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Green Logistics solutions in Vietnam

Case: Macnels Shipping Co.LTD

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Abstract

Nowadays, because of the increased globalization of business, each country's economy is increasingly dependent on the world economy. The scientific, technological and information technology revolution has accelerated the process of specialization in and cooperation between countries. Logistics plays an important role in this trend, especially in a developing country, such as Vietnam.

However, like production economy, logistics is linked to trading emissions, social factors and pollution, all of which need cleaner operations and more detailed planning for sustainable development. The objective of the thesis was to find ways to make logistics in Vietnam more sustainable by learning from the international standards of sustainable logistics.

Case study method was used in this study. The author has been working in a Macnels shipping company in Vietnam for 3 months. He started to learn about the company's internal logistics processes and figured out the way to improve the working performance in the green logistics idea. With the focus on the warehouse perspective, the author has developed the research into 3 main directions: employee training, warehouse, maintenance. The combination of qualitative and quantitative methods has been used to conduct and evaluate the study.

With an initial positive result in Macnels, the study could be applied by other medium sized companies with high investment in developing countries.

Keywords/tags (subjects)

Miscellaneous

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Terminology

ASEAN: Association of Southeast Asian Nations which established in 1967 include ten countries of South East Asia area. (A Secretariat - European Journal of Social Theory, 2016)

WTO: World Trade Organization, an intergovernmental organization which was officially commenced in 1995 (Mitsuo Matsushita, 2005. THE WORLD TRADE ORGANIZATION, Law, Practice and Policy)

AFTA: ASEAN Free Trade Area, a trade bloc agreement first signed in 1992 to support local trade and manufacturing in ASEAN area (Pearl Imada, 1993. Production and Trade Effects of an ASEAN Free Trade Area)

APEC: Asia-Pacific Economic Cooperation, an economic group of 21 members formed in 1989 with the goal of promoting free trade and sustainable development in the Pacific-Rim economies. (Andrew Bloomenthal, 2019. Asia-Pacific Economic Cooperation, Investopedia Magazines)

1. Introduction

1.1. Reasons for the topic

On the path of integration into the global economy, Vietnam is growing and affirming its position in all fields. With the trend of globalization and internationalization today, not only Vietnam but also many other countries need to quickly keep up with the international trends. To keep up with the pace of globalization, according to Ha Van Hoi (2013), Vietnam has joined international and regional organizations, typically the Association of Southeast Asian Nations (ASEAN), World Trade Organization (WTO), ASEAN Free Trade Area (AFTA) and the Asia-Pacific Economic Cooperation (APEC) in order to create more prospective opportunities as well as challenges for domestic producers to assert themselves. In Mr. Hoi's view (2013), Vietnam is in the process of economic transformation, from a centrally planned economy to an international market economy and integration into the world economy. Especially, the adjustment of the new policy of the state is a steppingstone for logistics to develop rapidly and become one of main economic sectors in Vietnam.

However, Logistics, which is believed to be a new industry in Vietnam, must deal with more increasing challenges for companies and enterprises. There are many common difficulties in developing the logistics industry in Vietnam, such as a bad transportation infrastructure and legislation. Moreover, the most important aspect is greenhouse gas emissions. According to Gross (2013), road cargo transportation's contribution to the global greenhouse gas emissions is approximately 5%, and it is expected to grow in the coming years on both a relative and an absolute basis due to increased traffic. In this thesis, a new philosophy called green logistics as well as its following affects are defined clearly as a main way of development for future supply chain management.

1.2. Case company: Macnels Shipping Company

The aim of the thesis is to improve the brand value of Macnels company in Vietnam using new green solutions. Macnels is an ideal forwarding company that was found in 2008 in Ho Chi Minh City. The company provides international delivery services as well as warehousing and transportation services. Specifically, Macnels, as well as almost all logistics enterprises in Vietnam, have to face with the greenhouse gas emissions problems caused by the low-quality infrastructure.

1.3. Objectives

The increasing demands of the logistics industry in Vietnam call for a sustainable development in operation as well as in management. This thesis proposes a new type of energy-efficient and low-carbon transport operations, called Green Logistics. According to Dr. Stefan Wolff (2013), Green Logistics is a hot topic in supply chain management and currently, part of many discussions about sustainability and innovation. In Europe, especially in the Northern countries, such as Finland and Norway, green logistics is operated popularly with high investments from the government and companies. By focusing on low level logistics operations in Vietnam, such as those of Macnels, the research questions are given as follows:

1. How to apply Green logistics to Macnels? What is the process?

2. What are the benefits that green logistics can bring to the company?

Question 1 should be answered by the following sub-questions:

- How are general logistics operations in Vietnam going on?

- What changes should be made for Macnels in terms of Green Logisctics way and how should they be made?

Question 2 could be answered by applying mostly qualitative research methods, such as interviews and surveys, in order to obtain an in-depth review of the results of the innovations in the Macnels company.

1.4. Limitation

Nowadays, many logistics services companies have emerged in Vietnam, such as those providing transportation services, door-to-door deliveries, international forwarding services, which proves for the high density of logistics demands there. Unfortunately, almost those service providers belong to organizations which have headquarters outside Vietnam, such as DB Schenker, Mearsk, Evergreen and Yusen. Although using Vietnamese people in their branch, their knowledge of operations is from the developed countries, which is not suitable for the working environment in the developing countries, such as Vietnam. Thus, the scope of this thesis was on low-level companies who have the right to make separate operation and investments with the hope that they thereby can contribute to the increase of the general quality of the logistics industry in Vietnam. The scope of this thesis is improving the green logistics operations in the Macnels Shipping company that can bring sustainable value in 5 to 10 years. The results of thesis are also suitable for other low-level forwarding companies in Vietnam.

Another limitation of this thesis is the real time internship of the author. Unfortunately, the green revolution ideas given by the author mean a long-term process that needs time and perseverance for researching while the author only had three months when working for Macnels. This means that only the green solutions process and its results in the first month are presented in this thesis.

1.5. Research methods

The aim of the thesis was to analyze all the current issues of the Macnels company in the warehouse and distribution part. To reach this goal, it was important to have a deep understanding about the company processes and their advantages and disadvantages by using a combination of quantitative and qualitative research methods. Since this was a medium level company, all detailed databases were confidential, so that the author could only analyze the general financial status given by the Accounting Department. On the other hand, interviews and surveys were conducted with both the employees and customers as one plus point for the research.

1.5.1. Qualitative method

According to Judith Green and Nicki Thorogood (2018, 4), qualitative research means using "*simple frequency counts of themes in interview data, for instance, and even, categorizing data into themes involves some elementary quantification to decide whether a data point belongs in a set or not*". In general, language data, such as interviews, surveys and case studies are the main data sources in qualitative research.

In this case, collecting feedback and reviews from directors, customers and especially warehouse employees played the most important role in results of the thesis. As mentioned above, only the one-month-after-innovation financial figures were collected that cannot describe exactly how green solutions affected the business.

1.5.2. Quantitative method

Opposite to qualitative methods, quantitative methods focus on *"numerical data that are analyzed using mathematically based methods"*, which mentioned by Aliaga and Gunderson (2002, 1). According to Khandker, Koolwal and Samad (2009, 4), this approach usually *"attempts predict the outcomes of intended policy changes, given*

assumptions on individual behavior and markets", for example, predictable market analysis.

To sum up, main source of quantitative approaches is numerical data, which is difficult to obtain if there is no permission from company. In practice, financial data from only three months collected from the author could not describe how green solution had affected Macnels as clearly as what surveys and interviews could.

1.5.3. Case study method

This study was a case study, so that it was very important to have a deep understanding of what case study research and its process is. Basically, as M.Zucker states on the first page of his book from 2009, the main tasks of a case study are collecting data in practice, analyze the data, present it and report the results. The results will then be described, and the phenomenon of interest explained. These data sources usually come from documentation, archival records, and interviews. According to Tiia Vissak (2010, 371), "*a case study does not have to rely on previous literature or prior empirical evidence. Thus, the case study research can be used for theory-building even if little is known about phenomenon*", which means its result may be in accordance with specific cases.

In this study, combination of the qualitative and quantitative research method was decided to be used as the main way of researching. With this case study, the author hoped to be able to detect problems in a specific issue as well as find the related solutions.

2. Literature Review

The following part includes theory that was used for supporting the whole case study. As the case study focused on green logistics solutions for the Macnels company, green logistics and its related parts are presented below.

2.1. Green Logistics

The logistics industry is becoming more and more specialized. However, there is the fact that the new developed changes in Logistics management and equipment have a more and more serious impact on the ecological environment. Today, Logistics activities are considered to be the main cause for environmental pollution and for the most resource consumption. Therefore, green solutions must be focused on the sustainable development of the Logistics industry.

According to Rodrigue, Slack and Comtois (2001, 2), the concept of green logistics was introduced first in the late 1980s to describe the new model of a logistics system using advanced technologies and facilities not only to minimize damage to the environment during operation but also to increase the productivity of the systems. This concept emphasizes integrating ecological objectives into the organizational values and providing them to the customers.

Green logistics describes a chain of activities relating to goods and information flows from the beginning to the final consumption point in a supply chain in cost-effective ways. This not only minimizes negative impacts on the environment but also meets the requirements of the customer. According to Carter and Rogers (2008, 371), the goal of green logistics is transporting and delivering goods and materials with minimal costs but still maintaining the highest quality as well as minimizing the impact on the environment during the process.

Lee and Klassen (2008, 575) define green logistics as "*a buying organization's plans and activities that integrated environmental issues in to supply chain management in order to improve the environmental performance of suppliers and customer*".

According to Ittmann (2011, 2), green logistics is defined as attempts to reduce external factors and achieve a more sustainable balance between economic, environmental and social objectives. In more detail, the term green logistics is studied as a strategy to minimize the environmental and energy harms of goods distribution, which focuses on material handling, waste management, packaging and shipping.

To sum up, almost all logistics and supply chain research organizations around the world agree on the concept of green logistics including all the solutions to minimize environmental impacts due to logistics activities, as well as to design friendly environmental products to provide the customer with added value to the environment. Green logistics content includes processes and work steps carried out by logistics enterprises to minimize the adverse impacts and consequences for the environment. These processes are applied to the products and services of the business from the beginning to the last point of the supply chain through warehousing and distribution processes to the final customer.

2.2. Framework of green logistics

As Ittman (2011, 2) states above, green logistics improve sustainability between economic, environmental and social objectives, which are related to the original triple bottom line (see Figure 1). According to Carter and Rogers (2008, 365), there are many activities related to the triple bottom line that a company can engage in which "*not only positively affect the natural environment and society, but which also result in long-term economic benefits and competitive advantage for the firm".*

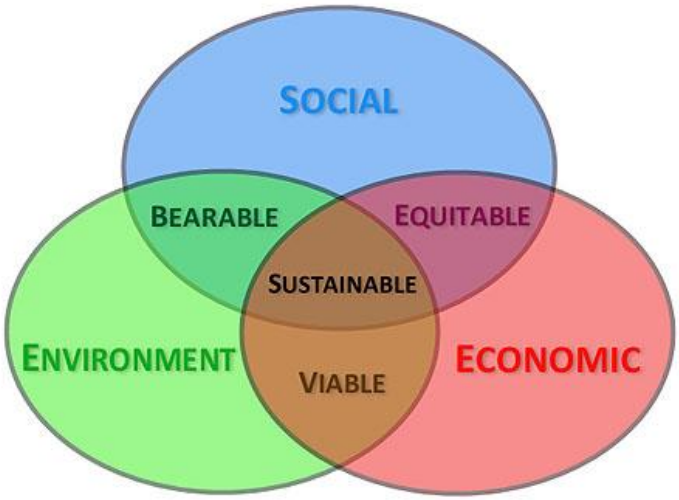

Figure 1: Tripple bottom line (Adapted from Holly Padgett, 2011,)

Originally, logistics provides services, such as freight transport, warehousing, packaging, material handling and data collection to fulfil the customer's requirements at a minimum cost. Today, since the environment has become a concern logistics companies have to face with challenges from the environment, such as the climate change, earthquakes, tsunamis, pollution and noise. Because of those negative effects from the environment, logistics companies today need to find new ways of development that reduce those factors and achieve a more sustainable balance between the social, economic and environmental objectives. That is why the triple bottom line can be applied to modern green logistics. According to Anil Kumar (2015, 8), there are two main reasons which compel companies to green their logistics services. One is the environmental concern, which is presented above, and the second is marketing demands. Kumar (2015, 9) supposes in his study that many companies promote their green image through their logistics management just to enhance their public relations, since green products are becoming a hot trend today with massive consumption.

2.3. Paradoxes of green logistics

According to Jean-Paul Rodrigue (2001, 3), there are several paradoxes between "green" development and the traditional logistics concept. Specifically, logistics means performing activities at a minimum cost, but this cost may be increased by environmental factors. Rodrigue (2001, 3) mentions in his study four basic paradoxes that are discussed below.

2.3.1. Cost

According to Jean-Paul Rodrigue (2001, 4), environmental costs in supply chain activities are often externalized, which reduces the total benefits in the supply chain process. "*Society in general, and many individuals in particular, are becoming less willing to accept these costs, and pressure is increasingly being put on governments and corporations to include greater environmental considerations in their activities".*

2.3.2. Time / Speed

According to Alan McKinnon (1996), when reducing the time as well as increasing the speed of the distribution, the most polluting and least energy- efficient transportation modes are applied. Today, logistics offers door-to-door (DTD) services, mostly coupled

with just-in-time (JIT) strategies, which leads to the vicious circle shown in Figure 2.

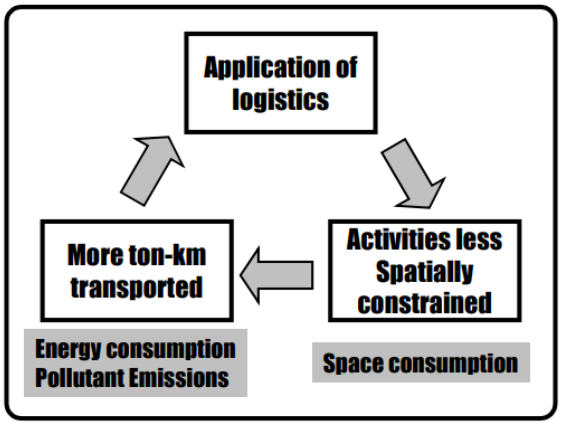

Figure 2: Environmental Vicious Circle of Logistics (Adapted from Rodrigue, Slack and Comtois, 2001)

As the circle above, Rodrigue (2001) believes that the more physical distribution through logistics is efficient, the higher usage of logistics and more ton-km of freight transported. As a result, although McKinnon (1998) suggests that JIT is not greatly increasing road freight volume in his research, it cannot be considered as green solution." *The more DTD and JIT strategies are applied, the further the negative environmental consequences of the traffic it creates*" (Rodrigue 2001, 5).

2.3.3. Reliability

According to Rodrigue (2001, 6), reliability plays an important role in the success of the logistics process, which is based on the on-time delivery and the least threat of breakage or damage. However, there is the unfortunate fact that logistics providers often regard the most polluting modes as the most reliable transportation modes. For example, governments focus their investments on road and air shipments, the two least environmentally friendly modes because of the poor feedback from the customers on the quality of the sea and railway modes.

2.3.4. Warehousing

Originally, logistics means reducing the needs of warehouse facilities in order to make the flow smoother. In a survey of 89 large British companies conducted by McKinnon (1998), the reduction in the number of warehouses led to an increased amount of truck traffic, although the increase was small in most cases. Unfortunately, this increase is the reason for the congestion, pollution and space consumption, that create extra costs to the environment and society.

2.4. The relationship of logistics facilities and green logistics

As mentioned above, green logistics basically has paradoxes such as decreasing profit and increasing CO_2 emissions. That is the reason why modern facilities and technologies play an important role in greening this industry.

2.4.1. Orientation

The transport infrastructure and information technology, comprehensive warehousing support throughout play an extremely important role for logistics operations. The adequacy or lack of environmental friendliness of each type of infrastructure represents greening potential, or the requirement to be greened in each stage. This assists managers in making decisions on which parts of the logistics process should be greened.

According to Dr. Vu Anh Dung (2015, 5), the transportation infrastructure carries out all the transportation processes in the logistics industry, from bringing machines to exploiting input materials and moving them to the factories, from transporting products through different stages, to distributing the goods to the forwarders and

consumers. Because of the main task of transporting goods and materials, logistics activities include a variety of road, waterway, rail and air transport vehicles, characterized by a very high fuel consumption that leads to large and high concentrations of greenhouse gas emissions, causing extensive environmental pollution. Generally, fuel consumption and gas concentration depend on factors such as the specification of a vehicle, the payload of a vehicle, specific infrastructure and traffic conditions. According to Tomas Skrycary (2009) (see Figure 3 below), road transport has the most negative impact on the environment which reflected is emissions, noise and traffic congestion.

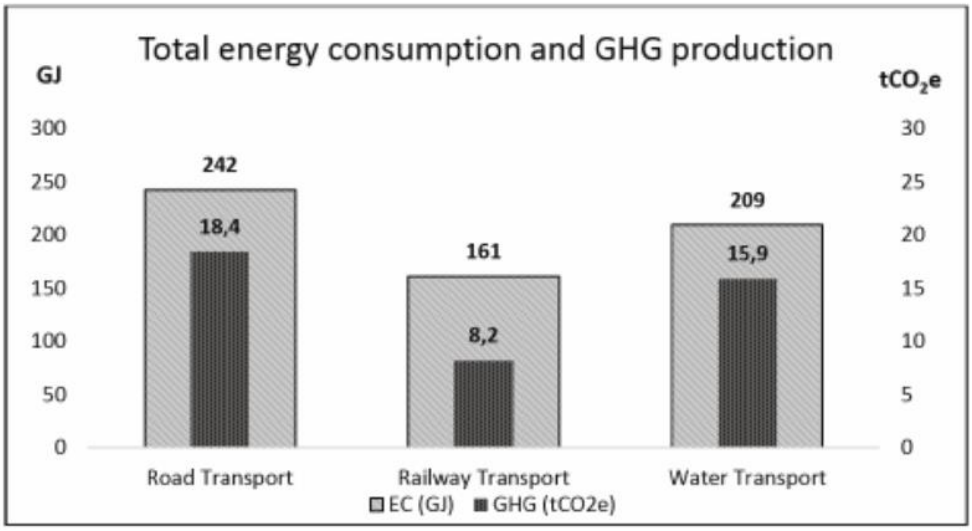

Figure 3: Comparation of emissions between modes of transport (Adapted from Tomas Skrycary, 2009)

Comparison of the environmental friendliness of several types of transport is also determined by which type should be focused on. In addition, converting the transport method from road to sea and rail could be seen as a solution to reduce transportation congestion and optimize the entire transport process. Moreover, with the modern

development of science these days, many vehicles use environmentally friendly alternative fuel sources, such as electricity and biodiesel, that have been created in order to reduce CO_2 emissions. On the other hand, it is also important to mention the continuous improvement of transport engines as a solution to reduce fuel consumption. According to Dr. Vu Anh Dung (2015, 6), "*in order to make transportation more efficient in order to prevent environmental pollution problems during transportation, many companies consider the main solutions to implementing green transport strategies associated with infrastructure, such as using fewer vehicles as well as clean and efficient fuels, and standardizing the size of the truck*". In conclusion, it can be affirmed that greening the transportation infrastructure is a top priority in greening the logistics process.

For centuries, warehousing has played an important role in the storing and handling of goods with the aim to provide consumer products in the future. As Dr. Vu Anh Dung (2015, 6) mentions in his study," *warehousing activities are considered to have significant potential in reducing carbon emissions caused by supply chains*". The storage and handling of goods at warehouses also consume a large amount of raw materials and create emissions to the environment. In a chain of studies about logistics activities in the UK, the researchers pointed out that about 4% of the emissions in the UK are caused by the transportation of large tonnage vehicles, compared with 3% of emissions from warehousing activities (UKWA, 2010). These characteristics are the most direct and recognizable ones in the supply chain, so greening warehouses is also a factor that managers need to consider when implementing green logistics in the supply chain. The greenness of the warehouse is reflected in the arrangement and allocation of warehouses in order to reduce the distance and save transportation costs. By relocating warehouses closer to the final consumers and by connecting ports and airports closely to reduce the transportation distance, cargoes and goods are finally transported faster. This reduces emissions to

the environment and the amount of fuel used, which supports the greening of the logistics processes.

2.4.2. Speed - Accuracy

In the modern manufacturing industry, speed of supply chain is an extremely important factor - this is the dominant point that make business different but can also be a difficult drawback. According to Hau L. Lee (2004, 2), the two most important points in supply chain is high speed and low cost, which are affected by many factors. Logistics infrastructure plays a role that determines the smoothness of the supply chain from point to point, transform the accuracy of time to profit from production stage to delivery stage, thereby deciding the speed performance of supply chain. At the same time, after giving decision which stage in logistics process need to be greened, quality of logistics infrastructure is the determinant of the greening way and the level of greening.

First of all, transportation infrastructure plays the most obvious role in the transport speed of logistics operations. According to Vu Anh Dung (2012, 7), for road traffic, road surface area, road network, road quality and durability, reasonable allocation of highways - overpasses - tunnels are the factors that need to be considered. For seaway, it is necessary to pay attention to the size and quality of the seaport and the logistic system include warehouses, forklift trucks, etc., which are arranged reasonably. For air transport, attention should be paid to airport management, air routes and warehouses system. As Dung (2012, 7) mentioned in his research," *the obstacles of transportation to logistics activities are not mainly sudden interruptions such as collapsing tunnels, rails, etc., but are long-term obstacles in speed and safety in transportation".* For example, narrow roads, lack of overpass systems and highways, small seaports, significantly slowing the speed of transporting goods and limiting large

transport vehicles. Additionally, rough roads, old rails, small airports threatening the safety for transportation, especially for fragile, easily disturbed items. In another way, weakness in IT infrastructure leads to disruption of information, causing 30% risk of supply chain disruption according to World Economic Forum report in 2012 as the picture below. However, these technological weaknesses include information and communication disruptions and transport infrastructure failures can be fixed if there are reasonable solutions and infrastructure upgraded.

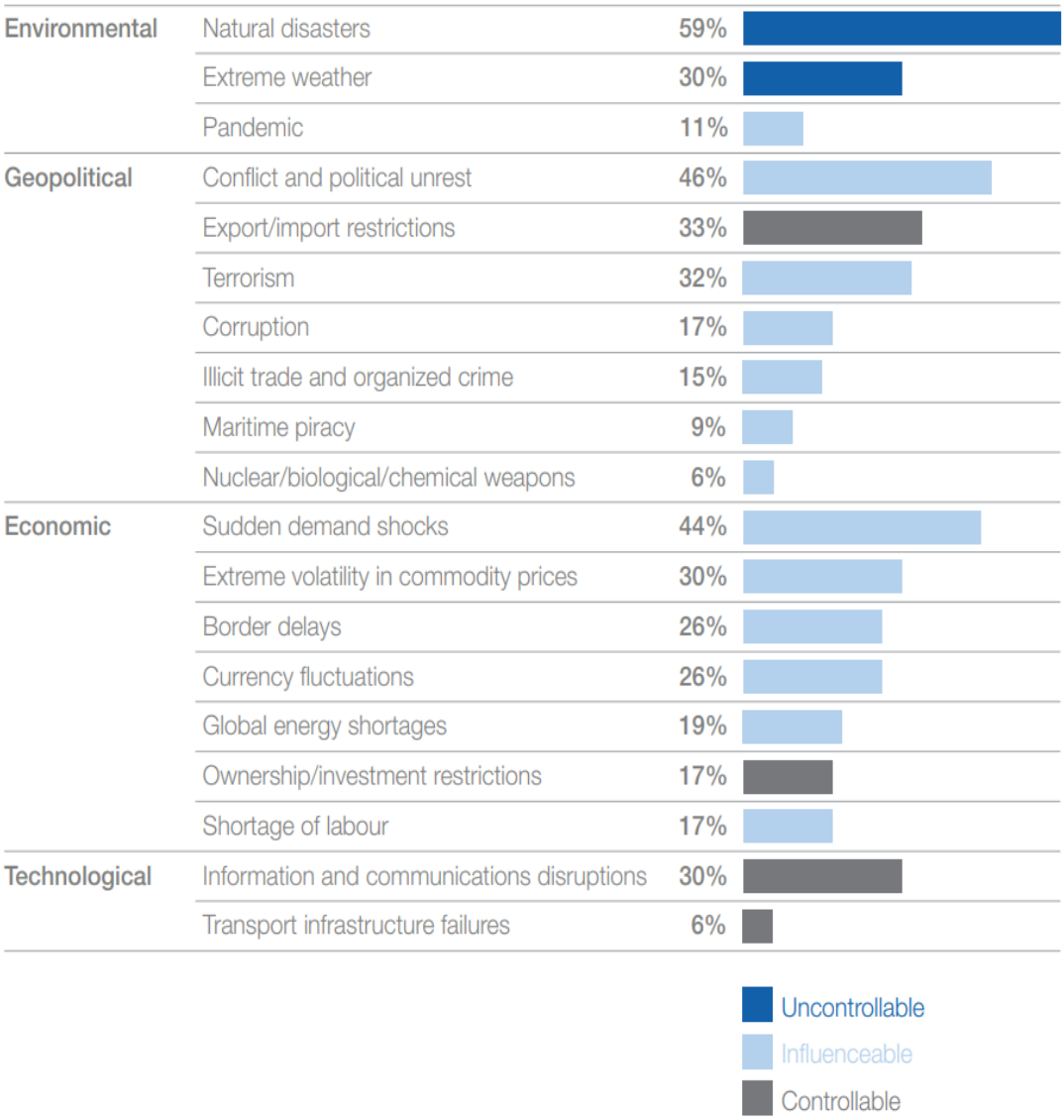

Figure 4: Triggers of global supply chain disruptions (Adapted from Vu Anh Dung, 2012, 7)

Greening logistics is associated with an increase in the demand for efficient transport of goods while the capacity of the existing transportation infrastructure system will be not enough to handle that leads to congestion. According to David B. Grant (2013, 85), congestion means that *"transport vehicles are not utilized well, as they spend much time queuing – and burning fuel – in traffic jams or waiting for a port terminal or a*

landing slot to become available, which means their engines are burned more fuel than necessary that leads to environmental pollution". There are 2 main solutions for congestion: reducing traffic demands or increasing capacity. While reducing traffic demands is absolutely impossible because it is opposite with the main purpose of logistics, increasing capacity is the only available solution in this case. For transportation infrastructure, greening methods can be searching and constructing new routes, selecting the optimal transport route to minimize transit time and reduce energy usage. In another way, an evolution of new energy efficient models of vehicle should be a good idea. However, companies should have their own greening options based on scale and economic conditions. In this case, low level companies only have one option through new energy, vehicles, re-designed warehouses and new routes.

2.4.3. Green logistics and sustainability

Despite of investment cost, greening logistics system will reduce long-term infrastructure cost, thereby make the whole system be more sustainable. In this part, the author will discuss how greening logistics improve its sustainability.

Firstly, when a company decide to invest in infrastructure, it means that company's financial capability must be enough for an evolution in the whole system. In this case, logistics infrastructure investment must meet the standards of global green supply chain, which means new technology and quality of material will be focused on from the beginning, thereby save time and reduce cost in maintenance compared to the previous logistics infrastructure. For example, in spite of the cost of alternative fuel vehicle investment is high, but in the long run, damage and failures of vehicle will be reduced, thus saving maintenance cost as well as fuel cost.

Secondly, according to Will Kenton (2019)," the *size of the business generally matters when it comes to economies of scale. The larger the business, the more the cost*

savings". In other words, economies of scale are cost advantages companies experience when production becomes efficient, as costs can be spread over a larger amount of goods. In this case, participating in greening supply chain through infrastructure investments can help companies improve the smoothness and efficient in their systems, thus increasing the using frequency of infrastructures, which means companies can fully exploit their facilities. As a result, based on Economies of scale rule by Kenton (2019), cost savings can be increased with large amount of output products, which leads companies to be more sustainable in the long run.

2.5. Maintenance strategies

By the aim of improving quality, productivity and reducing cost, many companies, especially freight forwarding and transportation companies, has focused on maintenance function. It is easy to realize that maintenance is critical to type of company that using infrastructure such as vehicles, warehouses and offices as their life source. According to Laura Swanson (2001, 237), a good maintenance strategy can "*extend equipment life, improve equipment availability and retain equipment in proper condition".* But the question is: How to get a good maintenance strategy?

At first, the author will clarify about types of maintenance.

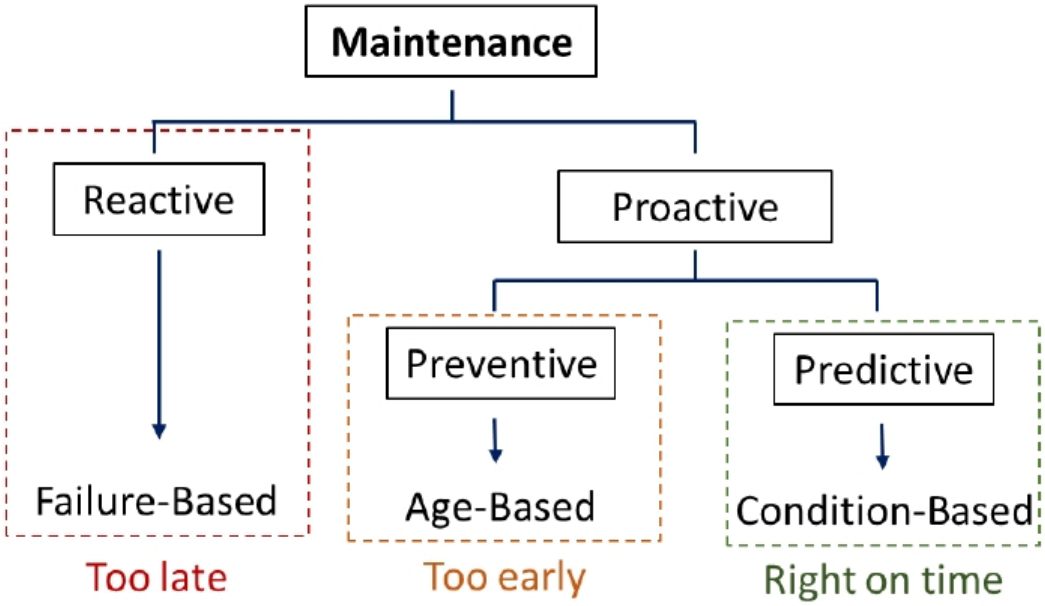

Figure 5: Maintenance cost classification (Adapted from Laura Swanson, 2001, 237)

2.5.1. Reactive maintenance

As the figure 5 above, there are two main types of maintenance called Reactive maintenance and Proactive maintenance. As Laura (2001, 238) mentioned in her study, reactive maintenance means passive maintenance approached only when equipment is broken. This type of maintenance allows company to minimize the manpower and money spent to keep equipment running. In the other hand, the disadvantages of this approach is negative effects on fluctuating production capacity and sometimes causes overestimated cost to repair critical failures. In addition, because of its passive reaction, reactive maintenance is not recommended in operations these days. According to many operations, proactive maintenance is now the best option in maintenance industry today.

2.5.2. Proactive maintenance

Proactive maintenance, according to Laura (2001, 238), is a maintenance strategy using active activities to check and maintain equipment regularly. As figure 6, these activities are divided into two main fields called Preventive maintenance and Predictive maintenance. In general, both preventive and predictive maintenance are generating maintenance schedule based on lifetime of equipment. However, preventive maintenance uses *"estimated probability that the equipment will fail in the specified interval based on its lifetime"* while predictive maintenance means "*restoring equipment whenever one of its physical condition (such as temperature, noise, lubrication and corrosion) reaches a specified level".*

2.5.3. Maintenance cost

The best solution to reduce maintenance cost to minimum amount that can get profit as much as possible is using combination between preventive and predictive maintenance. As the figure 7 below, maintenance cost is divided into three periods. Firstly, when the equipment is new and does not have many failures, almost the maintenance cost used for preventive maintenance and because of no critical failures which means no serious repairing solutions, this cost is not so high. In the second period, when the machine can sometimes be broken because of over-productivity and getting old, predictive maintenance is combined with preventive maintenance to keep the equipment in good condition with no critical failures. At the last period when equipment is so old that can be broken at any time, the lifecycle of equipment becomes too short to have forecasting solutions such as preventive and predictive maintenance. However, according to Swanson (2001, 242), this step should be considered as a last option since company is not able to invest a new one and have no choice but keep using the old one.

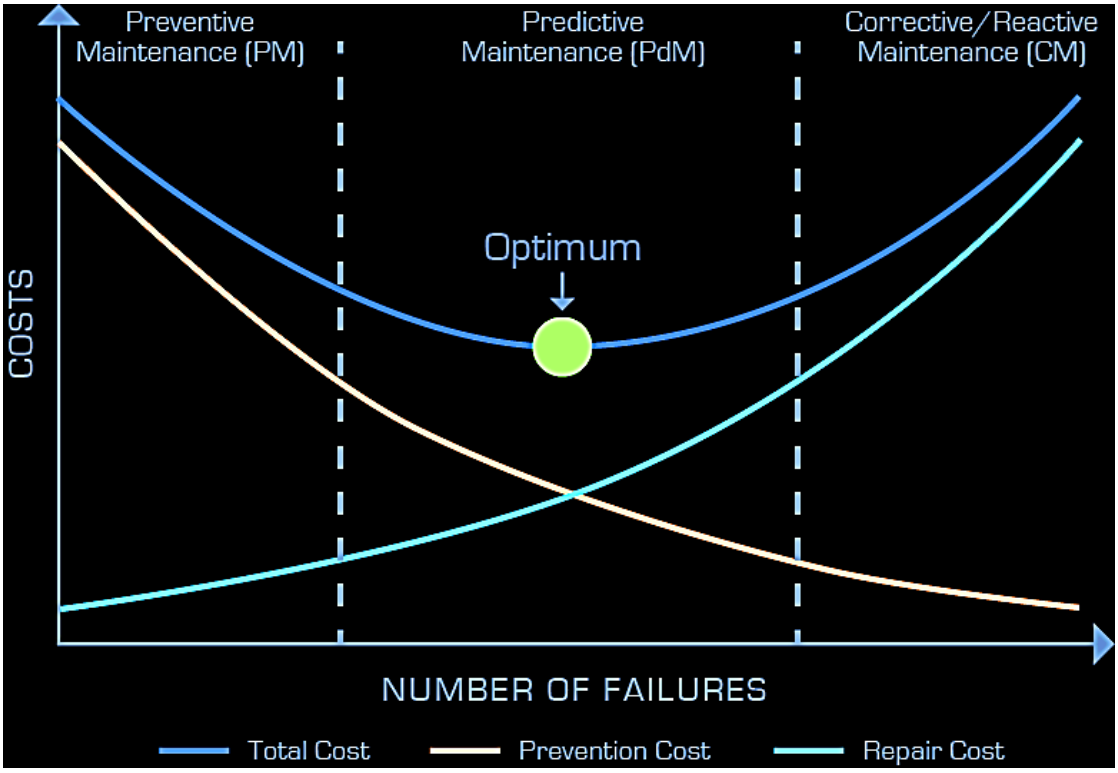

Figure 6:Minimizing maintenance cost (Adapted from Laura Swanson, 2001)

3. Case company: Macnels Shipping Co.LTD

Before having a straight discussion about the case company, it is important to have a quick review of the general logistics reality in Vietnam.

3.1. The current logistics in Vietnam

3.1.1. Economy

In recent years, Vietnam has achieved rapid economic growth by focusing on industry and services instead of original agriculture. According to Khong Chiem (2017), the gross domestic product (GDP) has been kept at 5-8% during the last 10 years. Moreover, the per capita income (GDP / person) in 2017 had also significantly

improved with the number of 2385 USD / person, which had increased by 1550 USD compared to 2007.

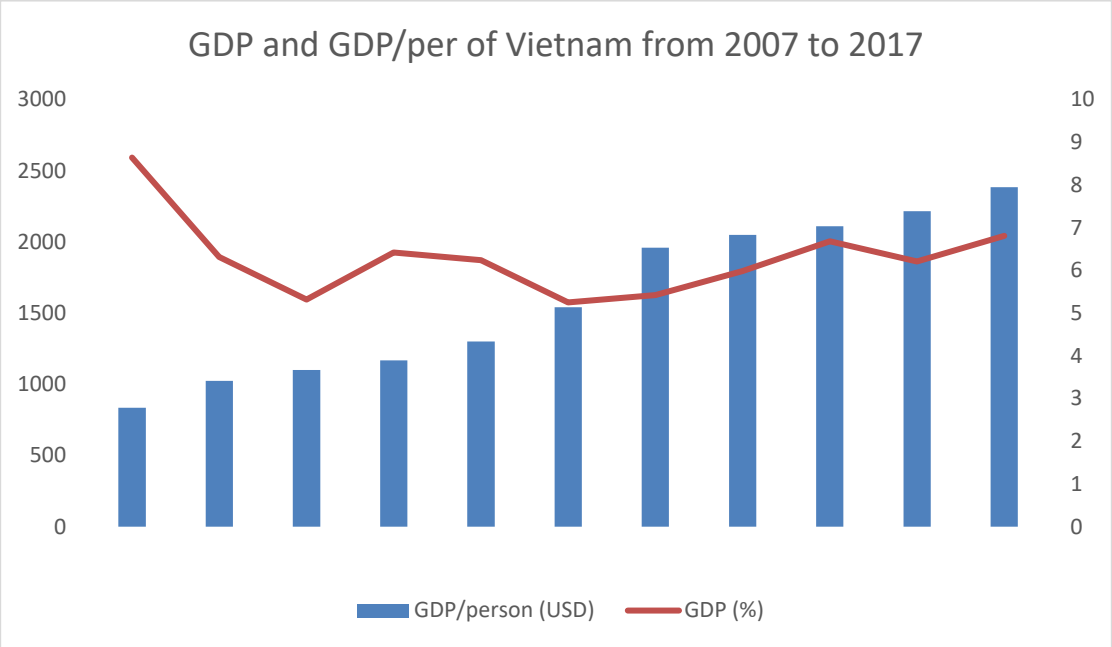

Figure 7: GDP and GDP/per of Vietnam from 2007 to 2017 (Adapted from Khong Chiem, 2017)

According to Ha Van Hoi (2013), officially becoming a member of the World Trade Organization (WTO) and the ASEAN Economic Community (AEC) has brought positive changes to the economic position of Vietnam, increasing the attraction of foreign direct investment (FDI) and the birth of many domestic private enterprises. Especially, by signing the Trans-Pacific Partnership Agreement (TPP) in 2010 (Deborah Elms and C. J. Lim 2012, 8), which is operated with the purpose of integration of economies in the Asia-Pacific region (the United States included), Vietnam has improved its ranking in the world economy and has an important role in the regional playground. In

consequence, international trade has also developed because of the increase of trading and warehousing demands.

However, the rising of logistics demands means increasing requirements of the quality of logistics, which is very weak since logistics is absolutely a new industry in Vietnam with a low quality of infrastructure as well as operation and management. According to Le Thi Bac (2015, 37), the logistics industry in Vietnam has in the past years has focused on exploiting resources with high intensity but low efficiency, which has caused depleted resources and a seriously polluted environment.

3.1.2. Infrastructure

In supply chain management (SCM), logistics play an important role in every step, from importing resources to their transportation and warehousing services. Martha C. Cooper (1997) states in her study that the main mission of logistics is to ensure the availability and fluency of material flow and service in the market, in which the logistics infrastructure plays an important role. There are a few researchers who have pointed out the concept of the logistics infrastructure. Firstly, according to A.A. Zuraimi's view (2013), the logistics infrastructure is" a fundamental factor in the operations of logistics networks through integrating of maritime, air and land transport modes". In addition, according to Dr. Vu Anh Dung (2012, 4), the logistic infrastructure is a total of material, technical and architectural factors that play a fundamental role in the logistics activities in general and logistics services in particular. There are two types of logistics infrastructure including the transport infrastructure and the information and communication infrastructure. The transport infrastructure is a system of material and technical as well as architectural solutions and means of organizing the foundation infrastructure for the development of the transport industry and economy. This includes the system of bridges, roads, seaports, river ports, railway stations, airports,

yards, and auxiliary equipment systems: signal information, signs and streetlights. The information and communication technology infrastructure is the system of information flow used to manage the processes of goods and information circulation in a company and devices used for this purpose, such as computer networks, barcode scanners and other such devices. In this situation, the author defines the logistics infrastructure as the basic elements for international trading including the transportation systems and warehouses.

Despite having a variety of transportation modes including road, sea, railway and air, the quality and scale of transportation in Vietnam are rated to be weaker compared to the other developed countries in the Asian region and the world. According to Vu Anh Dung (2012, 16), the ranking of Vietnam based on each type of transportation is shown in Table 1 below.

Transportation infrastructure	Scale	Quality rank/144 countries in 2013	Quality rank/144 countries in 2014
Road	206633 km	120	102
Railway	3146 km	68	58
Seaports	49	113	98
Airports	21	94	92
Overall		119	110

Table 1: Vietnam transportation rank (Adapted from Vu Anh Dung 2012, 16)

To sum up, despite having a good geographic location in the ASEAN area with a high density of international trading, the logistics infrastructure in Vietnam is a minus point that needs to be developed.

With regard to the Macnels company, because of being a Vietnamese company, Macnels must deal with the general logistics problems here, such as pollution and low-quality infrastructure. The following part describes more clearly the specific issues in this company.

3.2. Introduction of Macnels

Vietnam joined the WTO, creating favorable conditions for enterprises to freely exchange and trade goods with other countries in the world. Since each country has different geographical positions and produces as well as currency unit for buying and selling goods, the role of import and export knowledge become very important and necessary. At the same time, it is necessary to invest in a type of service that supplement the shortcomings that the transport industry has not done, which is freight forwarding service.

Because of the increasing of the demands of trade as well as the growing economic conditions, Mr. Pham Ngoc Binh has decided to set up a Freight forwarding service company on February 1st, 2008, the office is located at 2A Nguyen Thi Minh Khai, District 1, Ho Chi Minh city. This is considered a favorable position for the company's operations, the office is relatively close to the seaports, which is very convenient for freight forwarding.

Business areas:

- Sea freight agency service
- Air freight agency service
- Commodity brokerage service
- Tallying service

3.3. Status before applying green solutions

3.3.1. Achievements

During the ten-years operation, Macnels Vietnam has gained certain achievement and development. Specifically, the company's freight forwarding market is distributed throughout the country and abroad as in Europe and Asia. Customers of Macnels Vietnam are also very crowded. These are both national and international production/manufacture companies that need import and export services via sea, air. So far, Macnels Vietnam company has agency relations with many major shipping lines such as MISC HCM, China Shipping, Dongnama, K-Line, Wan Hai, Hanjin, NYK, ... along with airlines like China Airline, Thai Cargo, Vietnam Airline,… in order to improve services quality and affirm its position in forwarding industry in Vietnam.

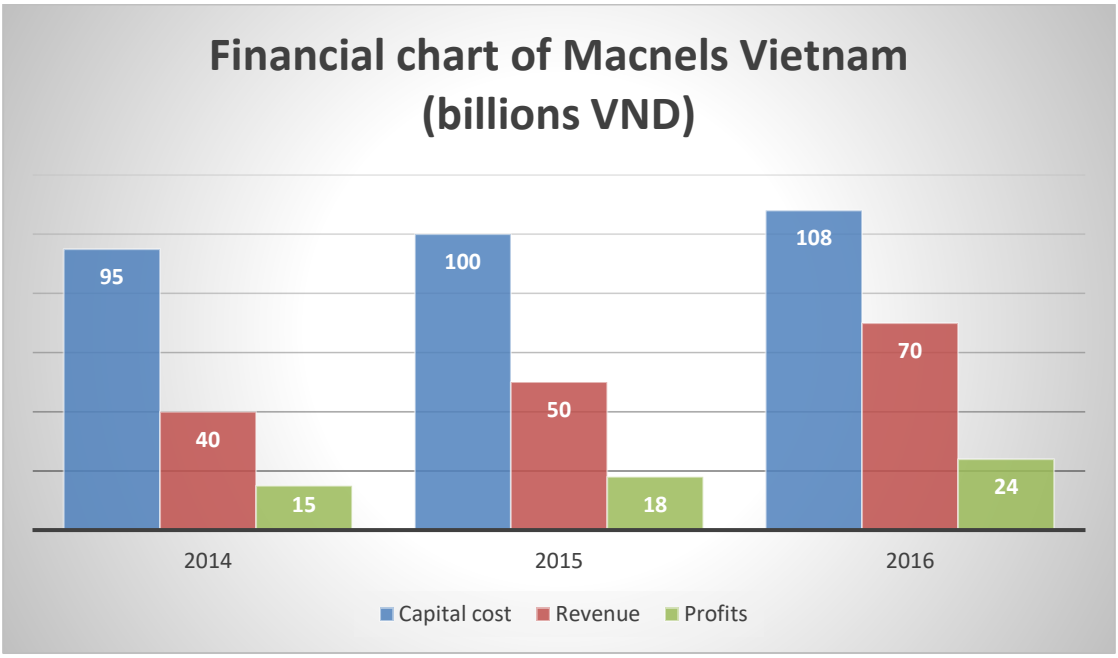

Table 2: Financial chart of Macnels Vietnam in 2014-2016 (Adapted from Macnels financial report)

The chart above shows the financial statues of Macnels Vietnam company from 2014 to 2016. Generally, both capital cost, total revenue and profits of company increased rapidly year by year. Specifically, capital cost grew up by 5 billion VND from 2014 to 2015 and 8 more billion VND in the next year. At the same time, total revenue and profits of the company also raised as an inevitable consequence, especially in 2016. To sum up, Macnels Vietnam company's total revenue has always been high as a medium level forwarding company in Vietnam and also increased year by year. As a result, the chart shows the stable growth of Macnels Vietnam company through each year of operation.

3.3.2. Challenges

Besides the stable growth of revenue as well as these above achievements, Macnels Vietnam still has many problems in its operation that need to be overcome. To analyze

these problems, the author decides to make researches in individual department of Macnels Vietnam to have the most clear and exact view about Macnels's operation. The problems below are located in 4 departments included office, human resource, transportation and warehouse.

- Office

Macnels Vietnam company brand office located in central area of Ho Chi Minh city, where the office hiring average cost is very high. Although having a good location, the infrastructure and technologies in office is quite old and not very effective for working condition such as photocopier, fax machine, camera system...

- Human resource

As a medium level company, almost employees of Macnels Vietnam come from low and medium level college, where they were not studied in a professional way by good professors and masters in international freight forwarding field. There was a fact that employees in Macnels Vietnam just have to finish their own jobs based on the certain process of company without thinking and using their imagination regularly.

- Transportation

It has been 11 years since the strong investment period in 2008, Macnels Vietnam still use their old transportation systems and vehicles, which consume a lot of fuel and pollute the environment. In addition, because of the long-term using time, the predictive maintenance cost of the vehicles now overcome the preventive maintenance cost. At the same time, the maintenance processes of vehicles also nearly reach its last reactive step which emergency solutions are needed.

- Warehouse

Macnels Vietnam has a warehouse system in Thu Duc district include one warehouse and five forklift trucks (two counterbalance trucks, two reach trucks and one lift truck). However, all of them come from the old generation that have high fuel consumption as well as high air pollution. The material of infrastructure in warehouse is also out of date. For example, almost wood pallets in the warehouse are seemed to be rotted away that may cause damage to goods.

3.4. Green solutions

In May 2018, Macnels's Board of Directors decided to hold a large-scale meeting covering all branches of Macnels in Vietnam. At this meeting, directors discussed about the long-term development of companies using new green strategies. The goal of the strategies is to address climate change, reduce fuel consumption and enhance traffic safety. According to Mr. Binh, Director of Macnels branch in Ho Chi Minh city, the word "green" here not only meaning of being environmentally friendly but also reflects on green technology, green solutions and green standards which imply both saving and efficiency. After the meeting, Directors has confirmed three solutions from the author as main ways of development in the future:

3.4.1. Employees trainings

As mention above, Macnels company includes mostly employees who come from average level college and junior college in Vietnam. Therefore, people there only follow the company's processes and try to finish their own jobs. That somehow reduces the development speed of company as well as has negative effects to those employees' imagination and soft skills. To face to this problem, Mr. Binh decides to

lead his employees to an extracurricular class about soft skills called Inhouse Training. In addition, the human resource department of Macnels now only recruit students who graduated with more than 2.5 GPA to improve employee's quality as well as increase competition in office.

3.4.2. Energy consumption reducing and upgrading warehouses

Because of the infrastructure of both warehouse and transportation is old and energy wasted, Macnels directors finally agree with two solution: upgrading warehouse system infrastructure and using new fuel generation. For instance, from September 2018, Macnels moved its warehouses from Transimex port to ICD Song Than New Port. Located in the west of modern Song Than industrial park, Binh Duong province, Vietnam, ICD Song Than Newport includes new warehouse systems based on Europe standards and introduced as the first warehouse system in Vietnam using solar energy.

Transimex port Song Than Newport

Figure 8: Wooden pallet

The pictures above shows the quality comparison between pallets in Transimex port and Song Than port. Generally, almost pallets in Transimex port is old and some pallets even have been rotted. In the other sides, every pallets in Song Than port are new and secure. In addition, the presentation of ITL symbol in every pallets have increasing branch value of Song Than port in practice.

Figure 9: Warehouse door

The seconds picture is the comparison between doors of these warehouses. In Transimex warehouse, containers are located outside doors for minimun distacnce of 500 meters with no outhouse covered. When loading and unloading packages, forklift trucks move packages from doors to containers and vice sersa. This is because Transimex warehouse have only 15 big doors as the left picture so locating containers outside help them increase productivity, for example, 1 door can handle 3 containers at the same time. The disadvantage of this design is the weather. There is a truth the Vietnam contain only two main weather: sunny and rainy, so when it is rain, all of loading and unloading acctivities are delayed that usually lead to overload.

In another side, Song Than warehouse are designed with 50 automatics doors with Europe standard, which mean one door can handle one container directly as the picture. This design not only keep productivity always high, but also create sense of modern and security for customers in loading and unloading process.

Last but not least, the inside warehouse environment. As the pictures below, Transimex warehouse is dark and old. There is a truth that almost light in the left picture captured by the author is come from outside doors, which means warehouse workers usually work in bad and dark environment. Talking to Song Than warehouse, the modern solar energy production which located in the house top always provide a certain energy source that enough to keep warehouse environtedment in best condition. In addition, personal protective equipment, wifi connection and water supply are located in the whole Song Than warehouse that also received good feedbacks from employees.

Figure 10: Inside of warehouse

To sum up, warehouse infrastructure has been upgraded from container yard to even a single pallet. This upgrade has received many good feedbacks from customer that the author will mention in the Result part. However, the warehouse's fee is increased lightly from 800 USD per month to 1000 USD per month.

The second solution focused on transportation fuel. There is the fact that all of Macnel's vehicles is belong to the old generation which is invested in 2008. So according to Macnel's directors, it is very difficult and costly to invest new vehicles generation for all of branch companies in Vietnam. Instead, the given solution for this problem is using the higher quality fuel to decrease smoke come from those old vehicles. For instance, the E5 petrol is one option to replace the RON95 petrol that are being equipped in almost vehicles in Vietnam. For more details, E5 petrol is a kind of

biofuel created by mixing conventional mineral gasoline, RON92 petrol, with bioethanol in percentage 95/5. Published in Vietnam Law Magazine in May 04th 2018, the table below shows the difference between these kinds of petrol.

Criteria	RON95	E5
Nature	A mineral petrol distilled from fossil fuels rich in carbon and hydrocarbons	A kind of biofuel which consisting of a mixture of traditional gasoline and bioethanol
Color	Yellow	Green
Environment effect	Due to being distilled from fossil fuels containing carbon and hydrocarbon content, when burned, it produces a lot of CO2 and CO - gases that are very harmful to the environment	When burning, the level of harmful emissions is much lower than the one of RON95 gasoline distilled from fossil fuels
Car engine effect	The octane rating is 95 that has good anti-knock ability, helps the engine works smoothly	The oxygen content is higher than mineral gasoline, so it helps the combustion process in the engine more thoroughly, increases the capacity and reduces fuel consumption.
Cost	0,88 USD / liter	0,82 USD / liter

Table 3: RON95 petrol and E5 petrol competition (Adapted from Vietnam Law Magazine, 2018)

3.4.3. Maintenance and services developments

From July 2018, a Macnels branch company in Ho Chi Minh City started to set up their new maintenance specialist in the office who takes care of the maintenance schedule for all the active vehicles. His main mission is making sure that each vehicle is checked after every trip and that theyc are in a good condition for the next trip. This strategy is a result of the proactive maintenance strategy described in the theory part.

However, the council declined to set up strong solutions, such as investments in new vehicle generations, because they were uncertain about the turnover that the green values would bring. As a result, the final investment decision will be made based on the outcome of the three-solutions above.

3.5. Results

This part is all about the results of the three-solutions. As there are three separate solutions, the results should be divided into three parts in order to discuss each problem. This result is mostly based on the employees' interviews and surveys. In addition, there is a small discussion part for the author to give his opinion.

3.5.1. Office affects

After one month from starting the Inhouse Training program as well as from recruiting employees, who had graduated from a high-quality university, the working environment in Macnels office became brighter and more effective. For instance, the paper consumption in the Ho Chi Minh branch office in July 2018 decreased by 23% compared to a month before. This result is due to applying electric technology instead

of using traditional paper documents. For example, the company started using electronic invoices and electronic delivery orders. According to Ms. Hanh, the Head of the Accounting Team, using electronic documents not only helped to save paper and fuel for the delivery team, but also increased accuracy and sped up the information exchange processes between companies.

3.5.2. Warehouse affects

In this part, only qualitative research method was used because the ITL warehouse managers refused to publish their data due to the highly competitive logistics market. The results of this part are mostly based on warehouse workers' interviews and on a small survey about warehouse upgrading.

Firstly, the interviews focused on the warehouse workers who had moved from a Transimex warehouse to the ITL warehouse.

Bob – forklift truck driver	This warehouse is totally more modern than Transimex one. I mean everything is new and they even have solar energy. I especially love these forklift trucks because they are so smooth and always in good condition.
Long – loading / unloading staff	In my view, the working environment here is much cleaner than in the Transimex port as well as the Wifi and intelligent warehouse management system, like barcode.
Hieu – forklift truck driver	I am so glad that the Director decided to move our warehouse to Song Than. In the Transimex port we had forklift trucks which were dirty and had a huge fuel consumption. There were some days when I had to charge them 3 times.

Tu - head of warehouse team	This warehouse is incredible, you know, it looks like a standard European warehouse. My team enjoys working here. Since we have used this warehouse, the good flow has been smoother, and productivity has been increasing. For example, the capacity of a loading door has increased from 8 containers to 11 containers per day. At the same time, because of the better service quality, our warehouse now serves a bigger amount of goods than before.
Tian - tally staff	Thanks to the new barcode application, my job here is now easier to do. A month ago, I had to check everything in the carton including the code, purchase order number, color and size by hand but now, you know, just one click by the barcode scanner and everything is done. This technology is really useful, and it helps to increase the productivity of the warehouse so much. One more thing that pleases me is the working environment, I mean this warehouse has everything from a Wi-Fi connection, clean environment and water supply to an air conditioning system.

Table 4: ITL Warehouse Interview

The table above shows the interview results of five men who moved from the Transimex warehouse to the Song Than warehouse. Generally, all these employees felt interested in and pleased with new working environment. There were several advantages that the Song Than warehouse brought to their workers including a Wi-Fi connection, air conditioning and water / fast food supply. In addition, a small survey conducted by the author showed that 13 workers were happy with the new warehouse and that two men were not really happy because it was further from their house to the ITL port than to the Transimex port. To sum up, the modern and clean environment in the new warehouse encouraged the workers' motivation as well as increased average productivity.

3.5.3. Business affects

In this part, combination of qualitative and quantitative research plays an important role. For instance, the qualitative research included survey and interview of Macnel's managers and customers feedbacks while quantitative research is the statistical income comparison between months to get an absolutely review of green solutions affects.

Firstly, let's have a look at the realistic economic statistic of Macnels after one month since the green solutions are applied:

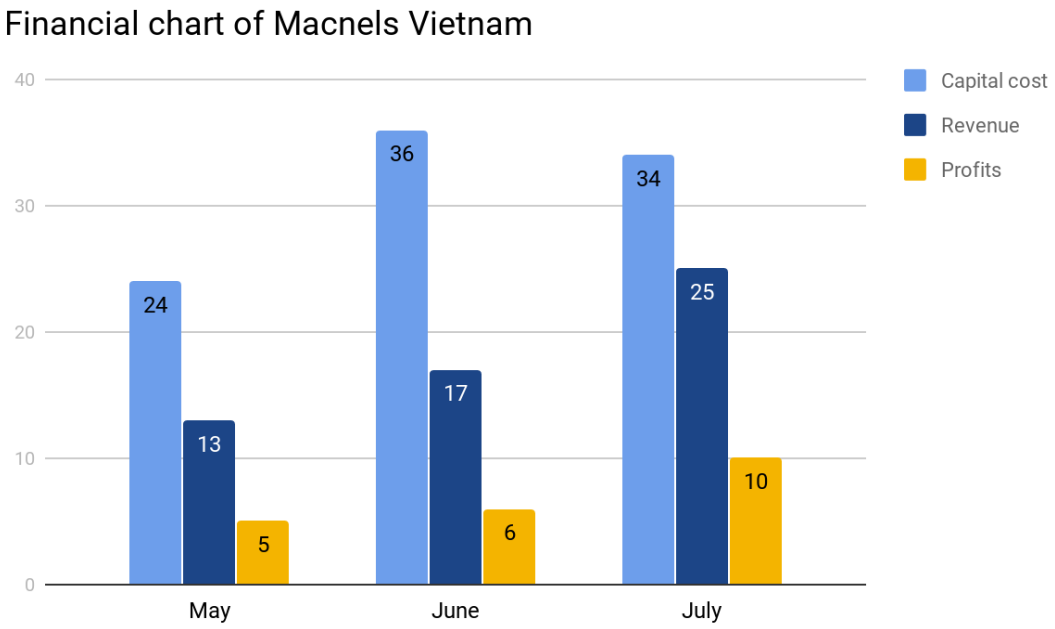

Figure 11: Financial chart of Macnels (billions VND) (Adapted from Macnels financial report)

The chart above shows financial status of Macnels Vietnam between months in 2018, which June is the time they invested for green solutions. That is the reason why capital cost in June is suddenly increase so much. However, because of the new maintenance strategy as well as good condition of infrastructure, revenue and profits of Macnels in

July increase sharply. As Mr. Binh said:" I love the idea you give us. This is such a revolution!"

Not only the Directors but also employees and especially customers give good feedbacks about the recent service quality of Macnels. The table below showed the synthetics feedbacks from random customers. Because of private reasons, name of customers will not be showed.

Mr. A	It is interesting when I visited the new warehouse. It's clear and modern, and I can see my goods are being handled carefully and professionally. The new fee is higher a bit, but it is not a problem to me. You know, after this innovation, I decided signing a new long-term corporation contract with your company in future.
Mr. B	Your delivery quality now is now creased. I mean the truck look more modern and cleaner. Another plus point is your trucks has never late a single order since the end of June 2018. About the warehouse, it is such in higher level compared to the last one. As people say:" Nothing ventured, nothing gained". You guys ventured, so my good will go through your line.

Table 5: Customers interview

In conclusion, green solutions have given Macnels both good finance status and good feedbacks from customers.

4. Conclusion

Based on the study and result during the time the author had been working in Macnels Vietnam, the green solutions have contributed a significant role in raising the total company's performance in 2018. The green solutions can bring benefits in a long-term period as well. Because the author did not have enough time for a thesis writing, the long-term results have not been mentioned yet in this paper. According to the positive feedbacks from internal employees and external customers, the green solutions are expected to be a main driven target for Macnels in 2019 and other next following years.

From some practical experiences the author got from developing and implementing the green solutions, there are still quite many problems which cannot be solved easily. The general awareness of employees about green logistics is one of those problems. In the beginning of the project, it seems that everyone is following and supporting the ideas but few weeks after that, no one cares about the ideas anymore. Therefore, it is considerable important for the company to keep up the awareness most of the time by organizing the workshop for training monthly and yearly. The involvements from employees who are working daily in the green logistics are also crucial. Getting feedbacks and new fresh ideas from employees should be considered by top managers.

5. Reflection

The learning and writing this paper were lasting for three months. In the first months, the author has been learnt many valuable lessons from top managers in Macnels. Understanding about how the company's working culture, operation procedures are extremely important for the researching process. The author has developed not only professional skills but also soft skills such as communication, teamwork…

From the Macnels side, the company itself has problems about their own logistics process. With this paper, company could get a lot of benefits not only for short-term but also long-term process.

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