumed	0.518
Transport Distance	Equal variances assumed	0.618
Transport Time, Punctuality and Frequency	Equal variances assumed	0.574

Speed of Transport	Equal variances assumed	0.738
Manpower	Equal variances assumed	0.135
Cost	Equal variances assumed	0.618
Types of Product	Equal variances assumed	0.174
Reliability of Vehicle and Container	Equal variances assumed	0.972
Capacity of each Transport Modes	Equal variances assumed	0.928

Table 39: Independent Sample T-Test of "Container Used in Non-Perishable Products and 9 Factors"

4.3.18. Container Used in Non-Perishable Products and Mode Choice Ratings: Non-Perishable Products

This Independent Sample T Test was done to compares the means of Container Used in Non-Perishable Products and Mode Choice Ratings of Non-Perishable Products to see whether statistical proof exists that the related population means are significantly different. From the results, it can be seen that all Sig. Value from T Test has a value greater than 0.05. Thus, Container Used in Non-Perishable Products has an equal variance on Mode Choice Ratings of Non-Perishable Products. This, further imply that the Container Used in Non-Perishable Products has no effect on Mode Choice Ratings of Non-Perishable Products.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.254

"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances not assumed	0.825
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances not assumed	0.38
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances not assumed	0.467
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.394
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.35
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.063
"Road Only" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.18

Table 40: Independent Sample T-Test of "Container Used in Non-Perishable Products and Mode Choice Ratings: Non-Perishable Products"

4.4.One-Way ANOVA (For Nominal with more than 2 Groups)

Testing Conditions

One-Way ANOVA

a. If Sig. value of One-Way ANOVA is greater than 0.05 then it has an "Equal variance" or is insignificant

b. If Sig. value of One-Way ANOVA is lesser than 0.05 then it has an “Unequal variance”

In the case of (b.), a Post Hoc (LSD) is done to see which group is having a difference to another.

a. If Post Hoc (LSD) errors occur, recheck the data for any group with only 1 answer. If there is, cut that group out of the analysis.
b. If there are 2 groups left after cutting, the analysis method must be changed to Independent Sample T-Test

4.4.1.Age and 9 Factors

Based on the Sig. value from the analysis, it can be seen that age has an equal variances on all factors. Thus, the respondent at all age range with in this analysis do have the same effect or opinion on the factors.

One-Way ANOVA

		Sig.
Intermodal Terminal Location	Between Groups Within Groups Total	0.235
Transport Distance	Between Groups Within Groups Total	0.619
Transport Time, Punctuality and Frequency	Between Groups Within Groups Total	0.426
Speed of Transport	Between Groups Within Groups Total	0.148
Manpower	Between Groups	0.094

	Within Groups	
	Total	
Cost	Between Groups	0.182
	Within Groups	
	Total	
Types of Product	Between Groups	0.838
	Within Groups	
	Total	
Reliability of Vehicle and Container	Between Groups	0.278
	Within Groups	
	Total	
Capacity of each Transport Modes	Between Groups	0.976
	Within Groups	
	Total	

Table 41: One-Way ANOVA of "Age and 9 Factors

4.4.2. Age and Mode Choice Ratings: Perishable Products

According to the One-Way ANOVA result, it can be seen that “Age” has an unequal variance on “Road-Rail [Short-Medium Transport Distance of Perishable Products]” with Sig value of 0.011. Consequently, the LSD is done in order to see which group has difference comparing to another.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Between Groups	0.011
	Within Groups	
	Total	
"Road - Sea" for Short - Medium Transport	Between Groups	0.564
	Within Groups	
	Total	

Distance (Perishable Products)		
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.118
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.537
"Road - Rail" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.241
"Road - Sea" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.71
"Road - Air" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.163
"Road Only" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.974

Table 42: One-Way ANOVA of "Age and Mode Choice Ratings: Perishable Products"

It is found from the LSD analysis that 41-50 Years is different in means compared to 31-40 Years, 41-50 Years is different in means compared to 51-60 Years, and 51-60 Years is different in means compared to 20-30 Years.

Multiple Comparisons

Dependent Variable: "Road - Rail" for Short - Medium Transport Distance (Perishable Products)

LSD

(I) Age	(J) Age	Sig.
20 - 30 Years	31 - 40 Years	0.065
	41 - 50 Years	0.414
	51 - 60 Years	0.042
31 - 40 Years	20 - 30 Years	0.065
	41 - 50 Years	0.008
	51 - 60 Years	0.75
41 - 50 Years	20 - 30 Years	0.414
	31 - 40 Years	0.008
	51 - 60 Years	0.005
51 - 60 Years	20 - 30 Years	0.042
	31 - 40 Years	0.75
	41 - 50 Years	0.005

Table 43: Multiple Comparisons of "Road-Rail for short-Medium Transport Distance (Perishable Products)"

4.4.3. Age and Mode Choice Ratings: Non-Perishable Products

The One-Way ANOVA result shows that "Age" has an unequal variance on "Road-Air [Short-Medium Transport Distance of Non-Perishable Products]" from the Sig value of 0.027. Therefore, in order to see which group is having a difference to another the LSD is done.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport	Between Groups	0.092
	Within Groups	

Distance (Non-Perishable Products)	Total	
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.768
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.027
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.176
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.636
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.958
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.06
"Road Only" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.377

Table 44:One-Way ANOVA of "Age and Mode Choice Ratings: Non-Perishable Products

It is found from the LSD analysis 20-30 Years is different in means compared to 31-40 Years, and 41-50.

Multiple Comparisons

Dependent Variable: "Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)

LSD

(I) Age	(J) Age	Sig.
20 - 30 Years	31 - 40 Years	0.007
	41 - 50 Years	0.012
	51 - 60 Years	0.104
31 - 40 Years	20 - 30 Years	0.007
	41 - 50 Years	1
	51 - 60 Years	0.387
41 - 50 Years	20 - 30 Years	0.012
	31 - 40 Years	1
	51 - 60 Years	0.415
51 - 60 Years	20 - 30 Years	0.104
	31 - 40 Years	0.387
	41 - 50 Years	0.415

Table 45: Multiple Comparisons of "Road-Air for Short-Medium Transprot Distance (Non-Perishable Products)"

4.4.4. Department and 9 Factors

According to the Sig value from the One-Way ANOVA table, it can be seen that Department has an unequal variance on "Transport Distance", "Cost", and "Reliability of Vehicle and Container". The sig value for the variances is 0.031, 0.002, and 0.008 respectively. With the results, Post Hoc analysis is done and is discussed in the section below.

One-Way ANOVA

		Sig.
Intermodal Terminal Location	Between Groups Within Groups Total	0.078
Transport Distance	Between Groups Within Groups Total	0.031
Transport Time, Punctuality and Frequency	Between Groups Within Groups Total	0.094
Speed of Transport	Between Groups Within Groups Total	0.271
Manpower	Between Groups Within Groups Total	0.432
Cost	Between Groups Within Groups Total	0.002
Types of Product	Between Groups Within Groups Total	0.704
Reliability of Vehicle and Container	Between Groups Within Groups Total	0.008
Capacity of each Transport Modes	Between Groups Within Groups Total	0.937

Table 46: One-Way ANOVA of "Department and 9 Factors"

From the LSD of Transport Distance, it can be seen that Transport/Shipping is different comparing to Warehousing and Supply Chain.

Multiple Comparisons

Dependent Variable: Transport Distance

LSD

(I) Department	(J) Department	Sig.
Transport/Shipping	Import/Export	0.068
	Warehousing	0.004
	Supply Chain	0.043
	Others	0.098
Import/Export	Transport/Shipping	0.068
	Warehousing	0.465
	Supply Chain	1
	Others	0.376
Warehousing	Transport/Shipping	0.004
	Import/Export	0.465
	Supply Chain	0.431
	Others	0.052
Supply Chain	Transport/Shipping	0.043
	Import/Export	1
	Warehousing	0.431
	Others	0.32
Others	Transport/Shipping	0.098
	Import/Export	0.376
	Warehousing	0.052
	Supply Chain	0.32

Table 47: Multiple Comparisons of "Transport Distance"

Based on Cost LSD, Transport/Shipping has different means comparing to Warehousing and Supply Chain. Import/Export is different means comparing to Warehousing and Supply Chain. Warehousing and Supply Chain have different means comparing to other.

Multiple Comparisons

Dependent Variable: Cost

LSD

(I) Department	(J) Department	Sig.
Transport/Shipping	Import/Export	0.758
	Warehousing	0.001
	Supply Chain	0.001
	Others	0.116
Import/Export	Transport/Shipping	0.758
	Warehousing	0.006
	Supply Chain	0.006
	Others	0.194
Warehousing	Transport/Shipping	0.001
	Import/Export	0.006
	Supply Chain	1
	Others	0.018
Supply Chain	Transport/Shipping	0.001
	Import/Export	0.006
	Warehousing	1
	Others	0.018
Others	Transport/Shipping	0.116
	Import/Export	0.194
	Warehousing	0.018
	Supply Chain	0.018

Table 48: Multiple Comparison of "Cost"

Based on Cost LSD, Transport/Shipping is different to Warehousing, Supply Chain, and Others. Import/Export is different in mean compared to Warehousing, Supply Chain, and Others.

Multiple Comparisons

Dependent Variable: Reliability of Vehicle and Container

LSD

(I) Department	(J) Department	Sig.
Transport/Shipping	Import/Export	0.528
	Warehousing	0.003
	Supply Chain	0.033
	Others	0.033
Import/Export	Transport/Shipping	0.528
	Warehousing	0.005
	Supply Chain	0.032
	Others	0.049
Warehousing	Transport/Shipping	0.003
	Import/Export	0.005
	Supply Chain	0.425
	Others	0.083
Supply Chain	Transport/Shipping	0.033
	Import/Export	0.032
	Warehousing	0.425
	Others	0.449
Others	Transport/Shipping	0.033
	Import/Export	0.049
	Warehousing	0.083

Supply Chain	0.449

Table 49: Multiple comparison of “Reliability of Vehicle and Container”

4.4.5. Department and Mode Choice Ratings: Perishable Products

Based on the One-Way ANOVA, it can be seen that Department has an unequal variances on "Road - Rail" for Short - Medium Transport Distance (Perishable Products) and "Road - Air" for Short - Medium Transport Distance (Perishable Products) with the sig value of 0.005 and 0.028 respectively. With the results, Post Hoc analysis is done and is discussed in the section below.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.005
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.26
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.028
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.584
"Road - Rail" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.121

"Road - Sea" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.623
"Road - Air" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.347
"Road Only" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.529

Table 50: One-Way ANOVA of "Department and Mode Choice Ratings: Perishable Products"

From the "Road-Rail for Short-Medium Transport Distance (Non-Perishable Products)" LSD analysis, the different in mean is found as follows: Transport/Shipping is different to Warehousing, Transport/Shipping is different to Supply Chain, Others are different to Import/Export, Others are different to Warehousing and Others are different to Supply Chain

Multiple Comparisons

Dependent Variable: "Road - Rail" for Short - Medium Transport Distance (Perishable Products)

LSD

(I) Department	(J) Department	Sig.
Transport/Shipping	Import/Export	0.064
	Warehousing	0.047
	Supply Chain	0.047
	Others	0.243
Import/Export	Transport/Shipping	0.064
	Warehousing	0.757
	Supply Chain	0.757
	Others	0.015

Warehousing	Transport/Shipping	0.047
	Import/Export	0.757
	Supply Chain	1
	Others	0.006
Supply Chain	Transport/Shipping	0.047
	Import/Export	0.757
	Warehousing	1
	Others	0.006
Others	Transport/Shipping	0.243
	Import/Export	0.015
	Warehousing	0.006
	Supply Chain	0.006

Table 51:Multiple Comparison of "Road-Rail for Short-Medium Transport Distance (Perishable Products)

From the LSD of Road-Air for Short-Medium Transport Distance (Non-Perishable Products), it is found that Transport/Shipping is different in means when compared to Import/Export, as well as Others which are different means compared to Import/Export.

Multiple Comparisons

Dependent Variable: "Road - Air" for Short - Medium Transport Distance (Perishable Products)

LSD

(I) Department	(J) Department	Sig.
Transport/Shipping	Import/Export	0.003
	Warehousing	0.068
	Supply Chain	0.17
	Others	0.2

Import/Export	Transport/Shipping	0.003
	Warehousing	0.114
	Supply Chain	0.06
	Others	0.013
Warehousing	Transport/Shipping	0.068
	Import/Export	0.114
	Supply Chain	0.693
	Others	0.308
Supply Chain	Transport/Shipping	0.17
	Import/Export	0.06
	Warehousing	0.693
	Others	0.597
Others	Transport/Shipping	0.2
	Import/Export	0.013
	Warehousing	0.308
	Supply Chain	0.597

Table 52:Multiple Comparison of "Road-Air for Short-Medium Transport Distance (Perishable Products)

4.4.6. Department and Mode Choice Ratings: Non-Perishable Products

Based on the One-Way ANOVA, the three-sig value found to be lower than 0.05 include Sig value of “Road-Rail [Short- Medium Transport Distance of Non-Perishable Products]”, Road-Sea [Short-Medium Transport Distance of Non-Perishable Products]” and “Road Only [Short-Medium Transport Distance of Non-Perishable Products]” with sig value of 0.008, 0.005, and 0.011 respectively. Therefore, Department has an unequal variance on those three factors. The LSD is thus done for the unequal variances yet note that “Warehousing” is cut as it has only 1 responder and example of “Others Department” are Accounting and Finance, Information Technology, Human Resources, Marketing.

One-Way ANOVA

	Sig.

"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.008
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.005
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.16
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.011
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.115
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.703
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.112
"Road Only" for Long Transport Distance	Between Groups Within Groups	0.197

(Non-Perishable Products)	Total	

Table 53: One-Way ANOVA of "Department and Mode Choice Ratings: Non-Products

According to Road-Rail for Short-Medium Transport Distance (Non-Perishable Products) LSD above, two different means can be found including Import/Export which has different means to Transport/Shipping and Import/Export which has different means to Others.

Multiple Comparisons

Dependent Variable: "Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)

LSD

(I) Department	(J) Department	Sig.
Transport/Shipping	Import/Export	0.045
	Supply Chain	0.625
	Others	0.059
Import/Export	Transport/Shipping	0.045
	Supply Chain	0.265
	Others	0.001
Supply Chain	Transport/Shipping	0.625
	Import/Export	0.265
	Others	0.105
Others	Transport/Shipping	0.059
	Import/Export	0.001
	Supply Chain	0.105

Table 54: Multiple Comparisons of "Road-Rail for Short-Medium Transport Distance (Non-Perishable Product)

For Road-Sea for Short-Medium Transport Distance (Non-Perishable Products) LSD, it is found that Transport/Shipping is different in means when compared to Import/Export and Others.

Multiple Comparisons

Dependent Variable: "Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)

LSD

(I) Department	(J) Department	Sig.
Transport/Shipping	Import/Export	0.007
	Supply Chain	0.08
	Others	0.001
Import/Export	Transport/Shipping	0.007
	Supply Chain	0.531
	Others	0.68
Supply Chain	Transport/Shipping	0.08
	Import/Export	0.531
	Others	0.685
Others	Transport/Shipping	0.001
	Import/Export	0.68
	Supply Chain	0.685

Table 55: Multiple Comparisons of "Road-Sea for Short-Medium Transport Distance (Non-Perishable Products)

From the LSD of Road Only for Short-Medium Transport Distance (Non-Perishable Products), Import/Export has different means comparing to Transport/Shipping as well as comparing to Others.

Multiple Comparisons

Dependent Variable: "Road Only" for Short - Medium Transport Distance (Non-Perishable Products)

LSD

(I) Department	(J) Department	Sig.
Transport/Shipping	Import/Export	0.001
	Supply Chain	0.321
	Others	0.752
Import/Export	Transport/Shipping	0.001
	Supply Chain	0.064
	Others	0.001
Supply Chain	Transport/Shipping	0.321
	Import/Export	0.064
	Others	0.396
Others	Transport/Shipping	0.752
	Import/Export	0.001
	Supply Chain	0.396

Table 56:Multiple Comparisons of "Road Only for Short-Medium Transport Distance (Non-Perishable Products)

4.4.7. Level in Organization and 9 Factors

According to the Sig value from the One-Way ANOVA table, it can be seen that Level in Organization has an unequal variance on “Cost” with the sig value of 0.09 and not any other factors.

One-Way ANOVA

		Sig.
Intermodal Terminal Location	Between Groups	0.141
	Within Groups	
	Total	

Transport Distance	Between Groups Within Groups Total	0.184
Transport Time, Punctuality and Frequency	Between Groups Within Groups Total	0.151
Speed of Transport	Between Groups Within Groups Total	0.347
Manpower	Between Groups Within Groups Total	0.545
Cost	Between Groups Within Groups Total	0.009
Types of Product	Between Groups Within Groups Total	0.721
Reliability of Vehicle and Container	Between Groups Within Groups Total	0.235
Capacity of each Transport Modes	Between Groups Within Groups Total	0.714

Table 57:One-Way ANOVA of "Level in Organization and 9 Factors"

Post Hoc analysis is done and is found that the Top Manager is different to Non-Supervisory Employee, First-Line Manager and Middle Manager.

Multiple Comparisons

Dependent Variable: Cost

LSD

(I) Level in Organization	(J) Level in Organization	Sig.
Top Manager	Middle Manager	0.009
	First-Line Manager	0.012
	Non-Supervisory Employee	0.001
Middle Manager	Top Manager	0.009
	First-Line Manager	0.87
	Non-Supervisory Employee	0.29
First-Line Manager	Top Manager	0.012
	Middle Manager	0.87
	Non-Supervisory Employee	0.504
Non-Supervisory Employee	Top Manager	0.001
	Middle Manager	0.29
	First-Line Manager	0.504

Table 58: Multiple Comparisons of "Cost"

4.4.8. Level in Organization and Mode Choice Ratings: Perishable Products

Based on the One-Way ANOVA, two sig values were found to be lower than 0.05 which include Sig value of “Road-Air” with Sig value of 0.038 and “Road Only” with Sig value of 0.027. Therefore, Level in Organization has an unequal variance on “Road-Air” and “Road Only” mode choices. The LSD is thus done for the unequal variances which are discussed in the section below.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport	Between Groups	0.165
	Within Groups	
	Total	

Distance (Perishable Products)		
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.26
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.387
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.821
"Road - Rail" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.304
"Road - Sea" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.652
"Road - Air" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.038
"Road Only" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.027

Table 59: One-Way ANOVA of "Level in Organization and Mode Choice Ratings: Perishable Products"

Based on the Road-Air for Long Transport Distance (Perishable Products) LSD outcome, it can be seen that First-Line Manager is different to Top Manager, Middle Manager and Non-Supervisory Employee.

Multiple Comparisons

Dependent Variable: "Road - Air" for Long Transport Distance (Perishable Products)

LSD

(I) Level in Organization	(J) Level in Organization	Sig.
Top Manager	Middle Manager	1
	First-Line Manager	0.044
	Non-Supervisory Employee	0.898
Middle Manager	Top Manager	1
	First-Line Manager	0.01
	Non-Supervisory Employee	0.844
First-Line Manager	Top Manager	0.044
	Middle Manager	0.01
	Non-Supervisory Employee	0.007
Non-Supervisory Employee	Top Manager	0.898
	Middle Manager	0.844
	First-Line Manager	0.007

Table 60: Multiple Comparisons of "Road-Air for Long Transport Distance (Perishable Products)

Based on the Road Only for Long Transport Distance (Perishable Products) comparison to the level of organizations, it can be seen that First-Line Manager is different to Middle Manager and Non-Supervisory Employee.

Multiple Comparisons

Dependent Variable: "Road Only" for Long Transport Distance (Perishable Products)

LSD

(I) Level in Organization	(J) Level in Organization	Sig.
Top Manager	Middle Manager	0.328
	First-Line Manager	0.326
	Non-Supervisory Employee	0.196
Middle Manager	Top Manager	0.328
	First-Line Manager	0.018
	Non-Supervisory Employee	0.701
First-Line Manager	Top Manager	0.326
	Middle Manager	0.018
	Non-Supervisory Employee	0.004
Non-Supervisory Employee	Top Manager	0.196
	Middle Manager	0.701
	First-Line Manager	0.004

Table 61:Multiple Comparisons of "Road Only for Long Transport Distance (Perishable Products)

4.4.9. Level in Organization and Mode Choice Ratings: Non-Perishable Products

When Level in Organization and Mode Choice Ratings of Non-Perishable Products were tested by One-Way ANOVA, it is found that Level of Organization has equal variances on all mode choice ratings of Non-Perishable Products.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport	Between Groups	0.752
	Within Groups	

Distance (Non-Perishable Products)	Total	
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.11
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.925
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.835
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.862
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.249
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.759
"Road Only" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.647

Table 62: One-Way ANOVA of "Level in Organization and Mode Choice Ratings: Non-Perishable Products"

4.4.10. Experience and 9 Factors

According to the sig value from the ANOVA test between Experience and 9 Factors, it is found that Experience has an unequal variance on “Cost” with the value of Sig equals to 0.046. Hence.

One-Way ANOVA

		Sig.
Intermodal Terminal Location	Between Groups	0.296
	Within Groups	
	Total	
Transport Distance	Between Groups	0.891
	Within Groups	
	Total	
Transport Time, Punctuality and Frequency	Between Groups	0.594
	Within Groups	
	Total	
Speed of Transport	Between Groups	0.85
	Within Groups	
	Total	
Manpower	Between Groups	0.337
	Within Groups	
	Total	
Cost	Between Groups	0.046
	Within Groups	
	Total	
Types of Product	Between Groups	0.837
	Within Groups	
	Total	

Reliability of Vehicle and Container	Between Groups Within Groups Total	0.301
Capacity of each Transport Modes	Between Groups Within Groups Total	0.075

Table 63: One-Way ANOVA of "Experience and 9 Factors"

the LSD test was further done and was found that respondent with more than 10 years is different to less than 5 years. It is also found that respondent with more than 10 years is different to less than 5-10 years.

Multiple Comparisons

Dependent Variable: Cost

LSD

(I) Experience	(J) Experience	Sig.
Less than 5 years	5 - 10 years	0.877
	More than 10 years	0.051
5 - 10 years	Less than 5 years	0.877
	More than 10 years	0.038
More than 10 years	Less than 5 years	0.051
	5 - 10 years	0.038

Table 64: Multiple Comparisons of "Cost"

4.4.11. Experience and Mode Choice Ratings: Perishable Products

Experience has equal variances on all mode choice ratings of Perishable Products, according to the findings of the ANOVA test between Experience and Mode Choice Ratings: Perishable Products.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.909
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.246
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.184
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.611
"Road - Rail" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.714
"Road - Sea" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.917
"Road - Air" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.441
"Road Only" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.739

Table 65: One-Way ANOVA of "Experience and Mode Choice Ratings: Perishable Products"

4.4.12. Experience and Mode Choice Ratings: Non-Perishable Products

From the sig values of ANVOA test between Experience and Mode Choice Ratings: Non-Perishable Products, it can be seen that Experience has an equal variances on all mode choice ratings of Non-Perishable Products.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.075
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.185
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.067
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.608
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.573
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.882

"Road - Air" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.265
"Road Only" for Long Transport Distance (Non-Perishable Products)	Between Groups Within Groups Total	0.563

Table 66: One-Way ANOVA of "Experience and Mode Choice Ratings: Non-Perishable Products"

4.4.13. Logistics Parties and 9 Factors

Logistics Parties have unequal variances on "Capacity of each Transport Modes," according to the sig value from the ANOVA test between Logistics Parties and 9 Factors, with the value of Sig equal to 0.005.

One-Way ANOVA

		Sig.
Intermodal Terminal Location	Between Groups Within Groups Total	0.096
Transport Distance	Between Groups Within Groups Total	0.924
Transport Time, Punctuality and Frequency	Between Groups Within Groups Total	0.671
Speed of Transport	Between Groups Within Groups Total	0.421
Manpower	Between Groups	0.352

	Within Groups	
	Total	
Cost	Between Groups	0.391
	Within Groups	
	Total	
Types of Product	Between Groups	0.476
	Within Groups	
	Total	
Reliability of Vehicle and Container	Between Groups	0.362
	Within Groups	
	Total	
Capacity of each Transport Modes	Between Groups	0.005
	Within Groups	
	Total	

Table 67: One-Way ANOVA of "Logistics Parties and 9 Factors"

the LSD test was conducted, and it was discovered that 3PL differs from 1PL while also differing from 2PL. Yet, it must be noted that 5PL is cut as it has only 1 responder.

Multiple Comparisons

Dependent Variable: Capacity of each Transport Modes

LSD

(I) Logistics Parties	(J) Logistics Parties	Sig.
1PL	2PL	0.564
	3PL	0.01
	4PL	0.21
2PL	1PL	0.564

	3PL	0.016
	4PL	0.308
3PL	1PL	0.01
	2PL	0.016
	4PL	0.48
4PL	1PL	0.21
	2PL	0.308
	3PL	0.48

Table 68: Multiple Comparisons of "Capacity of each Transport Modes"

4.4.14. Logistics Parties and Mode Choice Ratings: Perishable Products

According to the sig value from the ANOVA test between Logistics Parties and Mode Choice Ratings of Perishable Products, it is seen that “Road-Rail [Long Transport Distance of Perishable Products]” has sig value lower than 0.05 which is 0.044. Thus, Logistics Parties has an unequal variance on “Road-Rail [Long Transport Distance of Perishable Products]”.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Between Groups	0.057
	Within Groups	
	Total	
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Between Groups	0.755
	Within Groups	
	Total	
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Between Groups	0.372
	Within Groups	
	Total	

"Road Only" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.097
"Road - Rail" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.044
"Road - Sea" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.492
"Road - Air" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.281
"Road Only" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.257

Table 69: One-Way ANOVA of "Logistics Parties and Mode Choice Ratings: Perishable Products"

it is found that 1PL is different to 2PL as well as 3PL.

Multiple Comparisons

Dependent Variable: "Road - Rail" for Long Transport Distance (Perishable Products)

LSD

(I) Logistics Parties	(J) Logistics Parties	Sig.
1PL	2PL	0.005
	3PL	0.014
	4PL	0.271

2PL	1PL	0.005
	3PL	0.503
	4PL	0.665
3PL	1PL	0.014
	2PL	0.503
	4PL	0.428
4PL	1PL	0.271
	2PL	0.665
	3PL	0.428

Table 70: Multiple Comparison of "Road-Rail for Long Transport Distance (Perishable Products)

4.4.15. Logistics Parties and Mode Choice Ratings: Non-Perishable Products

From the experimental results from Independent Sample T Test of Logistics Parties and Mode Choice Ratings: Non-Perishable Products, it is found that “Logistics Parties” has an equal variance on all factors from the Sig. Value which is greater than 0.05. This can further imply that there is no difference between 2 groups and Logistics Parties does not affect any Mode Choice Ratings: Non-Perishable Products.

Note: with Parties related to Non-Perishable which are 1PL, 2PL, and 3PL, 3PL only has one responder therefore the result was excluded. Moreover, the “Use of Container” mode choice is skipped as all answers are ‘yes’.

Independent Samples T Test

		Sig. (2-tailed)
"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.22
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.33

"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances assumed	0.257
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Equal variances not assumed	0.105
"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.279
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.92
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.977
"Road Only" for Long Transport Distance (Non-Perishable Products)	Equal variances assumed	0.12

Table 71: Independent Samples T Test of "Logistics Parties and Mode Choice Ratings: Non-Perishable Products"

4.4.16. Import/Export and 9 Factors

Import/Export have unequal variances on "Speed of Transport" with the value of Sig equal to 0.037 according to the ANOVA test between Import/Export and 9 Factors. Yet, Import only is cut as it has only 1 responder**.**

One-Way ANOVA

		Sig.
Intermodal Terminal Location	Between Groups Within Groups Total	0.653
Transport Distance	Between Groups Within Groups Total	0.127

Transport Time, Punctuality and Frequency	Between Groups Within Groups Total	0.357
Speed of Transport	Between Groups Within Groups Total	0.037
Manpower	Between Groups Within Groups Total	0.57
Cost	Between Groups Within Groups Total	0.136
Types of Product	Between Groups Within Groups Total	0.897
Reliability of Vehicle and Container	Between Groups Within Groups Total	0.213
Capacity of each Transport Modes	Between Groups Within Groups Total	0.789

Table 72: One-Way ANOVA of Import/Export and 9 Factors

the LSD test was conducted, and it was discovered Export only is different to Neither Import nor Export.

Multiple Comparisons

Dependent Variable: Speed of Transport

LSD

(I) Import and Export	(J) Import and Export	Sig.
Both Import and Export	Export only	0.165
	Neither Import nor Export	0.061
Export only	Both Import and Export	0.165
	Neither Import nor Export	0.007
Neither Import nor Export	Both Import and Export	0.061
	Export only	0.007

Table 73: Multiple Comparisons for " Speed of Transport"

4.4.17. Import/Export and Mode Choice Ratings: Perishable Products

From the ANOVA test, sig value shows that Import/Export has an unequal variance on two mode choices such as “Road-Rail [Short-Medium Transport Distance of Perishable Products]” and “Road-Air [Long Transport Distance of Perishable Products]”. The sig values gained were 0.049 and 0.008 respectively. Consequently, the LSD of the two mode choices were done and is discussed below. However, it is noted that Import only is cut as it has only 1 responder.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Between Groups	0.049
	Within Groups	
	Total	
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Between Groups	0.976
	Within Groups	
	Total	
"Road - Air" for Short - Medium Transport	Between Groups	0.065
	Within Groups	
	Total	

Distance (Perishable Products)		
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.338
"Road - Rail" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.204
"Road - Sea" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.508
"Road - Air" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.008
"Road Only" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.134

Table 74: One-Way ANOVA of "Import/Export and Mode Choice Ratings: Perishable Products"

The post hoc summary of Import/Export under Road-Rail for Short-Medium Transport Distance (Perishable Products) shows that Neither Import nor Export is different to Both Import and Export and is also different to Export Only.

Multiple Comparisons

Dependent Variable: "Road - Rail" for Short - Medium Transport Distance (Perishable Products)

LSD

(I) Import and Export	(J) Import and Export	Sig.

Both Import and Export	Export only	0.326
	Neither Import nor Export	0.035
Export only	Both Import and Export	0.326
	Neither Import nor Export	0.014
Neither Import nor Export	Both Import and Export	0.035
	Export only	0.014

Table 75: Multiple Comparison of ""Road - Rail for Short - Medium Transport Distance (Perishable Products)"

The Import/Export under Road-Air for Long Transport Distance (Perishable Products) post hoc can be summarizes as Export only is different to Both Import and Export while also different to Neither Import nor Export.

Multiple Comparisons

Dependent Variable: "Road - Air" for Long Transport Distance (Perishable Products)

LSD

(I) Import and Export	(J) Import and Export	Sig.
Both Import and Export	Export only	0.027
	Neither Import nor Export	0.073
Export only	Both Import and Export	0.027
	Neither Import nor Export	0.001
Neither Import nor Export	Both Import and Export	0.073
	Export only	0.001

Table 76: Multiple Comparisons of "Road - Air for Long Transport Distance (Perishable Products) "

4.4.18. Import/Export and Mode Choice Rating: Non-Perishable Product

According to Import/Export and Mode Choice Rating: Non-Perishable Product's ANOVA test outcomes, it is discovered that Freight Modes used in Perishable Products has an equal variance on all factors. This is implied from all sig values greater than 0.05.

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.122
"Road - Sea" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.636
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.331
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.169
"Road - Rail" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.483
"Road - Sea" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.068
"Road - Air" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.792

"Road Only" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.455

Table 77: One-Way ANOVA of "Import/Export and Mode Choice Ratings: Perishable Products"

4.4.19. Freight Modes Used in Perishable Products and 9 Factors

According to the Freight Modes Used in Perishable Products and 9 Factors ANOVA test outcomes, it is discovered that Freight Modes used in Perishable Products has an equal variance on all factors. This is implied from all sig values greater than 0.05.

One-Way ANOVA

		Sig.
Intermodal Terminal Location	Between Groups Within Groups Total	0.645
Transport Distance	Between Groups Within Groups Total	0.12
Transport Time, Punctuality and Frequency	Between Groups Within Groups Total	0.748
Speed of Transport	Between Groups Within Groups Total	0.92
Manpower	Between Groups Within Groups Total	0.179
Cost	Between Groups Within Groups Total	0.121

Types of Product	Between Groups Within Groups Total	0.361
Reliability of Vehicle and Container	Between Groups Within Groups Total	0.826
Capacity of each Transport Modes	Between Groups Within Groups Total	0.556

Table 78: One-Way ANOVA of "Freight Modes Used in Perishable Products and 9 Factors"

4.4.20. Freight Modes Used in Perishable Products and Mode Choice Ratings: Perishable Products

Based on the ANOVA test between the Freight Modes Used in Perishable Products and Mode Choice Ratings: Perishable Products, two sig appears to be greater than 0.05 while Using Air Freight (Intermodal Container) is cut as it has only 1 responder**.** Accordingly, the two sig values are 0.021 and 0.027 which are “Road-Air [Short-Medium Transport Distance of Perishable Products]” and “Road Only [Short-Medium Transport Distance of Perishable Products]” respectively. Hence, Freight Modes used in Perishable Products has an unequal variance on “Road-Air [Short-Medium Transport Distance of Perishable Products]” and “Road Only [Short-Medium Transport Distance of Perishable Products]”.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.077
"Road - Sea" for Short - Medium Transport	Between Groups Within Groups Total	0.156

Distance (Perishable Products)		
"Road - Air" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.021
"Road Only" for Short - Medium Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.027
"Road - Rail" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.173
"Road - Sea" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.404
"Road - Air" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.695
"Road Only" for Long Transport Distance (Perishable Products)	Between Groups Within Groups Total	0.066

Table 79: One-Way ANOVA of "Freight Modes Used in Perishable Products and Mode Choice Ratings: Perishable Products"

It is appeared from the Post Hoc (Freight Modes Used Perishable) under Road-Air for Short-Medium Transport Distance (Perishable Products) that Using Both is different to Using ULD.

Multiple Comparisons

Dependent Variable: "Road - Air" for Short - Medium Transport Distance (Perishable Products)

LSD

(I) Freight Modes Used in Perishable Products	(J) Freight Modes Used in Perishable Products	Sig.
Not using Air Freight Transport	Using Air Freight Transport (ULD)	0.208
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.366
Using Air Freight Transport (ULD)	Not using Air Freight Transport	0.208
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.037
Using Both Air Freight Transport (Intermodal Container and ULD)	Not using Air Freight Transport	0.366
	Using Air Freight Transport (ULD)	0.037

Table 80: Multiple Comparisons of ""Road - Air" for Short - Medium Transport Distance (Perishable Products) "

Road Only for Short-Medium Transport Distance (Perishable Products) Post Hoc can be summarizes that Using Both is different to Not using Air Freight while is also different to Using ULD.

Multiple Comparisons

Dependent Variable: "Road Only" for Short - Medium Transport Distance (Perishable Products)

LSD

(I) Freight Modes Used in Perishable Products	(J) Freight Modes Used in Perishable Products	Sig.
Not using Air Freight Transport	Using Air Freight Transport (ULD)	0.522
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.024
Using Air Freight Transport (ULD)	Not using Air Freight Transport	0.522
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.006

Using Both Air Freight Transport (Intermodal Container and ULD)	Not using Air Freight Transport	0.024
	Using Air Freight Transport (ULD)	0.006

Table 81: Multiple Comparisons of ""Road Only for Short - Medium Transport Distance (Perishable Products)"

4.4.21. Freight Modes Used in Non-Perishable Products and 9 Factors

By doing the ANOVA test, it is found that Freight Modes used in Non-Perishable Products has an unequal variance on “Intermodal Terminal Location” with Sig value of 0.007. Hence, the Post Hoc test is done by excluding Using Air Freight (Intermodal Container) as it has only 1 responder.

One-Way ANOVA

		Sig.
Intermodal Terminal Location	Between Groups	0.007
	Within Groups	
	Total	
Transport Distance	Between Groups	0.569
	Within Groups	
	Total	
Transport Time, Punctuality and Frequency	Between Groups	0.753
	Within Groups	
	Total	
Speed of Transport	Between Groups	0.882
	Within Groups	
	Total	
Manpower	Between Groups	0.38
	Within Groups	
	Total	
Cost	Between Groups	0.736
	Within Groups	

	Total	
Types of Product	Between Groups Within Groups Total	0.212
Reliability of Vehicle and Container	Between Groups Within Groups Total	0.858
Capacity of each Transport Modes	Between Groups Within Groups Total	0.568

Table 82: One-Way ANOVA of "Freight Modes Used in Non-Perishable Products and 9 Factors"

it is seen that Using ULD is different to Not using Air Freight. Using ULD is also different to Using Both.

Multiple Comparisons

Dependent Variable: Intermodal Terminal Location

LSD

(I) Freight Modes Used in Non-Perishable Products	(J) Freight Modes Used in Non-Perishable Products	Sig.
Not using Air Freight Transport	Using Air Freight Transport (ULD)	0.035
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.295
Using Air Freight Transport (ULD)	Not using Air Freight Transport	0.035
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.018
Using Both Air Freight Transport (Intermodal Container and ULD)	Not using Air Freight Transport	0.295
	Using Air Freight Transport (ULD)	0.018

Table 83: Multiple Comparisons of “Intermodal Terminal Location”

4.4.22. Freight Modes Used in Non-Perishable Products and Mode Choice Ratings: Non-Perishable Products

Freight Modes Used in Non-Perishable Products)” has unequal variances on “Road-Air [Short-Medium Transport Distance of Non-Perishable Products]” and “Road Only [Short-Medium Transport Distance of Non-Perishable Products]” with Sig values of 0.005 and 0.000, respectively, according to the ANOVA examination. As a result, the Post Hoc test excludes Using Air Freight (Intermodal Container) since there is only one respondent. The findings are examined in the following section.

One-Way ANOVA

		Sig.
"Road - Rail" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups	0.052
	Within Groups	
	Total	
"Road - Sea" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups	0.456
	Within Groups	
	Total	
"Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups	0.005
	Within Groups	
	Total	
"Road Only" for Short - Medium Transport Distance (Non-Perishable Products)	Between Groups	0
	Within Groups	
	Total	
	Between Groups	0.084

"Road - Rail" for Long Transport Distance (Non-Perishable Products)	Within Groups	
	Total	
"Road - Sea" for Long Transport Distance (Non-Perishable Products)	Between Groups	0.381
	Within Groups	
	Total	
"Road - Air" for Long Transport Distance (Non-Perishable Products)	Between Groups	0.193
	Within Groups	
	Total	
"Road Only" for Long Transport Distance (Non-Perishable Products)	Between Groups	0.154
	Within Groups	
	Total	

Table 84: One-Way ANOVA of "Freight Modes Used in Non-Perishable Products and Mode Choice Ratings: Non-Perishable Products"

The post hoc of Road-Air for Short-Medium Transport Distance (Non-Perishable Products) results as Using Both is different to Not using Air Freight while Using Both is also different to Using ULD.

Multiple Comparisons

Dependent Variable: "Road - Air" for Short - Medium Transport Distance (Non-Perishable Products)

LSD

(I) Freight Modes Used in Non-Perishable Products	(J) Freight Modes Used in Non-Perishable Products	Sig.
	Using Air Freight Transport (ULD)	0.158

Not using Air Freight Transport	Using Both Air Freight Transport (Intermodal Container and ULD)	0.001
Using Air Freight Transport (ULD)	Not using Air Freight Transport	0.158
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.001
Using Both Air Freight Transport (Intermodal Container and ULD)	Not using Air Freight Transport	0.001
	Using Air Freight Transport (ULD)	0.001

Table 85: Multiple Comparisons of "Road - Air for Short - Medium Transport Distance (Non-Perishable Products)"

Road Only for Short-Medium Transport Distance (Non-Perishable Products) Post Hoc is summarizes as Using Both is different to Not using Air Freight and different to Using ULD.

Multiple Comparisons

Dependent Variable: "Road Only" for Short - Medium Transport Distance (Non-Perishable Products)

LSD

(I) Freight Modes Used in Non-Perishable Products	(J) Freight Modes Used in Non-Perishable Products	Sig.
Not using Air Freight Transport	Using Air Freight Transport (ULD)	0.529
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.004
Using Air Freight Transport (ULD)	Not using Air Freight Transport	0.529
	Using Both Air Freight Transport (Intermodal Container and ULD)	0.012
Using Both Air Freight Transport (Intermodal Container and ULD)	Not using Air Freight Transport	0.004
	Using Air Freight Transport (ULD)	0.012

Table 86: Multiple Comparisons of ""Road Only for Short - Medium Transport Distance (Non-Perishable Products)"

Chapter 5: Conclusion

5.1 General Analysis

Based on the Descriptive Statistics of the 9 Factors, 36 responders agree that all 9 factors have effect on choosing modes of freight transport as all factors have the average of more than 4 with most effect is cost, and least effect is manpower. Moreover, when analyzing the Mode Choice Rating results, it can be seen that “Road Only” is the most suitable modes of freight transport for short – medium transport distance (Both Perishable and Non-Perishable Products). Additionally, for long transport distance, the most suitable modes of Perishable Products are “Road - Air”, while Non-Perishable Products is “Road - Sea”. Lastly, “Road – Sea” is second choice for both conditions of Perishable Products.

5.1.1 Descriptive Statistics of the 9 Factors

From the Descriptive Statistics of the 9 Factors, the factors have the average of “more than 4”. In other words, the responders “agree that these factors have an effect on choosing modes of freight transport”. 9 Factors in order from most effect to least effect is listed as follows.

1.) Cost (4.61)

2.) Reliability of Vehicle and Container (4.53)

3.) Transport Time, Punctuality and Frequency (4.42)

4.) Types of Products (4.34)

5.) Transport Distance (4.24)

6.=) Speed of Transport (4.21)

6.=) Capacity of each Transport Modes (4.21)

8.) Intermodal Terminal Location (4.18)

9.) Manpower (4.03)

Therefore, Responders agree that all 9 factors have effect on choosing modes of freight transport with the most effect is cost, and least effect is manpower.

5.1.2 Suitable Mode choice for Perishable Products with "Short-Medium Transport Distances"

It is found that out of 36 responders, the most suitable mode choice for Perishable Products with "Short-Medium Transport Distance" is "Road Only" while "Road – Air" is slightly suitable. 4 Modes of Freight Transport for Perishable Products with Short-Medium Transport Distance in order from most to least suitable is listed as follows.

1.) Road Only (3.81)
2.) Road - Sea (3.33)
3.) Road - Rail (3.22)
4.) Road - Air (2.78)

5.1.3 Suitable Mode Choice for Perishable Products with "Long Transport Distance"

It is found that out of 36 responders, the most suitable mode choice for Perishable Products with "Long Transport Distance" is "Road - Air" while "Road Only" and "Road - Rail" are slightly suitable 4 Modes of Freight Transport for Perishable Products with Long Transport Distance in order from most to least suitable is listed as follows.

1.) Road - Air (4.11)
2.) Road - Sea (3.47)
3.) Road Only (2.83)
4.) Road - Rail (2.53)

5.1.4 Suitable Mode Choice for Non-Perishable Products with "Short-Medium Transport Distance"

According to the respond from 38 responders, only 27 responders or 71.1% of the responders has informed that they work in relation with non-perishable products. Hence, it is found that out of 27 responders, the most suitable mode choice for Non-Perishable Products with "Short-Medium Transport Distance" is "Road Only" while "Road – Air" is slightly

suitable 4 Modes of Freight Transport for Non-Perishable Products with Short-Medium Transport Distance in order from most to least suitable is listed as follows.

1.) Road Only (4.33)
2.) Road - Rail (3.56)
3.) Road - Sea (3.26)
4.) Road - Air (2.19)

5.1.5 Suitable Mode Choice for Non-Perishable Products with "Long Transport Distance"

According to the respond from 38 responders, only 27 responders or 71.1% of the responders has informed that they work in relation with non-perishable products. Hence, it is found that out of 27 responders, the most suitable mode choice for Non-Perishable Products with "Long Transport Distance" is "Road - Sea" while "Other Modes" are slightly suitable 4 Modes of Freight Transport for Non-Perishable Products with Long Transport Distance in order from most to least suitable is listed as follows.

1.) Road - Sea (4.00)
2.) Road - Air (2.89)
3.) Road - Rail (2.81)
4.) Road Only (2.59)

5.2 Further Analysis

From Independent Sample T-Test and One-Way ANOVA analysis, most of segmentation questions, either nominal or ordinal, have some difference in means of Scale questions which is around 2-3 scales with difference in means. Segmentation questions with the most difference in means of scale questions are "Use of Intermodal Freight Transport" with 7 scales with difference in means and "Department" with 8 scales with differences in means.

5.2.1 Independent Sample T-Test of Use of Intermodal Freight Transport

According to the Independent Sample T-Test of Use of Intermodal Freight Transport, there are 7 scales with difference in means between 2 groups such as using and not using intermodal freight transport. It is found that out of 9 factors, 3 Factors (or scales) on Choosing Modes of Freight Transport has difference in means between the two groups. The 3 factors

include Intermodal Terminal Location, Transport Distance, and Speed of Transport. Moreover, the two scales such as “Road - Sea” (Short – Medium Transport Distance) and “Road - Rail” (Long Transport Distance) under Mode Choice Rating of Perishable Products also have difference in means between 2 groups. Similarly, in accordance with Mode Choice Rating of Non-Perishable Products scales, two scales were found to have difference in means between 2 groups which include “Road - Rail” (Short – Medium Transport Distance) and “Road Only” (Short – Medium Transport Distance).

5.2.2 One-Way ANOVA on Department

Based on the study, 5 departments were included in the test such as Transport/Shipping, Import/Export, Warehousing, Supply Chain, and Others . Overall, there are 8 scales with difference in means between 5 groups (or the 5 different departments). 3 of the differences were found in the Factors on Choosing Modes of Freight Transport which include Transport Distance, Cost, and Reliability of Vehicle and Container. Furthermore, it is observed in the Mode Choice Rating of Perishable Products results that “Road - Rail” (Short - Medium Transport Distance) and “Road – Air” (Short - Medium Transport Distance) are the two scales which have difference in means between 5 groups. Correspondingly, Mode Choice Rating of Non-Perishable Products also suggested that the three scales such as “Road - Rail” (Short – Medium Transport Distance), “Road - Sea” (Short – Medium Transport Distance), and “Road Only” (Short – Medium Transport Distance) have difference in means between 5 groups.

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