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Maritime cargo claims in Vietnam: practical issues and the design of a virtual consultancy expert system based on artificial intelligence to assist non-lawyer users

Thi Mai Phuong Pham
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DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature): ...........................................

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ABSTRACT

Title of Dissertation: MARITIME CARGO CLAIMS IN VIETNAM:
Practical issues and the Design of a Virtual Consultancy
Expert System based on Artificial Intelligence to assist non-lawyer users

Degree: MSc

The shipping and logistics industry is one of the strategic factors in the development of national economics in Vietnam. Recently, there are various investments in improving the quality and quantity of the shipping and logistics procedure to enable the international and national trade, thus developing significantly the national economy. One of the problems that interrupts the cargo flow within the whole shipping and logistics procedure is the dispute between different stakeholders in handling the marine cargo.

The study, therefore, is to identify the current quality of marine cargo claim procedure in Vietnam. To identify it, the survey method was conducted through different channels. The targeted interviewees are companies operating in shipping and logistics. The survey highlighted the main reasons leading to the ineffectiveness of the claim handling process such as the shortage of qualified staff, the limited legal specialists and the high cost of legal counselling fees. This results in the requirement of having an innovative solution to tackle the procedural problem.

As pointed out as the powerful tool of Artificial Intelligence, the expert system is proposed as an innovative solution to solve the problem in the short term. As a computer program simulating human expert’s behaviors, the expert system technology was applied in the legal domain and shipping field but not in maritime law for the non-lawyer users in training and commercial use. Therefore, developing a virtual consultancy based on an expert system can be a new solution to assist non-lawyer staffs in shipping and logistics companies in cargo claim handling under the Vietnam Maritime Code.
From the legal aspect, rule-base analysis can break case laws or statutes into separate elements to establish conditional sentences in the knowledge base and then facilitate inference engine to give users recommendations. Therefore, a rule-based expert system will be applied to develop virtual consultancy. However, with the limitation of time, only a prototype is constructed for users to look up any Articles related to maritime cargo claims under the Vietnam Maritime Code 2015 and consult the system of whether there are some basic problems in the cargo claim handling.

Key words: maritime cargo claims in Vietnam, rule-base expert system, virtual consultancy system for maritime cargo claims, expert system for non-lawyer users.
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LIST OF ABBREVIATIONS

AI            Artificial Intelligence
VMU           Vietnam Maritime University
COGSA         Carriage of Goods by Sea Act
SDR           Special Drawing Rights
UNCTAD        United Nations Conference on Trade and Development
CHAPTER 1
INTRODUCTION

1.1. Background

1.1.1 Overview of shipping and logistics companies in Vietnam

Today, logistics in Vietnam emerges as an essential and strategical factor towards national economic development. The average growth of the throughput of ports per year reported by the Maritime Administration in Vietnam is 10%, meanwhile the improvement speed of the logistics industry is 20% each year (Bui, 2017). This leads to a recently significant increase in the number of shipping and logistics companies in Vietnam recently. According to a survey of Vietnam Logistics Association (2016) (As cited by Vinafico, 2016), there are about 1,300 logistics enterprises, of which 20% are state-owned companies, 70% are limited companies, and private enterprises are 10%. Furthermore, there are 25 world-leading logistics companies in the Vietnam logistics market. The average number of employees at medium- and small-sized logistics enterprises is about 30-40 people and large enterprises with 100 employees or more.

Thus, the functioning of this industry does not always work without any interruptions, but unfortunately, many unpleasant events are arising due to the human errors or other external factors in its operations. Many dangerous situations are resulting in fatal incidents leading to a raising of claims from the cargo interest who bears the risk of damage and loss of the cargo. In the context that the national shipping and logistics develop dramatically, it is required to minimize the delay time in the logistics procedure to enable the movement of cargo flow in international and domestic trading. The delay could be caused by different factors such as the bureaucracy of the document
system or disputes arising from transportation and trading. Among these factors, the most common cause of disputes refers to the damage and loss of the cargo in transportation, especially at the sea leg. Thus, shipping is a complex industry. To handle the disputes and marine cargo claims from different incidents, the handler needs to combine different perspectives from various specializations.

However, if staff in companies, including shipping companies and freight forwarders, fail to grasp knowledge in how to deal with cargo claims, the quality of maritime logistics service cannot be ensured because of wasting time and money towards shipping companies and the customer as well. Only about 5-7% of employees are trained and professional; the rest comes from many sources with different backgrounds and 85% self-training human resources (Vinafaco, 2016).

1.1.2 Shipping 4.0 and application of Artificial Intelligence

On the other hand, Vietnam released many projects to catch up with the global revolution of Industry 4.0. In 2018, the government invited 110 Vietnamese scientists and researchers around the world to contribute to the research on the application of Industry 4.0 in Vietnam (Pham, 2018). The Maritime Administration also pointed out the necessity of application of industry 4.0 into the shipping and logistics procedure as the national strategy to maintain the current high speed of the national maritime sector currently (Phan, 2017). It is undeniable that it is a powerful tool to enhance the effectivity of the shipping operations.

Thus, Artificial Intelligence (AI) is considered one of the most common applications of the digitalized revolution. As the factual brain behind the Industrial revolution 4.0, AI enables computers to communicate and collect data automatically. Navigated by this revolution, maritime transportation also applies some components in Artificial Intelligence (expert system, robotics, machine learning, etc.) to go to the age of Shipping 4.0. In terms of the expert system, there are some applications developed to support engineers and staff in ship design, maritime navigation training, voyage planning, shipping risk management. Hence, it is comfortable for engineers and staff
to use the expert system anywhere and anytime. Moreover, the application of AI potentially enables the effective logistics procedure. It is expected to solve the issue from ineffective procedure caused by the delay from claims and disputes as mentioned in the previous part.

1.2. Statement of problem

As published by the Ministry of Justice, there is a growing concern in handling disputes in Vietnam that there is a shortage of legal specialists in the international trading, fewer of lawyers in shipping transport, while at the same time the international trading is developing significantly. There are only 20 legal experts on the global trading and one-third of them worked in the shipping domain until 2015 (Thu, 2015). The government launched a project in 2010 to develop a national lawyer team to involve in international trading under decision No.123/QĐ-TTg; however, the success of this project in the maritime field is uncertain (Nguyen, 2017). Shipping transport falling under maritime law is a narrow domain, plus the lack of project’s finance. As consequence, the number legal experts in shipping domain remain small despite the increase of the lawyers in international trade in general. Another reason contributing to the low number of lawyers in this domain is the limitation of training. In fact, there is only one institute, Vietnam Maritime University (VMU) that has been providing a course of bachelor of maritime law since 2015 (VMU, 2017). However, VMU is not a university of law; the teaching content has not been organized completely and the number of experienced lecturers, especially those who worked as legal specialists, is limited. Therefore, the qualification of the course remains uncertain because the assessment of the first generation graduated in 2019 and will be carried out in the following years. Meanwhile, other universities of law institutions have not provided the maritime law specialization due to the shortage of experts and lecturers in this domain. In conclusion, there is a severe issue in training maritime law in Vietnam, at least in the short term.

Due to the lack of qualified lawyers in maritime law, it is reasonable that the company has to hire the international legal specialists to solve disputes. Nevertheless, there are
various cases that still need the involvement of local lawyers to interpret the customs and Vietnamese law. Plus, the cost of hiring local lawyers or legal advisors is known to be significantly expensive, around $250-300/hour (Hanoi lawyer counselors, 2016). The fee for hiring international lawyers, for example in Singapore, is even higher. Therefore, small and medium companies regularly choose to handle claims and disputes by themselves since the participation of lawyers in the immediate resolution is not mandatory in Vietnamese law (Vo, et al., 2010)

Another issue has risen is the few of shipping and logistics providers in Vietnam who have the legal department within a company, leading to the fact that the one handling the claims is the staff of operation department of the commercial department. However, the shipping and logistics operators in the companies are not equipped with a legal background. This leads to various difficulties in handling the claims in operations, especially the most regular claims as marine cargo claims. This situation is discussed in details in the analysis of the survey in chapter 3.

In recent years, there is a significant number of claims of damage and shortage of cargo due to the poor infrastructure of the local port, potentially leading to the postponing of cargo flow in port. As discussed, there will be a lack of qualified staff to handle the marine cargo claims in Vietnam. It is necessary to find out other solution to tackle the issue from the legal procedure to enable the sustainable development of international trading and the national shipping and logistics industry.

Recently, the significant increase of application of technology information in the maritime field, in the context of Industrial 4.0, provides a new solution to this problem. The integration of the expert system in maritime law to assist the cargo claim procedure is proposed in the study as a solution in the short term to tackle the shortage of experts in this domain.

In conclusion, there is a shortage of national legal counselors in maritime field, plus the fee of hiring international lawyers is significantly expensive; meanwhile operation
staff are not qualified to handle marine cargo claims. Therefore, the designing of the expert system in law is carried out as a feasible solution to support the handling procedure in Vietnam.

1.3. Aims and objectives
In the light of that, the principal aim of this study is to improve the practice quality of the cargo claim handling system in Vietnam with the assistance of the expert system – one of technology information systems. The user of this system could be the operator of the marine cargo claim in the shipping and logistics companies, who are non-lawyer users. By using this system, the users could seek for the answer by him/herself instead of hiring legal advisors at a high cost.

The objectives of this research are to:

- Understand the limitation of the cargo claim under the Vietnamese regime
- Find the main causes leading to the ineffectiveness of the cargo claim handling procedure in Vietnam
- Understand the structure of the expert system and its application in law
- Design the expert system to assist the practice of marine cargo claims procedure as a solution of improving the effectivity of this procedure

1.4. Research question/hypothesis
In order to achieve the mentioned objectives, these following questions need to be addressed.

a. What is the existing cargo claim regime and its principles in general?
b. How can the cargo claim principles be interpreted from the Vietnamese Maritime Code?
c. What is the qualification of the claim handler in Vietnamese shipping and logistics companies?
d. What are the difficulties leading to a delay cargo claim procedure surveyed by these companies?
e. What are the rationales to applying the expert system in assisting marine cargo handling?

f. How to integrate the expert system on legal reasoning to assist the decision making in the cargo claim procedure under the Vietnamese Maritime Code 2015?

1.5. Significance of the study
In the light of microeconomics, the solution to address cargo claims in this thesis does not only eliminate the potential losses from practices but also accelerates the cargo claim procedure and minimize claiming cost for the shipping and logistics company. From a broader point of view, it is proposed as a first step to tackle the immediate problem caused by the shortage of qualified employees and the high cost of hiring legal advisors in handling basic legal cases while operating the shipping and logistics procedure.

1.6. Proposed research methodology

1.6.1. Theory
It is necessary to review related concepts and general knowledge in academic research and books relating to the marine cargo claims and previous studies on the application of the expert system in law. Furthermore, laws, regulations, and guidelines in the shipping sector and especially maritime cargo claims in Vietnam, are reviewed.

1.6.2. Cargo claims in practices assessment
The identification of issues in handling marine cargo claims in practice is empirically investigated through interviews and surveys conducted via skype, emails and Google form with various relevant individuals in shipping companies, charterers, cargo owners, shipbrokers and logistics companies. The purpose is to assess the practices and their problems faced by the new employees, comparing between theory and reality; and systemize them to serve for “virtual consultancy” development.
1.6.3. Expert System
To test the development of a solution to address the problem of cargo claim handling identified an Expert System application will be a designed and prototyped component of Artificial Intelligence. The rationale for choosing this technology to transfer law knowledge into a system will be presented clearly in chapter 5 as the methodology.

1.7. Result
The outcome of the research is the design of a “Virtual consultancy” Expert System in cargo claims handling. This Expert System is expected to assist non-lawyer users in maritime law practices, specifically satisfying the cargo claim raising from a sea leg transportation from the loading port to discharging port. This could be applied in training employees who are involved in handling the marine cargo claims in Vietnam, as well as stimulation for educating senior students at the university to enhance their knowledge of marine cargo claims.

1.8. Delimitation/Scope of the study
In the limitation of this time, only the fundamental knowledge of cargo claims is provided and integrated into the system to tackle simple cases. The scope of claims also covers only contractual claims arising from the loss and damage of cargo during the transportation port to port. The developed system is applied in the Vietnamese context; therefore, only applicable regimes in Vietnam and the Vietnamese Maritime Code 2015 are interpreted in the study. However, the interpretation of the law will be carried out by the non-lawyers; therefore, the analysis will be at the shallow approach. Furthermore, the scope of this study has not covered the involvement of the insurer.

In terms of the expert system, its background will not be approached in the perspective of computer scientists but the perspective of its application in legal and training aspects. Thus, the system is developed in the form of the prototype. Therefore, the system is not tested with the users. The testing is only based on the theoretical outcome from the literature review and the empirical study. The full system is expected to be developed in future research.
1.9. Outline of the research

In this research, the chapter 2 provides the knowledge base of Vietnamese Maritime law in the perspective of marine cargo claims principles. Chapter 3 presents the result of the survey to highlight of current situation in handling claims in Vietnam. Chapter 4 gives an overview of the expert system and its application in the law and maritime fields. Based on the review of previous studies and the survey in the chapter 3, this chapter positions the study in the academic area. The methodology based on the legal reasoning to integrate the legal knowledge into the advisory system is introduced in chapter 5. Chapter 6 analyzes the system and its outcome. The final chapter 7 discusses and concludes the outcome of the study.
CHAPTER 2

ANALYSIS OF MARINE CARGO CLAIMS REGIME AND ITS APPLICATION IN PRACTICE IN VIETNAM

In this chapter, the general knowledge of the marine cargo claims regime is presented at both the international and national levels. The choice of law and principles of cargo claims is also discussed from the perspective of the Vietnamese Maritime Code 2015. The legal knowledge presented in this chapter will serve as an input to the development of the expert system elaborated in chapter 6.

2.1. Legal framework for marine cargo claims

2.1.1. International cargo claim rules

The first practical effort to create a uniform system of international cargo claim rules is in the form of the Harter Act of 1893, which legislates a compromise between the conflicting economic interests of the ship and the cargo (Sweeney, 1993).

This eventually led to the event that the International Convention for the Unification of Certain Rules of Law relating to Bills of Lading or the Hague Rules was signed in Brussels, in 1924. The basic structure of the Hague rules was, then, incorporated into English law by the U.S. Carriage of Goods by Sea Act of 1936 (COGSA) (Clarke, 1976).
In 1968, these rules were amended by the Brussels Protocol known as the Hague-Visby Rules. This is considered as the most prominent rules applied worldwide toward the current international standard, with over 80 contracting states presenting 90% of global shipping tonnage. These rules are interpreted into English law under the “Carriage of Goods by Sea Act 1971” then modified by the Second Protocol (SDR Protocol) in 1979.

In 1978, the United Nations Convention on the Carriage of Goods by Sea, also referred to the Hamburg rules; was signed and then entered into force in 1992. It is reviewed by UNCTAD as a modern uniform of international regulations, replacing the Hague-Visby rules due to its unresolved legal problems (UNCTAD, 2009). The scope of the new regulations was extended to the multimodal transport. However, it failed to attract worldwide acceptance due to its extended limitation of the carrier’s liability, which causes more disadvantages to the ship owner.

There are various researches on the carrier’s liability in different countries regime and global regimes. Iwawns (2017) discovered that during the 20th century, and until today, there has been an international attempt to unify and harmonize the regulations governing cargo claims; however, the regime is applied differently in different countries (Iwawns, 2017). In most of the cases, the claim procedure for types of cargo under a specific national scheme has to work together with the global mandatory liability regime; however, it depends on which maritime convention the states are signatory to (Qingyue, 2000).

2.1.2. Vietnamese liability regime

sea. It incorporates both the Hague-Visby rules and Hamburg rules. In other words, the basic principles that govern the carrier’s liability are shaped by the Hague-Visby rules and Hamburg rules under Vietnamese law. However, Vietnam has not enacted these rules but has incorporated them into the domestic law as inappropriate form.

2.2. Marine claims subject to limitation of liability
This part will present the definition of cargo claims covered under this study. Thus, it is necessary to understand in general all types of contract, which the claim could lie with. Furthermore, the factor determines the choice of law under international and national regimes and under the contract is analyzed under the Vietnamese case.

2.2.1. Defining cargo claims
It may be objected that there is no absolute definition of a claim. To endorse the basic litigation unite, Clark defines claim, in the general context, as an operative set of facts giving rise one or more right of action (Clark, Ryan, & Young, 1947). In other words, based on the constitute of facts, one party may have the right to assert a demand for relief against another.

In light of the contract, a claim will arise when there is a breach of contractual obligations by one party. Generally, the contractual obligation of both parties are stated clearly under the terms and condition of the contract, thus the contractor is entitled to satisfy his/her demand in the event of another default.

It is inevitable that there will be damages and loss during the carriage of goods at sea, resulted from various factors ranging from the force majeure to the human errors; therefore the carrier will face many cargo interest’s claims in the case of loss and damage. When there is a breach of contracts such as cargo damage and loss resulted from the default of the carrier, the shipper has the right to have his/her demand satisfied from the carrier. The contractual claim, in this case, refers to the requirement of payment of money or compensation against the carrier.
2.2.2. *Contract of carriage of goods at sea and incorporated documents.*

To determine whether the claims are subject to the limited liability, the types of the contracts on which the claims are being brought should be identified (Chen, 2001).

In maritime transportation, the contract of carriage is drawn between a carrier and a charterer in the form of charter party, incorporated with other documents issued by the carrier such as the bill of lading (Chanda, 2011). Regarding the contract, the parties have the freedom of contract regulated under the Vietnamese civil law. Accordingly, the limitation of contractual freedom under Vietnamese civil Code 2105 includes the right to agree on terms of the contract freely, the right to agree on the condition to guarantee contractual performance and the right to choose tribunals and resolution in case of contractual disputes (Nguyen, 2016).

The bill of lading is considered valid evidence of the contract and reference of the term of parties' liability (Özdel, 2015). It summarizes the terms stated in the charter party and acts as a document of title to the goods (Chanda, 2011). It can be transferred to the subsequent holder, depending on the type of the bill of lading. The transferable bill of lading can transfer the rights of property, possession of the good, the contractual rights as well as the liabilities against carriers to the lawful holder of the bill of lading (Todd, 2015). Under the Vietnamese regime, the transfer of the bill of lading includes the transfer of both rights of property, ownership of the good and contract rights as interpreted under the Article 148(1), 162 and 171 of the Maritime Code.

When the claims against the carrier are brought by the charterer, the carrier’s liability depends on the precise terms of his/hers undertaking stated under the charter party. However, when there is a claim from a third party, such as the free on board seller, other transport documents as the bill of lading, can be treated as the contract governing the limitation of carrier’s liability. It is clear that the charter party generates the contractual relationship between the carrier and the charterer meanwhile the bill of lading generates the contractual relationship between the carrier and the receiver (Jessen, 2018).
A further complication to determine whether the claims arise out of the charter party or the bill of lading is if the bill of lading contains an incorporating clause or all terms and conditions incorporated under the Paramount clause. The rule of incorporation remains uncertain under different jurisdictions. Under Vietnamese jurisdiction, the date of the charter party should be stated clearly on the face of the bill of lading to incorporate the terms of the charter party into the bill of lading (Cooper, 2014). In this case, the clause of arbitration under the charter party may bind on the holder of the bill of lading into which it is incorporated.

Additionally, in civil law, it is acceptable that the contractual right is transferable to the third party (Pejovic, 2001). This refers to article 419 of the Vietnamese civil law “when a contract is performed for the benefit of a third party; the third party shall have the right to request the obligor to perform the obligation toward directly”. Therefore, under Vietnamese law, the claims from the third party could be brought on the charter party.

2.2.3. Applicable law and regime

Finally, the factors determined the choice of law should be identified. Generally, the limitation of liability in cargo claims depends on the causes of action leading to the claim and the multiple legal regimes governing claims, which may be either the international limitation regime and or the specific limitation of liability regime of carriage of marine cargo (Chen, 2001). When there are international disputes that result in claims, at the outset it is vital to consider which source of law will be applied. In many maritime incident cases, it is reasonable that one jurisdiction could be more favorable to one party than another. The race between the parties to choose the more favorable jurisdiction depends on the cost, rule, etc. However, in this part, the choice of law is defined by the legal aspect. That issue is solved by the identification of the contract where the claim is brought. It is whether the claim under bill of lading or charter party and which term express choice of law is stated under this contract. If under the bill of lading, which rules will be applied, whether the Hague-Visby or Hamburg rules or another national law. The answer depends on different factors such
as the issuing country of the bill of lading, the incorporation of the bill of lading to the State legislation and the incorporate rules in the bill of lading such as the paramount clause (Ozdel, 2010).

If the claim is raised among domestic companies in Vietnam, the Vietnamese law will be applied (Pham, 2016). In the other case when there is an involvement of a party located in another country outside of the jurisdiction of Vietnam, it will apply to any international judicial assistance between Vietnam and this country as under Article 75 of the Vietnamese Code of civil procedure No. 92/2015/QH13.

2.3. Marine cargo claims principles

Many factors need to be identified before the commencement of filing the claim. In this part, there are step by step questions that need to be answered in the early stage before starting to claim. These questions identify the principles of cargo claims that will be interpreted under Vietnamese. The first vital factor needs to be clarified for the claimant’s title to sue. Without it, the claim will be dismissed. Thus, the claimant needs to know whom they need to bring the claim to as identified in the identity of the carrier. The next step is set for a cargo claim, which items the parties need to prove to exercise their rights. Finally, it is necessary to prove that under which terms there is a loss caused by a breach of the carrier; plus, the limitation of the carrier under the Vietnamese regime.

2.3.1. Title to sue

A question that the claimant should answer before taking the suit is whether he has the legitimacy of the claim, the so-called locus standi (Tokar, 1984). There are many routes to a claim, such as a claim through the contract or tort or bailment (Weir, 1965). In the scope of this research, only the contractual claims will be discussed. In fact, both the claimant and the carrier need to concern themselves about the claimant’s title to sue the carrier in the contract. This is because without the title to sue, the claim will be thrown out. On the other hand, eliminating the legitimacy of the claim of the claimant is the easiest way to deny to respond the claim in the carrier’s perspective.
Undoubtedly, the charterer, who signs the contract with the carrier no matter under the time charter party or the voyage charter party, has the title to claim against the carrier on the contract itself because the carrier in many cases, is bound by the liability toward the charterer under the contract. However, s/he has the right to claim, provided that s/he has suffered a loss through the breach of the contract (Tetley, 1986). In the other case when the assignee of the contract is not the one who bears the risk from damage and loss of goods and the title to sue is transferred to another person by the transferable bill of lading, or there is the involvement of a third party outside the contract, the title to claim become complicated.

Under the civil law principles, the consignee, in this case, can be treated as an integral part of the contract of carriage (Hallebeek & Dondorp, 2014). The relating parties to the contract are mentioned in the Article 147 (4) of the Vietnamese Code as the consignor means “person by whom or in whose name or on whose behalf the goods are actually delivered to the carrier in relation to the contract of carriage by sea.” Thus, under the civil law view, the creditor of an obligation is the one who is considered as the owner of the goods (Rodière & Du Pontavice, 1991). Under Vietnamese Maritime law, there are three types of parties who can be considered as the owner of goods or lawful claimant with the right to take the suit against the carrier:

a. The legitimate holder of the transferable bill of lading, Article 162 (1)

b. The consignee named in the straight bill of lading or the seaway bills, who has the entitlement to take the delivery of goods, Article 162 (3)

c. To whom the carrier acknowledges to deliver the goods to under the ship’s delivery order.

2.3.2. Identity of carrier

Moreover, the claimant needs to acknowledge the identity of the defendant whom he must claim. It is obvious that the identification of the carrier does not cause any problems because surely if the claimant is the charterer, definitely the defendant is the carrier as the contractual counterparty. However, the issue appears when there is a confusing identity of the contractual carrier in a certain circumstance such as under
sub-charter contract or there is no contract of carrier at all. The identity of the carrier or whom the claimant should sue is defined under the bill of lading and contract. The identity of the actual carrier lies with the bill of lading, specifically the signature and the banner of the bill of lading (Han, 2008).

There are two cases whether the claimant is the charterer or not the charterer. Obviously, when the claimant is the charterer, the defendant is the carrier who chartered the vessel. In the latter case, the identity of the defendant is based on the actual carrier defined by the banner and signature of the bill of lading. As in Article 159 (1) of Vietnamese law, the carrier is the one who must issue the bill of lading to the shipper.

The other problem raised under the context of chartered vessel, is where it must identify who is the actual carrier. As referred to in the Hamburg rules, Vietnamese law defines the carrier in Article 147 (2) as the person who “concludes on his own, or authorizes another person to conclude the contract for carriage of goods by sea with the shipper” and the actual carrier is identified as “a person authorized by the carrier to perform the whole or a part of carriage of goods by sea” referred in the Article 147 (3). As in the Vietnamese code, the actual carrier is considered as a party to the contract so that s/he cannot avoid his/her responsibility by law (Tetley, 2008).

However, the shipowner may still be liable for the damage even when not the contractual carrier, because under Vietnamese law the cargo interest has the right to sue against him/her in a tort claim (Cooper, 2014). Nevertheless, it is not covered within the scope of this research.

2.3.3. The burden and order of proof

a. The principles of burden and order of proof

There are numerous discrepancies between carriers and cargo interests for the understanding of cargo claims. To identify the liability between these two parts properly, it is necessary to figure out the burden of proof (Yuzhou & Li, 2009). Initially, the claimant is the one who has the burden of proof. As defined by Tetley, the burden of proof identify which party bear the responsibility to adduce evidence of
the breach of the liability, known as the “evidentiary burden.” He also points out four different principles of burden of proof as the prima facie liability of the carrier for all loss and damage of cargo, the responsibility of proving all available facts of all parties, the onus proof and the failure of providing key evidence (Tetley, 2008).

What another element refers to the claims, is the order of proofs that identifies the items that one party must prove. From the claimant’s perspective, s/he must prove his loss initially and the proof of the carrier’s breach. Thus, to prove the carrier’s breach, the claimant has to identify under which duties the carrier breaches and whether this term falls under the bill of lading or the charter party

Meanwhile, the carrier must prove the cause leading to the loss, his/her due diligence care to maintain the ship seaworthiness in respect of the cargo damage, and assert his/her exemption of liability (Tetley, 2008).

b. The burden and order of proof under Vietnamese Maritime Code 2015 and Hague-Visby rules

Clearly stated in Article 130, Vietnamese code, in many cases the burden of proof lies with the claimant. In other words, the one who claims against the carrier should prove his/her loss and damage to the cargo resulted from the carrier’s fault and neglect. Regarding the onus of proof, the principles under the Vietnamese regime are similar to the Hague Visby rules.

In terms of order of proofs, specific terms are identified that parties must present in marking a cargo claim. As mentioned, the plaintiff must prove his/her loss and the evidence of a carrier’s breach. To prove the loss, the claimant should prove that the cargo was not delivered in the condition and quantities stated in the bill of lading issued by the carrier in the port of loading. This is established by the comparison of the snapshot of the good at the loading and discharging port (Debattista, 2017). The Article 174 (2) of Vietnamese code defines the notice of loss at the discharge that could be provided to the carrier in writing in 3 days since the day of reception if the goods were discovered loss and damage in a joint inspection. This snapshot at the discharging port is considered as important evidence to get the cargo claims off the ground. Thus, the
other snapshot in the loading port is shown in the bill of loading (Gaskell, 2000). When the carrier signs the bill of lading, s/he declares that the goods at the loading port are indicated in the quantity and apparent condition marked in the bill of lading. Therefore, the claimant as shipper has the right to raise the prima facie presumption against the carrier through the statement contracted on the bill of lading as the wording of Article III (4) of the Hague-Visby rules (Palmer, 2015). In this case, the bill of lading is considered as conclusive evidence in the hands of the shipper. Additionally, if the claim is brought by the third party, the bill also provides the consignee the conclusive evidence on the basis that under the Article 146 the bill of lading is defined as the contract concluded between parties and the requirement of completion of delivery to the consignee under Article 170 (3) of the Vietnamese code.

On the other hand, the burden of proving the cause of loss lies with the carrier. In other words, the carrier can be presumed to have liability unless s/he can prove that the claim falls under one of the lists of exemption by the Article 151 (2) of Vietnamese code. Here, the lost results from the unseaworthiness, the Article 151 (1) of Vietnamese code states that proving the exercise of due diligence shall be on the carrier’s responsibility.

2.3.4. **Time bar**

There is a time limit that the claimant should be aware of to secure his/her claim. The time bar, defined under the Article 149 of Vietnamese Civil Code 2015, is the time limit that upon its expiry, the right and interest of claimant are intrigued. Under the Vietnamese Maritime Code 2015, the claimant has the right to submit the claim arising under the charter party after two years from the date of termination of the contract as stipulated in the Article 219. Based on the Hague Visy rule time limit, the limitation period for the cargo claim on loss and damage is one year from the date when the goods should be delivered to the legitimate consignee as stated in the Article 169 of the Vietnamese Maritime Code 2015. Thus, under Vietnamese code, the extension of the time bar is not allowed for the contracting parties due to the limitation of statutory law by the Article 153 under the Civil code. However, to harmonize the Vietnamese regime with other global standards, there are some resolutions issued by the Supreme
Court of Vietnam that allow parties to agree on the starting point of the time bar under the contract (Cooper, 2014).

2.3.5. Carrier’s limited liability regime
This is the last stage of the cargo claim principles that both parties need to identify.

The period of carrier’s liability is defined under the Vietnamese from the point of reception of the goods at the loading port to the completion of delivering the goods to the legal consignee at the port of discharge under Article 166 There are two principles of cargo claims regime as the principles of fault and limitation of carrier (Schinas, 1982). The fault could be identified as the fault of the carrier and not the fault of the carrier. The carrier’s obligation is bound to “exercise every due diligence” as Article 150 (1) under Vietnamese law meanwhile he is relieved from the fault from the shipper, servant, and his agent explicitly stated in the Article 156.

On the other hand, the limitation of the carrier could be analyzed under the exception to liability and limitation of lost. Firstly, the exemption of a carrier’s liability is closed in the list of Article 151 (2) under Vietnamese Maritime Code 2015. This list is based on the list stated in the Article IV (2) of Hague-Visby rules. Thus, as similar to most regimes, the marine cargo claims under the Vietnamese regime are subject to the monetary limit system (Dinh, 2017). There are two stages where the claimant should quantify the damage of the breach of the contract; these assist in calculating the limitation of those damages. (Tetley, 1995). Interestingly, Vietnamese law incorporates both the Hague Visby rules and the Hamburg rules into the limitation of liability of the carrier. In details, in the basis of Hague Visby rules, the package limit system states that the carrier’s liability is limited to “666.67 units of account per package or shipping unit or 2 units of account per kilogram of gross weight of the goods lost or damaged, whichever is higher” as in Article 152 (1) of the Vietnam Maritime code 2015. However, the difference is the unit of measurement which is a “unit of account” that is defined by the International Monetary Fund and the unit of calculation is identified as per “shipping unit” instead of “unit.” On the other hand, the liability of the carrier under the claim resulting from the late delivery is stipulated as
under the Hamburg rules; however, this claim is not covered by the scope of this research.

2.4. **Cargo claim handling in practice**

2.4.1. *Ineffective cargo claims handling*

There is a growing concern in both the global and national levels over unnecessary delays and complexity caused by the conflicts in international trade. In fact, the frequency of cargo claims was reported to double from 2010 to 2015 (Baoviet, 2015). Therefore, the ineffective claims process became a concern for both the involved parties such as the carrier and national and international trade in general. From the company’s perspective, the ineffective cargo claims procedure results in a high cost. Especially, cargo claims cost accounts for the highest volume of total claim cost with appropriately 30% reported in 2014 by the largest insurance firm in Vietnam. Thus the average cost of cargo claims also doubled from 2010 to 2014 (Baoviet, 2014). This infectivity increases the workload and time-consumption in operation for the company. Thus, when the claims are not handled smoothly, the reputation of the company and the partner relationship between the parties will be influenced negatively. On the other hand, the inefficiency of the cargo claims systems will eliminate the seamless cargo flow and prevent the development of international trade.

The causes leading to the ineffective claims handling process are various. The lack of awareness of legal matters and practical reasons from both parties contribute to this matter because the cargo claim is considered as the most confused kind of contractual claim of carriage of good by sea. In Vietnam, cargo claims involve both inbound and outbound goods; however, the majority of claims comes to the national carriers. In most cases, the claims are followed up by the legal department within the company or the insurer’s claim staff. Unfortunately, a claim is occasionally met by the carrier, more often it is denied or limited liability of carriage of goods or simply unanswered. The causes variables; however, the main reasons are found that the claims are against the wrong party or followed by an improper procedure.
2.4.2. Cargo claim handler requirement

In practice, the staff who is in charge of handling the claims of the company are the staff in the operation department which involves directly the transportation operations or the staff in the legal department. The cargo handling is an area where the operator is required to acquire a wide range of knowledge. It includes knowledge about the shipping and logistics procedure such as ships, cargo types, carriage methods, document procedure, especially legal aspects as applicable law, limitation of liability, etc. Generally, shipping and other procedural operation could be acquired from practicing; however, the legal knowledge is too complicated to be achieved only from practice. In fact, the claims handler requires a bachelor in law to handle the legal matters properly, as the operator in the legal department. Often, the operator is the person who is in charge of the claim handling; however, it is challenging for the operator to be an expert in both shipping operations and legal background.

2.5. Summary

This chapter presented the legal framework for maritime cargo claims on both the international and domestic level. Furthermore, the choice of law and general principles of cargo claims such as title to sue, the identity of the carrier, the burden of proof, time bar and limitation of the carrier were discussed from the perspective of the Vietnamese Maritime Code 2015. The chapter also indicated the ineffectiveness of handling maritime cargo claims as well as the requirements towards cargo claim handlers in Vietnam. To clarify the reason behind ineffectiveness in the process of cargo claim handling in Vietnam, a survey is conducted, which is analyzed in the next chapter.
CHAPTER 3

CURRENT ISSUES OF CARGO CLAIMS OPERATIONS IN VIETNAM

This chapter describes the research method and analysis of data from the survey (primary data) to find out the practical problems as well as reasons behind ineffectiveness in the maritime cargo claims procedure in Vietnam. Furthermore, this chapter gives a suggestion which solution is feasible to tackle these problems.

3.1. Practice in cargo claim handling in Vietnam

As discussed, the practice of cargo claim handling in Vietnam is facing different issues. First of all, there is a lack of qualified lawyers due to the lack of training and the nature of narrow domain; therefore, it is difficult for the small and medium companies to have a legal department within their organization. The company, then, is faced with hiring of legal counselling to tackle the problem. However, the national lawyers do not meet the requirement, so these companies need to hire international legal advisors. It is obvious that the fee of hiring international lawyers is a significant expense for the small and medium firm. Therefore, in small claims and dispute cases, the companies choose to handle issues themselves. Another problem is that their staff are not qualified to handle legal cases; generally, their background is that of a shipping expert. All factors lead to the result that the claims regularly take a long time to resolve, and are not compensated completely. Furthermore, the survey was carried out to highlight these mentioned issues in cargo claim practice in Vietnam.
3.2. Survey of cargo claims handling in Vietnam

3.2.1. Survey in general

a. Selection of participants
In a qualitative analysis, purposeful sampling is normally used to identify and select information-rich cases for a specific phenomenon (Palinkas et al., 2015). Accordingly, in this research, a purposeful sampling application will assist the researchers to focus on getting reliable information from the people having experience in dealing with maritime cargo claims in Vietnam, such as cargo owners, shipping service provider, freight forwarders and insurance service provider. Taking into account the limited time and the research scope of the dissertation, the survey is designed to collect opinions from people working in shipping companies, shipping agents, and freight forwarding companies in Vietnam.

b. Questionnaire
Affixed here in the Appendix, the questionnaire was administered to 30 respondents including managers and staff in shipping companies, shipping agent and freight forwarding companies in Vietnam who are well informed on the topic and the target of the survey. The participants were given 1 month to respond to the questionnaire via email and google form. The questionnaires were divided in two parts.

Part I concentrates on the respondent demographics with their personal information including their workplace, position and years of experience. This section is designed to support researchers to capture the respondents’ background for analysis purpose and verify the quality of information. Part II contains two sections, where sections 1 is about assessing cargo claim operators in Vietnam, and section 2 which captures the opinions about the cargo claim procedure in Vietnam.

c. Ethical issues
The cornerstone of ethical issues in conducting a research is that respondents should be protected from any kind of negative sensation and ensure the opportunity of hidden identity. Furthermore, they need to be informed about the topic and target of the
research so that they can decide if they would like to participate in it or not (Oliver, 2010).

Moreover, the researchers processed all the required documents towards research that involves human participation. Therefore, the research was approved by the WMU Research Ethical Committee before the survey was conducted. Furthermore, the survey was conducted along with the approval of the participants. The consent form was also sent with the survey so that the respondent could withdraw from participating in the survey at any time they would like. This purported to protect the privacy of respondents and to ensure that the collected data would be treated confidentially.

d. Demographic information

There is a total of 30 administered surveys, 28 were completed. Responses were collected from 21 shipping companies which equates to 75% of total responses, two shipping agents (7%) and five freight forwarders (18%). (Figure 1)

![Figure 1: Respondent distribution regarding workplace](image)

Figure 2 indicates the data on the profession of respondents, in which 50% of the respondents are export/import/shipping operators, 21.4% are managers of export/import/shipping management department, 14.3% are directors and 14.3% are sales staff.
Figure 2: Respondent distribution regarding position

Figure 3 describes the working experience of the respondents. There are nine people working in the shipping industry and dealing with cargo claims for 2-4 years, which equates to 32% of total number of responses. Ten people (about 36%) working for 5-9 years in the industry while there is seven people (25%) working for 10-20 years and two people (7%) working for more than 20 years in this industry.
3.2.2. Finding from the survey

a. Who will be the one dealing with cargo claims in your company?

Figure 4: Person in charge of handling cargo claims

Figure 4 indicates that 60% of surveyed companies in Vietnam primarily use their legal department to deal with cargo claims raised from their customers. However, 40% of
companies reported, their firm does not have a specific department to deal with legal matters. Their operator or staff working in the operation department are the ones who operate and satisfy the complete claims from customers.

**b. How many are people in charge of handling these problems in your company?**

Regarding the companies having their legal department, there are generally 1 to 5 staff members in charge of the cargo claims depends on the size and organization structure of the company. For example, Gemadept Shipping, one of the top three shipping companies in Vietnam, reports that they only have five staff working in the legal department. Many other companies only have 1-2 people in charge of this section because of the mismatch between education at colleges, universities and requirements towards recruitment, especially for a position of handling maritime cargo claims. According to the decree No.30/2014/ND-CP, the company that provides the shipping services must have a legal department and the staff has to have a bachelor of law and at least 2 years of experience.

In some cases, the company seeks advice from legal counselling. The main reasons leading to the involvement of lawyers that is mentioned is that the company does not have a sufficiency of expert knowledge and experience to handle the case in house.

**c. Staff assessment**

![Figure 5: Assessment of background of staff handling cargo claim](image)

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Surprisingly, the staff handle the claims, especially beginners, and are reported as not being equipped with the sufficient knowledge of law, cargo claims, or the fundamental knowledge of shipping and logistics such as the cargo handling procedure or basic liability of the carrier. The assessment classifies knowledge levels into four levels: the first level is not backgrounded at all, the second level is “shallow knowledge”, meaning that the staff is able to understand only the fundamental concepts; the higher level is “deep knowledge” which the staff can apply in practicing; the last level is “expert”. The percentage unit presents as per surveyed company. According to the survey; it was found that 57% of the companies reported that their employees handling the claims obtain only the basic concepts of shipping and logistics, 28% reported that their employees had deep knowledge, and only 3% reported that their employees were experts. Regarding legal background, there is a huge shortage of competent employees. One-third of the companies stated that their staff did not have any legal background at all. Meanwhile, there are fewer companies employing staff with higher legal knowledge, especially, merely 7% of surveyed companies have experts working on cargo claims. Regarding cargo claims assessment, due to the specific domain, there is also a high percentage of staff with insufficient knowledge of the claim procedure, 28% do not know anything at all, and 43% just obtain a basic knowledge. It is obvious that the majority of companies suffer a shortage of competent staff to deal with the claims. With this current level of acknowledgment, the staff are not able to handle the cargo claims efficiently.

d. What are the training programs applied?
The survey reveals the training procedure among companies in Vietnam. Over one-third of the respondents do not build their own program for training new employees in cargo claim handling and related issues. The most popular method applied is learning by doing, on a case by case basis. The most common training program used by 30% of the respondents to train beginners is E-learning. E-Learning is used to provide basic knowledge and variable tests to the staff before they are ready on the job. However, the e-learning programs cannot interact effectively with users. For example, Hapag Lloyd, a big shipping line having a branch in Vietnam, has an e-learning program but with only basic lectures about bill of lading and cargo claims. This is not sufficient. Programs such as short-term training courses and training classes are less prominent due its high cost and the time required to complete them. Therefore, to conduct these programs efficiently, a qualified senior is required. Currently, there is no company that apply an expert system in training or assisting the new staff.

e. What are the main difficulties in handling the claim?

Vietnamese companies go for settlement and reconciliation to solve the claim and dispute due to its low cost and high confidentiality as presented in the Figure 7. There are seldom cases that are brought to the Arbitration and Court.
However, in accordance with the analysis of level of knowledge of staff above, the negotiation will rarely be effective and satisfactory due to the gap of knowledge. Companies are frequently struggling with the cargo claim procedure. The reasons vary, and the survey points out the main reasons as lack of proof or documents, lack of expert and large expenses as illustrated in Figure 8.

Among them, the lack of expertise was the second common reasons recorded, leading to the delay or failure of claiming the cargo damage. It can be understood that if the claimant is knowledgeable, he/she can also collect sufficient proofs and documents to...
process the claims. Therefore, the reason of lack of proof can be tackled if the staff has the proper knowledge to handle the case. Other reasons mentioned are the unwillingness of another party, miscommunication due to poor language or significant obstacles from the administration procedure.

Regarding the law applied in an occurrence of dispute, the two main laws are English and Vietnamese law that are applied to both inbound and outbound transportation. As the survey, 60% of claim cases are solved under Vietnamese law and other 40% applied English law. Other international companies based in Vietnam could use other laws such as Hapag-Lloyd uses German law. However, within the scope of the analysis, the cargo claim is analyzed in the light of Vietnamese law, the English law is used as a reference.

3.3. Conclusion from the survey

The survey provides evidence to prove the assumption of the current situation of cargo claim in Vietnam. This proves our statement of the shortage of qualified staff in handling the cargo claims as well as the difficulties in hiring legal counselling. There is also no study to identify the current situation in shipping and logistics companies in Vietnam toward the practice in legal aspect before this survey. As analyzed, concerning the importance of the effective cargo claim procedure in the whole cargo operation and international trade, it is vital to find a solution to improve the effectiveness of cargo claims. The study’s purpose is to improve the training cargo claim and reduce the cost of handling claims.

Among various solutions, the development of the expert system in the integration of law is proposed to assist the improvement of cargo claims handling in Vietnam. It could be considered as an innovate solution to tackle the issue in the context of significant development of the Industry 4.0 in Vietnam. Thus, it is also a breakout in maritime industry research because there is no existence of such a system applied before in Vietnam, and also in the context of the significant development of Artificial Intelligence globally.
CHAPTER 4

EXPERT SYSTEM OVERVIEW

The combination of all factors, plus the analysis of the current situation, identified the problem of ineffective cargo claims handling in Vietnam. It is necessary to find a solution which is more effective for training new and non-lawyer staffs who need to look for legal specialists rather than e-learning or a class. An expert system application can be considered a useful tool to support these non-lawyer staff. This chapter introduces the expert system as a component of Artificial Intelligence with its benefits, and limitations. In addition, the applications of expert systems in the legal domain as well as in the maritime industry will be elaborated to explain why an expert system can be a feasible solution.

4.1. What is Artificial Intelligence and Expert System?

Driving force for the development of the shipping 4.0 era is the conceptualization of Industry 4.0 with cornerstones, including machine learning and, cyber-physical system that target the enhancement of human and machine collaboration such as ship design, risk management, and even operation of autonomous ship. However, the factual brain behind this revolution is Artificial Intelligence, which enables computers to collect and analyze data, schedule, learn, communicate, and identify voice or face automatically (Lambrou & Ota, 2017; Moretti, 2017)

The history of Artificial Intelligence (AI) can be dated back to 1956 and the programming of John McCarthy that aimed to create a system that could function intelligently and independently. To be more specific, AI is based on stored knowledge
to control, handle problems and perform actions such as reasoning, learning, interpretation, perception, communication, and decision-making. (Kumar, 2017).

There are, however, many definitions of Artificial Intelligence. For example, AI is a term of intelligence simulation in machines, based on the viewpoint that human intelligence can be analyzed so accurately that a machine can imitate to learn and solve problems, etc. (Investopedia, 2018). Or AI is computer systems’ development which has the capability of performing human intelligence – required tasks (Schatsky, Gurumurthy, & Muraskin, 2014).

Nevertheless, AI is a broad term with a wide range of applications. To illustrate, AI is developed for various applications (figure 1).

![Figure 9: Artificial Intelligence and its applications](source: NEOTA Logic, 2016)

From the above diagram, it is visible that expert system is a component of Artificial Intelligence. On the one hand, an expert system is a computer program simulating human expert’s behaviors within a well-defined and narrow field of knowledge and assisting the decision-making procedure as an expert. On the other hand, an expert system is constructed from two main components: a knowledge base, and an inference engine, in which the knowledge base is a synthesis from books, regulations or human
experts’ opinion in a specific specialization. In this respect, expert systems may potentially be developed to solve a wide range of problems such as making financial decisions, playing chess or underwriting insurance policies (Liebowitz, 1995; Merritt, 2012; Jadhav, 2013).

4.2. Advantages and disadvantages of expert system

4.2.1. Advantages
Being designed to mimic experts’ intelligence, expert systems are potentially good at making decisions accurately and quickly in particular domains. The following advantages are identified (Das, 2018; Naik & Lokhanday, 2012).

- **Consistency and reliability**
  Expert systems are computer-based. Therefore, all knowledge as well as logic rules are programed into the application. If the application encounters the same situations, it will respond with the same decision or recommendation again and again. Furthermore, human experts can feel tired or stressed. Thereby, they can make incorrect decision. Meanwhile, if an expert system is programmed precisely, it will always be reliable.

- **Accessibility and availability**
  The expert systems can be available at any time for all people. Therefore, the expert system can support users immediately without hesitation.

- **Memory**
  Many people find it difficult to remember too much knowledge. Expert systems, however, can be programmed on a computer with a tremendous amount of memory to store a huge amount of knowledge.

- **Logic**
  In expert systems, logics are very clear. Every rule, condition or understanding related to making a decision, or reaching a conclusion, are always clear because they are programed with the support of domain experts.
• **Diligence**

Users can ask all single questions, including the most boring questions on their mind. With its diligence, expert system will consider all details in its knowledge base to answer the questions in a specific domain coherently. Meanwhile, in some cases, human expert hesitates to give solutions because of their exhaustion.

• **Cost reduction**

One expert system can serve many users at the same time. Therefore, the cost of using an expert system per user is reduced.

4.2.2. **Disadvantages**

Everything has two sides. An expert system does not learn by itself, but depends on the manual updates of a human expert. Therefore, human experts have to update the expert system continuously to catch up with the changes in its application domain. Furthermore, time spent for setting up an expert system is tremendous. Sometimes, expert systems can make incorrect decisions and cannot give solutions for a new problem because they have to go through the set of rules which are programmed in the knowledge base. Nevertheless, expert systems can be very efficient if high-quality knowledge is programmed and organized well in the system (Lee & Jo, 1999).

4.3. **Literature review of expert system in legal domain and maritime field**

4.3.1. **Review of expert system application in legal domain**

Recently, expert system applications have been developed in several domains such as mechanics, medicine, education and reasoning (Venkateswarlu, 2012). Depending on principles of specific domain, the expert system is developed differently. In the legal domain, there has been also various developments of expert system that target law issues. Recently, there is an increasing interest of legal system development in the context of the rapid improvement of information technology system globally (Jadhav, 2013). However, the initial development of legal expert system surprisingly started since 1970s. Buchanan and Headrick (1970) firstly published their paper presenting the possibility of expert system applications to support the process of legal reasoning
in 1970. This paper proposed the idea of integrating the law into the computer system to assist the legal profession. After this time, there were several research papers published on the development of the legal advisory systems.

However, the research on expert systems started a new trend of research on practical implementation. Generally, the legal expert system or the expert system in law is built for the lawyers (Australia, 2017). As Susskind (1986) discovered that users of such systems are intended to be general legal practitioners, who, when faced with legal problems beyond their range of experience and knowledge, rather than always having to turn to qualified legal specialists, instead may consult their expert systems with coded expertise in law. Thomasset and Paquin (1989) furthermore figured out that it was possible that the expert system could be built for the non-lawyer users. They created a prototype of LOGE-EXPERT based on the Québec Housing Law to assist the general population to solve their conflicts towards the landlord-tenant relationships in Québec (Thomasset & Paquin, 1989). This system was designed for the general public who were aware that they should be able handle their routine legal issues.

Lately, there has been other research on expert systems for laypersons; although, it was developed for users with other purposes such as training and profession. An automated intelligent system, CCLIPS i.e. Civil Code Legal Information Processing System, was built based on AI techniques to generate intelligent responses as input for teaching legal case solving (Debessonet, Cary G.; Cross, George R, 1996). Whereas a legal expert system focuses its output on advice and supporting authority, a legal tutoring system was designed to instruct and test law students' knowledge of a particular legal domain. This is a natural extension of legal expert systems and has already made its way into the curriculum of a number of law schools. Interestingly, however, legal expert systems, the area on which most AI and law research has focused, has seen relatively little commercial development (Kowalski, 1993). Susskind (1994) also pointed out the importance of developing the legal expert system in commercial projects. CAAS is an example of a legal knowledge-based system which aids in the process of statutory interpretation in commercial use. Its purpose is
classifying the loan transaction under the Victorian Credit Act (Vossos et al., 1993). Another system was developed by Stevens (2011) and called the JAES project which embodies the rules on the passing of property and the risks that are contained in sections 16 to 20 Sale of Goods Act (SGA) in a prototype expert system to enhance the solution of disputes between buyers and sellers on the question of which party bears the risk of accidental damage to goods. The majority of users of this system are the insurers (Stevens, 2011). These studies research on the commercial area, cover the contract in trading between buyers and sellers, and within debtor and creditor. However, no legal expert system exists for laypersons in both training and commercial use that is developed for transport issues, between carrier and charterer, especially in maritime transport. This is a specific domain that also contains a range of components such as ship design, ship safety on board and shipping operations on shore. Firstly, it is necessary to have an overview of the application of expert system in other domain under the maritime industry in the next part.

4.3.2. Review of expert system implementation in maritime industry

A number of expert system applications in the maritime industry is examined in table 1. It is obvious that most of expert systems in the maritime industry are applied to ship design, risk management, voyage planning, vessel efficiency improvement or maritime navigation training. It can be concluded that there are various expert systems in the maritime field; however, no expert system exists in the maritime law domain, specifically covering the contract of carriage of good by sea. In particular, when Artificial Intelligence is an emerging technology trend in Vietnam (Ngoc Lan, 2018), constructing a virtual consultancy based on expert system can be a feasible solution in maritime cargo claim handling.
<table>
<thead>
<tr>
<th>No</th>
<th>Expert system</th>
<th>Application area</th>
<th>Aim of system</th>
<th>Knowledge Elicitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>MADES</strong> (Lee, et al, 1998) (as cited by Helvacioglu &amp; Insel, 2008)</td>
<td>Design of Machinery Arrangement</td>
<td>Based on the actual CAD environment to extend the existing CAD system capability in the ship engine room</td>
<td>From the knowledge of experienced designers, and design regulations and constraints.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Container ship ES</strong> (Welsh, 1989) (as cited by Helvacioglu &amp; Insel, 2008)</td>
<td>Ship design</td>
<td>Over all of design systems related to the vessel dimensions, lay out, and hull form</td>
<td>Face to face interview</td>
</tr>
<tr>
<td>3</td>
<td><strong>Navigation rule expert system</strong> (Calfee &amp; Rowe, 2002)</td>
<td>Maritime Navigation training</td>
<td>Two aims in two different modules - <strong>MAM - Mariner-Assistance Module:</strong> support mariners to determine precisely not only the maritime situations happening between two ships but also the necessary actions to be taken under the International and Inland Maritime Navigation Rules</td>
<td>From the “Convention on the International Regulations for Preventing Collisions at Sea Treaty” in 1972 and Inland Rules, which was adopted following the above convention in the USA.</td>
</tr>
<tr>
<td>No.</td>
<td>Module Name</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-------------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>ALDES</strong> (Helvacioglu, 2001) (as cited by Helvacioglu &amp; Insel, 2008)</td>
<td>Ship design&lt;br&gt;Give instruction and advice in container ship design at preliminary stage&lt;br&gt;Interview with a number of experts and knowledge from books, and regulations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><strong>Ship system operation ES</strong> (Kowalski et al, 2001) (as cited by Helvacioglu &amp; Insel, 2008)</td>
<td>Design for the automation of ship power system&lt;br&gt;Simulate and provide a knowledge base related to the automation of ship power system at preliminary stage.&lt;br&gt;Collecting opinions from classification societies, shipyards, and shipping companies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>FOCES</strong> (Katsoulakos &amp; Hornsby, 1989)</td>
<td>Marine fuel oil characterization&lt;br&gt;Property area identification in “fuel map”, based on fuel combustion&lt;br&gt;Knowledge from books, rules, experiments and experience of experts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><strong>Expert Voyage Planning</strong> (Katsoulakos &amp; Hornsby, 1989)</td>
<td>Commercial voyage planning&lt;br&gt;Give advice on optimum voyage under variety of constraints such as details in charter party, legislation, route and weather, vessel conditions, etc.&lt;br&gt;From experience of experts combined with data from digital maps, statistical weather forecast, port arrangement, fuel cost, and chartering detail.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Maritime Container Security Risk Management</strong> (Boukachour, Fredouet, &amp; Gningue, 2011)</td>
<td>Shipping risk management</td>
<td>Facilitate and optimize the security of container transit and give solution for dealing with many kinds of cargos</td>
<td>Protocol analysis with the expression of experts (police, customs, immigration agents, port authorities, lawyers) on their hedging methods in specific maritime container risk-loaded circumstances</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
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<td>---</td>
</tr>
</tbody>
</table>
| 8 | **Diesel engine fault diagnostic expert system** (Katsoulakos & Hornsby, 1989) | Improvement of vessel efficiency | - Give advice for non-qualified workers on severity, location, and causes of faults  
- Enhance diesel engine safety  
- Support engineers to handle problems in operation of diesel engine  
- Early warnings for maintenance planning | Knowledge from books, rules, experiments and experience of experts |
4.4. Summary

As a component of Artificial Intelligence, the expert system can be a useful and practical application to give consultancy within a specific domain. Depending on the knowledge that the researcher puts into the expert system, the application is logical, consistent, and reliable. As discussed, there are several expert system applications in the legal domain and maritime industry; however, the idea of combining these domains into one system did not appear in previous studies. In fact, there is no previous research on the development of an expert system in maritime law for the non-lawyer users in training and commercial use as positioned in Figure 10. In the context that the application of Artificial Intelligence is still a new concept in Vietnam, there has not been any research on legal expert system applied in the Vietnamese legal regime. Therefore, developing a virtual consultancy, based on the expert system for non-lawyer staffs in cargo claim handling under Vietnamese Maritime Code, is not only an innovative solution but also a substantial contribution to the academic field.

*Figure 10: Research positioning*
CHAPTER 5

HOW TO BUILD AN EXPERT SYSTEM

A virtual consultancy expert system is one feasible solution to fill the gap in maritime cargo claims in Vietnam. Before designing virtual consultancy expert system for maritime cargo claim handling in Vietnam, it is necessary to identify what the components of an expert system are. Hence, the working principles of an expert system are elaborated. Furthermore, in this chapter, the process of developing an expert system is formalized as a model for constructing a virtual consultancy system of maritime cargo claim handling in Vietnam.

5.1. Components of an expert systems

Expert systems are created from some main components and interface with various individual roles. These components are illustrated in figure 11.
5.1.1. **Working storage and knowledge base.**

In expert systems, working storage is where data is stored for solving specific problems. However, expert systems cannot function without a knowledge base, an organized collection of heuristics and facts of the domain of the system (Aniba et al., 2008). Collected from expert opinions or books, rules, and regulations in one specific domain, a knowledge base is represented in three main components “OBJECT-ATTRIBUTE-VALUE”. Specifically, the attribute is a feature or characteristics of an object, and the value is the thing to define precisely the attribute of the object (Korczewski, 2008). For example, the object “Function of Bill of Lading” can be illustrated as below.
5.1.2. Inference engine

From the knowledge base of the expert system, the inference engine will combine the facts in specific cases to come up with recommendation for users. To be more specific, the inference engine will give directions to a user interface as well as give users questionnaires so that expert system can give a recommendation or conclusion (McLeod & Schell, 2007).

However, there are many kinds of expert systems such as rule-based expert system, fuzzy logic expert system or knowledge-based expert system. For fuzzy logic systems or knowledge-based system, which needs to combine with other technologies (machine learning, data mining, neural network) in Artificial Intelligence with different inference engine. The inference engine in such expert system is also complicated. Meanwhile, rule-based expert system demonstrates distinctly state of the
art and nature in developing expert systems (Bruce & Buchanan, 1983). In addition, rule-base analysis in legal aspect can break case laws or statutes into separated elements to establish conditional sentences in knowledge base and then facilitate inference engine to give users recommendation (Naik & Lokhanday, 2012). Therefore, this research would pay attention to only rule-based expert system, in which knowledge is represented as sets of conditional sentences within the IF-THEN production rule. Inference engine links all aspects from knowledge base and working storage to give conclusion with two following strategies.

- **Forward chaining**
  Starting with available data and using production rules to come up with conclusion, this is a data-driven method. In particular, forward-chaining engine use information which is provided by user and then move through the knowledge base and working storage with a set of logic “AND” and “OR” to reach a conclusion.

  For example, if users ask expert system about functions of Bill of Lading, the system will use forward chaining inference and base on available knowledge base to give answer as follows.

  **IF** “Functions of Bill of Lading”

  **Inference: THEN** “Document of title” **AND** “Evidence of contract of carriage” **AND** “Receipt for the goods loaded”

- **Backward chaining**
  On the contrary, backward chaining is an object-driven method. Specifically, this method will start from the goal and go through the knowledge base and working storage to check if there is any information supporting the goal. For example, the user would like to check if this document has function “document of title”, and the expert system will base it on the backward chaining inference to give an answer as follows.
5.1.3. Individual roles in expert system

- **Knowledge engineer**
  Knowledge engineers are individuals encoding knowledge and experience of experts into the systems. Commonly, they have dual tasks along with the function of domain expert.

- **Domain expert**
  The successfullness of the expert system depends on the domain experts because they are the people who bring experience and knowledge into the system. They are also the experts in solving the problems that the expert system has the intention of solving.

- **User**
  Users will communicate with expert system to get advice which could be provided by domain expert before.
5.2. How to develop an expert system

Developing an expert system is an art without any uniform models or methods. It is a difficult process without a mature methodology. Many researchers have tried to describe the methodology to build an expert system based on different processes. Finegan (1993) used soft system methodology (7 stages - the problem situation unstructured, problem expressed, root definition, conceptual model, comparison between the problem expressed and conceptual model, definition of feasible changes, improve the problem situation) with the concept of human activity to build a rule-based expert system for remote sensing technology management. However, it is difficult for the people who are unfamiliar with expert system to understand. GUIDA & TASSO (1989) and Alma, Marzhan, & Kanat (2014) outlined the three pillars in developing expert systems (the knowledge from expert engineer, mapping knowledge in sets of rules in knowledge base, and inference engine used to reach a conclusion for user) to illustrate the stages for developing an expert system (Figure 14). This process is easy to understand; therefore, it will be applied to develop a virtual consultancy in this thesis.

![Figure 14: Stages of developing an expert system](image)

5.2.1. Preparation/ Plausibility study

This stage aims to identify a promising domain as well as an area where the expert system will be applied. Therefore, the type, and size of the knowledge, which is intended to be put into the expert system; need to be elicited. In other words, in this stage, the developer of the expert system needs to identify knowledge sources (books, regulations, experts’ experience), the motivation of the system as well as classifications of solved problems. Furthermore, the expert system developer needs to
determine which tool will be applied in the system, the main function of the expert system (advisory, diagnostic or criticizing system) and technical specifications of the expert system. Other factors also need considering such as opportunity of development, cost and benefit, who will be the users of expert system application, etc.

5.2.2. Prototyping stage

In the stage of expert system’s prototype, a limited number of problems are chosen, on which the program will concentrate. Accordingly, profound analysis for the knowledge of those problems, which is put into expert system, will be conducted. Specifically, the concrete and complicated insights of the problems need conceptualizing according to kinds of available data, input and output of data, content and relationship inside knowledge used in solving problem as well as the method, in which expert system reaches conclusion.

5.2.3. Evaluation

This stage depends on the kind of expert system that is implemented. The developer of the expert system can organize a workshop to present the system, allowing the participants to experience the system and collect evaluation from them. The expert system developer can also install the system in the real operational environment, and conduct a full test for the system with the real data. Furthermore, human experts can be invited to evaluate the expert system. If the system is effective, the system can be constructed in full version. Otherwise, developer has to go back stage of preparation/plausibility study.

5.2.4. Full expert system

In this stage, the prototypes are fully developed to meet all objectives, and functional specifications, which are mentioned in the preparation/ plausibility study stage. Furthermore, the knowledge base of the expert system is also fulfilled with the kinds and size of knowledge specified in the first stage.
5.2.5. Operation, maintenance, support and extension.

With the full functional performance, the system needs to be installed for end-users with the following purposes.

- Supporting users in the system operations
- Correcting possible faults, and bugs during the system operations
- Monitoring the performance of the system and collect the feedback from the user so that the developer can innovate the system in accordance with the demand of the users

However, in the limitation of time for this research, authors will pay attention to stage 1 and stage 2, which will be elaborated in next chapter. Other stage will be left for further research.

5.3. Summary

Every expert system is constructed based on working storage, knowledge base, inference engine, domain expert, knowledge engineer and users. However, there are some kinds of expert system such as rule-based expert system, fuzzy logic, and knowledge-based expert system. Rule-based expert systems distinctly demonstrate state of the art and nature in developing expert systems. From a legal aspect, rule-base analysis can break case laws or statutes into separated elements to establish conditional sentences in the knowledge base and then facilitate the inference engine to give users recommendation. Therefore, a rule-based expert system will be applied to develop virtual consultancy system. Additionally, from three pillars in the expert system (the knowledge from the expert engineer, mapping knowledge in sets of rules in knowledge base, and inference engine used to give recommendations for users), the general process of developing an expert system is formed to construct a virtual consultancy system in the domain of maritime cargo claim handling in Vietnam.
CHAPTER 6

DESIGN OF VIRTUAL CONSULTANCY SYSTEM FOR NON-LAWYER USERS IN VIETNAM

This chapter will elaborate and analyze how a virtual consultancy system can be designed and interact with users by rule-based expert system, and how it effectively can support operator of marine cargo claim in the shipping and logistics companies, who are non-lawyer users. Based on knowledge from books and regulations, this system with rule-based analysis can give reasonable and logic advice in legal perspectives for non-lawyer users in maritime cargo claim handling in Vietnam. In order to assess if a virtual consultancy system is an effective advisory application, this chapter will also test the legal problems about maritime cargo claims and assumptions about its application in practice in Vietnam (mentioned in chapter 2 and proved by survey analysis in chapter 3)

6.1. Preparation and identification of knowledge

From the gap found in the survey (chapter 3), the virtual consultancy expert system is considered as one feasible solution to improve the process of maritime cargo claim handling in Vietnam. In other words, this system is developed to support and give advice for staff in shipping and logistics companies, who are non-lawyer users, when customers claim about their cargo loss or damage. As mentioned in chapter 4, knowledge identification is one of the preliminary and important stages of each problem, especially consultancy in decision making. This stage also determines the sources of knowledge which is put into the system (Alma, Marzhan, & Kanat, 2014). Regarding virtual consultancy system for maritime cargo claims, the knowledge is
collected from Vietnam Maritime Code 2015, Hague/Hague Visby Rules, Civil law, books about maritime cargo claims, and interpretation from case laws related to maritime cargo claims in Vietnam. In legal perspective, knowledge used for consultancy in maritime cargo claim handling can be classified as follows.

- **Basic problems and principles in maritime cargo claims** (mentioned in chapter 2)
  - Title to sue – Who may claim or sue
  - Identity of carrier – whom to sue
  - The burden and order of proof
  - Time Bar
  - Carrier’s limited liability regime
- **Other problems related to maritime cargo claims** (Tetley, 2008)
  - Applicable law
  - Counterproof by the claimant
    - Load carefully and Properly
    - Stow carefully and properly
    - Properly carry, keep, and care for cargo
    - Discharge carefully and properly
  - Available argument to both parties
    - Arbitration clause
    - Collision and loss of cargo
    - Deck carriage
    - Container
    - Delay for suit
    - Freight forwarder’s responsibility
    - Geographic Deviation
    - Obligation of cargo owner in general average
6.2. Prototyping stage

6.2.1. Conceptualization

In this stage, the knowledge base needed to design the virtual consultancy system is analyzed in-depth. To be more specific, the definitions as well as their relationships need to be identified. They are illustrated in the three component of OBJECT-ATTRIBUTE-VALUE and transferred to inference engine with IF-THEN production rule (Alma, Marzhan, & Kanat, 2014; Korczewski, 2008). Both forward and backward chaining techniques will be applied to reach a conclusion in this system.

In this stage, a prototype of a virtual consultancy expert system will be built. However, there are two typical kinds of prototypes including horizontal and vertical ones. To illustrate, the development of horizontal prototype aims to provide users the whole picture will all functions in the system. On the contrary, a vertical prototype concentrates on an exact function, which is described in the horizontal prototype (Budde, Kautz, Kuhlenkamp, & Züllighoven, 1992). In this thesis, the prototype will be developed in both ways. Vertical prototype will be constructed with some typical problems in maritime cargo claims to explain how the interface of virtual consultancy connects to an underlying expert system application layer and knowledge base in the bottom. Furthermore, horizontal prototype will be developed by integrating Articles in Vietnam Maritime Codes into the virtual consultancy system simultaneously. Therefore, the users can have a general picture about the virtual consultancy expert system and understand how the virtual consultancy system can support them in handling maritime cargo claims.

In the initial stage of knowledge identification, there are many problems that needs to be loaded into the virtual consultancy expert system. For the purpose of developing a vertical prototype, some particular problems will be picked to illustrate the knowledge base construction and clarify how a problem is put into the system. For the development of horizontal prototype, Articles in Vietnam Maritime Codes will be analyzed in the same way.

a. Title to sue

The title to sue is explained in chapter 2 and considered as knowledge base of this problem. However, this knowledge base needs to be transferred into Object-Attribute-Value components with IF-THEN production rules so that inference engine can understand what is contained in the knowledge base and come up with conclusion for users.
Figure 15: How virtual consultancy concludes who may claim or sue
Figure 15 describes how the knowledge base of the problem “title to sue” is transferred into Object-Attribute-Value components with the IF-THEN production rule. The analysis and conceptualization are based on Article 147 “Parties to the contract of carriage of goods by sea”, Article 148 “Transport document”, Article 162 “Transfer of Bill of Lading”, and Article 166 “Obligation to discharge goods” under the Vietnam Maritime Code 2015 (see page 21 in chapter 2). If the charterer or sub-charterer of a chartered vessel is the cargo claimant, this claimant undoubtedly has title to sue the party from whom he chartered the vessel. In the other case, the claimant is not a charterer or sub-charterer of a chartered vessel, it is necessary to consider if transportation is issued or not. The shipper will have title to sue until B/L is issued by the carrier and transferred to the receiver. After B/L is issued, there are three types of parties who could be considered as the owner of goods or lawful claimant with the right to take the suit against the carrier:

- **The legitimate holder of the transferable bill of lading**
  - Bearer B/L: in this kind of B/L, the information about consignee is blank or named “bearer.” Therefore, any person holding the B/L can physically present this B/L to receive goods at discharging port. Accordingly, anybody holding this kind of B/L has title to sue.
  - Shipper’s order B/L: the consignee box in this kind of B/L can be “To order” or “To shipper’s order.” Towards such B/Ls, carrier agreed to carry and deliver cargo to anybody that shipper orders. Therefore, the holder of such B/Ls has title to sue as long as the carrier acknowledges the shipper’s instruction to deliver goods to this holder.
- Named consignee’s order B/L (named consignee is not shipper): the title to sue towards the holder of such kind of B/L comes up with two problems. If the B/L is physically presented at the discharging port without any endorsement, named consignee is a lawful holder of this B/L and simultaneously has the title to sue. Otherwise, the final endorsee on the reverse side of B/L will be the lawful holder of B/L and has title to sue.

- The consignee named in the straight bill of lading or the seaway bills, who has the title to take the delivery of goods as well as title to sue as long as he physically presents them at the discharging port

- To whom the carrier acknowledges to delivery the goods to under the ship’s delivery order. In other words, named consignees on delivery order have right of taking a suit against carrier. However, in this case, shipper does not lose the title to sue because he still holds the original B/L.

b. **Identity of carrier – whom to sue**

In maritime cargo claims, the claimant needs well informed advice to make a claim against the person having the deepest pocket to ensure that the cargo loss or damage can be compensated reasonably. If the claimant takes a suit against the wrong defendant, the claimant has to suffer from a large amount of unnecessary cost (Debattista, 2017). As mentioned in chapter 2, the identity of carrier – the defendant lies with charter party and Bill of Lading, based on Article 147 (2,3) “2. The carrier refers to a person who concludes on his own, or authorizes other person to conclude the contract for carriage of goods by sea with the shipper. 3. The actual carrier refers to a person authorized by the carrier to perform the whole or a part of carriage of goods by sea” and Article 159(1) “The carrier must, on demand of the shipper, issue to the shipper a bill of lading” of Vietnam Maritime Code 2015. This identification is the knowledge base of the problem “whom to sue.” To be loaded into the virtual consultancy expert system, this knowledge need to be transferred into the Object-Attribute-Value components with IF-THEN production rules so that the inference engine can understand. (Figure 16)
To illustrate, if the claimant in the maritime cargo claims is a charterer in a contract of carriage such as voyage charter party, the carrier in this contract will be the defendant. However, if the claimant is not charterer like receiver of goods under CIF term on a commercial contract, he will face some possible defendants including shipowner, head-charterer, and sub-charterer. In such case, the claimant needs to look at, and pay attention to the logo at the top and the signature at the toe of the B/L. If the logo on B/L belongs to the shipowner, the shipowner is the true carrier and simultaneously the defendant. Otherwise, signature on B/L needs considering. Specifically, the logo on B/L is represented as charterer, but the signature is “As agent of shipowner,” shipowner is still an actual carrier and the defendant in the suit. If the signature is from charterer, charterer will be the defendant. In case that the signature is from master or on behalf of master, the demise charterer is the defendant if master is employed by demise charterer. Otherwise, the shipowner will be the defendant.
Figure 16: How virtual consultancy concludes whom to sue
c. Exception of Liability - Fault in navigation or management of vessel

Chapter 2 also mentioned that the carrier must prove the cause leading to the loss, his due diligence care to maintain the ship seaworthiness in respect of the cargo damage and assert his exemption of liability. Fault in navigation and management of ship are two common faults that can make carrier excepted from liability, which is regulated under Article 151 (2a), Vietnam Maritime Code 2015 “the carrier shall be totally exempted from liabilities for any loss of and damage to goods arising out of or resulting from the followings: a) Act, neglect or default of the master, seafarer, pilot or the servants of the carrier in the navigation and in the management of the ship.”

However, these faults are rarely explained clearly in the Maritime Law of many countries including Vietnam. In the book “100 questions on carriage of goods by sea” (in Vietnamese) written by the distinguished lawyers of maritime law in Vietnam - Vo, Ngo, Tran, and Tran (2010), it is stated that faults in the navigation of a vessel is related to the vessel’s movement such as collision, being wrecked, going around, improper selection of anchor or delay in voyage planning because of bad weather. It is worth noting that negligent navigation in berthing is not considered an exception of liability for carrier, though it is fault of navigation. Another fault is in management of a ship, which is generally understood as the fault in operation, and inspection of machines and equipment on vessel to ensure the safety for vessel.

The above analysis is the knowledge base of problem “if an action is fault in navigation or management of vessel or not.” However, this knowledge base needs to be coded in the Objective-Attribute-Value components with the IF-THEN production rules so that the inference engine can come up with a conclusion, which is described in Figure 17.
Figure 17: Exception from fault of navigation or management of a vessel
6.2.3. Result of prototype for virtual consultancy system in maritime cargo claim in Vietnam

With the development of a prototype, users can experience the virtual consultancy of some problems in maritime cargo claim handling, which is mentioned in the part of knowledge identification. In this system, users can communicate with the expert system to ask any Article related to maritime cargo claims under the Vietnam Maritime Code 2015. For example, if users would like to look at the limitation period of cargo claim on loss/damage or the obligations of discharge goods, they can chat with the system and the system will respond as in figure 18.
Virtual Consultancy

> Hello
> Bot: Hi there!
> How are you?
> Bot: I am fine, thank you.
> Great
> Bot: I'm glad you liked it Pham, Thi Mai Phuong.
> I have some questions about maritime cargo claims in Vietnam
> Bot: A very serious problem?
> STATUTE OF LIMITATION FOR SUBMISSION OF A CLAIM ON LOSS AND DAMAGE TO GOODS UNDER VIETNAM MARITIME CODE 2015
> Bot: The statute of limitation for submission of a claim on loss of and damage to the goods shall be 01 year from the date of discharge of the goods or the date on which the goods should have been delivered to the consignee.
> OBLIGATIONS TO DISCHARGE GOODS
> Bot: That is deep.
> OBLIGATIONS TO DISCHARGE GOODS UNDER VIETNAM MARITIME CODE 2015
> Bot: When the ship arrives at the port of discharge, the carrier shall be obliged to deliver the goods to the legal consignee if that consignee shows the original bill of lading, sea waybill or other transport document to take delivery of such goods as referred to in Article 162 hereof.
> After the goods have been discharged, the remaining transport document shall become void.

Figure 18: Basic function of Virtual consultancy to look up Articles in Vietnam Maritime Code 2015

However, this is the simplest function in the system. For more complicated problems, users can text “test case,” the system will automatically move to a new interface, in which there are many common problems in maritime cargo claims. Based on the knowledge loaded into the virtual consultancy expert system, it will ask users some questions to clarify the situation of the users and then give suitable recommendations for the users. For example, when the users look up the article about exception of liability of a carrier under Vietnam Maritime Law 2015, the system will give an answer, in which fault of navigation or management of the vessel is excepted. However, if the users do not understand what the fault of navigation or management of vessel is or which action is considered as the fault of navigation or management of vessel, they can text “test case of fault of navigation or management” to get consultancy from the system. A new interface will be opened for the user to choose the problem that they are concerned with. Accordingly, some questions related to this problem will be given. Users will answer these questions so that the system can recommend if they have a title to sue or not. (Figure 19).
Welcome to the Maritime Law Expert System. Case: Error in navigation or management of vessel

What fault?

- Navigation of vessel
- Management of vessel

Answer: Navigation of vessel
Nevertheless, if the knowledge about some specific problem has not been loaded into the system, the system will respond “this problem is out of my knowledge, please go to a lawyer to have a better answer.” (Figure 18)
6.3. Summary

This chapter has described how virtual consultancy system is designed by expert system technologies and applied in the context of maritime cargo claims in Vietnam. The system is identified to serve non-lawyer users in shipping and logistics companies. In theory, the system should cover all the problems in maritime cargo claims in Vietnam. However, within the context of this thesis, a number of vertical and horizontal prototypes were constructed to test the assumption of the system based on literature review (chapter 2) and the survey of expert in the shipping industry in Vietnam (chapter 3). Knowledge related to the chosen problems is transferred into Object-Attribute-Value components with the IF-THEN production rules so that the inference engine can understand what is contained in the knowledge base and come up with a conclusions for users. Based on prototype, it is shown how users can communicate with the system to look up any Articles related to maritime cargo claims in Vietnam Maritime Code 2015, and consult the system about some basic problems such as who may sue or claim, identity of carrier or determining the fault of navigation or management. As mentioned before, this is only a prototype. Therefore, it is
impossible to give a consultancy about the problems that the knowledge engineer has not put into the system. The system instead responds “this problem is out of my knowledge, please go to a lawyer to have a better answer.”
CHAPTER 7
DISCUSSION AND CONCLUSION

Chapter 6 described how virtual consultancy can be developed by expert system technologies and applied in the context of maritime cargo claims in Vietnam. It highlighted the knowledge identification, the way to put knowledge into the system as well as how virtual consultancy system communicates with users. This chapter provides a critical discussion of the virtual consultancy for maritime cargo claim handling in Vietnam against the maritime cargo claim regime, the gap found from survey, the literature review of expert system in the legal domain and the maritime industry from previous chapters before coming to a conclusion with the limitation, and further developments for the research.

7.1. Discussion
Firstly, the research is conducted to understand the limitation of cargo claim under the Vietnamese regime as well as to find the main causes leading to the ineffective aspect of the cargo claim handling procedure in Vietnam. In Vietnam, the law governing the contract of carriage of goods by sea, as well as the marine cargo claims is the Vietnam Maritime Code 2015, which was first established in 1990. It incorporated two international conventions including the Hague-Visby Rules and Hamburg Rules. In essence, to deal with such claims, the staff need to grasp the legal framework for maritime cargo claims, marine cargo claims subject to limitation of liability including the regulations about carriage of goods by sea, and applicable law. Furthermore, staff need to know at least the general principles in handling cargo claims such as title to sue, identity of carrier, limitation of liability, the burden and order of proof under the
Vietnam Maritime Code. However, in Vietnam, the operator is the person who is in charge of the claim handling. Therefore, it is challenging for the operator to have expertise in both shipping operations and the legal background. According to the analysis from the survey, the legal background of staff handling maritime cargo claims in Vietnam is mostly at a shallow level. It is difficult to acquire such legal knowledge from practicing because it is too complicated. Many small and medium shipping and logistics companies hesitate to go to lawyers because of the high cost. The cost of hiring local lawyers or legal advisors in Vietnam is known to be expensive, approximately $250-300/hour (Hanoi lawyer counselors, 2016). Additionally, the number of lawyers in the maritime industry or experts in maritime cargo claims in Vietnam are limited. There are only 20 legal experts on the international trading and only one third of them were working in the shipping domain until 2015 (Thu, 2015). Therefore, the ability of shipping and logistics companies in accessing consultants from specific lawyers is limited. For an immediate resolution, the company is not required to hire lawyers to solve disputes; therefore, the company always handles this by themselves. As a consequence, they can suffer from unnecessary cost dues to lack of knowledge. It is necessary for shipping and logistics companies in Vietnam to have an effective tool so that their staff can be supported in time.

This research has revealed that the expert system, a computer program simulating human expert’s behaviors, can be a solution. Specifically, the expert system is constructed based on working storage, knowledge base, inference engine, domain expert, knowledge engineer, and users. Depending on the knowledge that researcher put into expert system, this application is logical, consistent, and reliable with a huge memory. This research also reviewed and indicated expert system applications in the legal domain and the maritime industry. However, there is no previous research on the development of the expert system in maritime law for the non-lawyer users in training and commercial use. In the context where the application of Artificial Intelligence is still a new concept in Vietnam, there is also very few items of research on the legal expert system applied in other legal domains under the Vietnamese regime. Additionally, from legal aspect, rule-base analysis can break case laws or statutes into
separated elements to establish conditional sentences in the knowledge base and then facilitate the inference engine to give users recommendations. Therefore, developing a virtual consultancy based on the expert system can assist non-lawyer staffs in cargo claim handling under the Vietnamese Maritime Code and bring the quality of handling marine cargo claims in Vietnam into a new area.

This is the first study to implement the expert system in the domain of maritime cargo claims in Vietnam - the country has a strategy to develop better maritime economics but the human resource, especially in maritime cargo claim handling, is insufficient and not well-trained. In addition to the analysis of limitation in maritime cargo claims in Vietnam, this research aims to develop the expert system to assist the practice of marine cargo claims as a solution of improving the effectiveness of this procedure. In other words, the virtual consultancy system, which is based on the expert system - a component in Artificial Intelligence, will be an effective supporting application to handle basic problems in maritime cargo claims. As a result of mining and analyzing data from Vietnam Maritime Code 2015, Hague/Hague Visby Rule, Civil Code, and books about maritime cargo claims in Vietnam, this virtual consultancy system can be used in Vietnam as a supporting tool for staff in shipping and logistics company when cargo loss or damage happens. The system can give advice and help those staff to prepare basic specialized knowledge for the problems they have to handle with their customers in terms of maritime cargo claims, including the legal framework for maritime cargo claims, marine cargo claims subject to limitation of liability (regulations about carriage of goods by sea, applicable law), and general principles in handling cargo claims such as title to sue, identity of carrier, limitation of liability, and the burden and order of proof, etc. Hence, their negotiation or reconciliation with the customers will be facilitated.

One option is that the users google to search for any information they would like. However, results from google are rambling, and they are sometimes not related much to maritime cargo claims, especially in Vietnam. Many results are from unreliable websites or blogs. Therefore, users have to filter and analyze the results, which takes
much time. Meanwhile, compared with Google, the knowledge base in virtual consultancy system is compact. Specifically, the knowledge and advice from virtual consultancy system are from reliable academic sources and experts. Hence, the knowledge is vetted. This is also a friendly system because users can ask all single and simple questions without hesitation. Users only need to answer some questions from the system, and then they can receive a quick response from the system with the problem of maritime cargo claims that they wonder. In comparison with hiring legal experts outside, virtual consultancy system can save cost per user due to economy of scale. This system can be installed in as many computers as possible. And users can access to the virtual consultancy system to be supported when there is a maritime cargo claim. In particular, if this is not a complicated problem, the users can handle all this by themselves to satisfy the cargo claims from customers and avoid unnecessary time and cost. In addition, the system can be used as a learning tool for non-lawyer users to enhance their knowledge about maritime cargo claims in Vietnam.

Nevertheless, this is only an application and cannot work as a real lawyer in the domain of maritime cargo claims. In the initial stage, the virtual consultancy system can assist users in solving basic problems. Meanwhile, the knowledge related to maritime cargo claims is huge and complicated. Therefore, developing the entire virtual consultancy system for maritime cargo claim handling costs much time, money as well as technical programming. In the research scope and time limitation of this thesis, the prototypes of this system were developed to analyze and discuss how the system can work. Articles related to maritime cargo claims, as well as general principles in cargo claims are interpreted under Vietnam Maritime Code 2015 and transferred into IF-THEN production rule with the Object-Attribute-Value components before being loaded into the knowledge base of the virtual consultancy system. Hence, the prototype allows users look up any Articles about maritime cargo claims under Vietnam Maritime Code 2015, and ask for consultancies about basic problems. However, towards complicated cases, the system will suggest users to go to lawyers to get a suitable consultancy. With the view to developing a full version of this virtual consultancy system, additional research will be required.
The aim of this research is to understand the limitation of cargo claims under the Vietnamese regime, find the main causes leading to the ineffective aspect of the cargo claim handling procedure in Vietnam, understand the structure of the expert system and its application in law, and maritime industry as well as design the expert system to assist non-lawyer users in the practice of marine cargo claim as a solution of improving the effectivity of this procedure. To meet these objectives, the dissertation answered the following questions

a. What is the existing cargo claim regime and its principles in general? (addressed in chapter 2)

b. How can the cargo claim principles be interpreted from the Vietnamese Maritime Code? (addressed in chapter 2)

c. What is the qualification of the claim handler in Vietnamese shipping and logistics companies? (assumption in chapter 2 and was proved by the survey analysis in chapter 3)

d. What are the difficulties leading to a delay cargo claim procedure surveyed by these companies? (addressed in chapter 3 by indicating the advantage of expert system and analysing the previous researches on expert system applications in legal domain and maritime industry)

e. What are the rationales to applying the expert system in assisting marine cargo handling? (addressed in chapter 4)

f. How to integrate the expert system on legal reasoning to assist decision making in the cargo claim procedure under the Vietnamese Maritime Code 2015? (addressed in chapter 5 and chapter 6)

This research has identified that many of staff in shipping and logistics companies, who are responsible for dealing with cargo claims, are not qualified with the shallow knowledge in cargo claim and law. Additionally, the cost of legal advisors or hiring lawyers to solve cargo claims is high, while the number of experts in solving the cargo
claims in shipping and logistics companies in Vietnam is insufficient. For the immediate resolution, the companies are not required to hire lawyers to solve disputes; therefore, the companies always handle issues by themselves. As a consequence, many cargo claims are not solved and compensated. Moreover, there is no previous study about the application of the expert system to maritime cargo claims. In order to improve the quality of maritime cargo claim handling in Vietnam, the authors applied rule-based expert system technology to develop a virtual consultancy system for maritime cargo claim handling in Vietnam.

The system is constructed from articles related to the contract of carriage of goods by sea and maritime cargo claims under Vietnam Maritime Code 2015, Hague/Hague Visby Rules, Vietnam Civil Procedure Code as well as knowledge about maritime cargo claims such as title to sue, identity of carrier, burden and order of proof, time bar, limitation of carrier, etc. This knowledge needs transferring into Object-Attribute-Value components and IF-THEN production rule so that inference engine can understand and give recommendation for users. However, developing a full system requires much time. In the limitation of this dissertation, only a prototype of a virtual consultancy system is developed with some functions. Specifically, users can communicate with the system to look up any Articles related to maritime cargo claims in Vietnam Maritime Code 2015, and consult the system about some basic problems such as who may sue or claim, identity of carrier or determining the fault of navigation or management.

7.3. Limitation

The research designed the Virtual Consultancy Expert System to assist non-lawyer users in the practice of marine cargo claim procedure. However, the conducted survey and the design of system are based on viewpoint of staff in shipping and logistics companies in Vietnam and have not covered the viewpoint of insurance service providers.
As mentioned before, this is only a prototype. Knowledge based in the current system is only articles related to the contract of carriage and cargo claims in the Vietnam Maritime Code 2015 as well as some basic problems in maritime cargo claims. Therefore, it is impossible to give a consultancy about the problems that a knowledge engineer has not put into the system. Furthermore, the communication ability of the system is limited and unnaturally. Users interact with the virtual consultancy system by texting. The inference ability of the system is also limited, mostly based on the knowledge and sets of rules that knowledge engineer put into the system. Furthermore, inference engine applied in this system is classical with IF-THEN production rules. Therefore, the system is not actually flexible and not able to deal with complicated problems.

7.4. Future development

In the future, the developers of virtual consultancy expert system will make efforts to update as much knowledge about maritime cargo claims as possible. Additionally, the developers will try to improve the communication ability with more input and output of the system. For example, the system can communicate with users as a person. The system can also talk to users. Natural language processing will be applied so that the system can understand what users mean in their questions. The answers from the system is not only text, image, but also voice like Cortana or Siri on Windows and IOS respectively. Furthermore, the learning and inference ability of the system will be innovated by applying some advanced methods such as decision tree, data mining, big data, and machine learning. The system can learn and absorb more knowledge and logic thinking from lawyers, and specialized books, as well as decision in case laws in domain of maritime cargo claims in Vietnam.
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Vietnam Maritime Code 2015


APPENDIX

QUESTIONAIRES
SURVEY OF CARGO CLAIMS HANDLING IN SHIPPING OPERATION
VIETNAM

Target: Collecting specialist’s opinions from shipping companies, shipping agents, logistics companies to:

1. Determine the efficiency of cargo claims procedure in shipping operation in Vietnam
2. Determine practical issues arising from cargo claims and its solutions

This survey makes contribution to the topic “MARITIME CARGO CLAIMS IN VIETNAM: Practical issues and the Design of a Virtual Consultancy Expert System based on Artificial Intelligence to assist non-lawyer users”. There are no wrong answers. All answers are opinions and assessment in view point of surveyed people. Because of a limited number of surveys, your opinions are very important to our research topic. We are looking forward to your support.

Sincerely thank you!

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Email: maiphuongktn@gmail.com hanghtn.ktb@vimaru.edu.vn
w1701425@wmu.se edu.vn
w1701048@wmu.se
Part 1: General information

Full name: 
Years of experience (years):

Workplace: 
Position:

Email: 
Major types of cargo operated by the company:

Part 2: Questions

Section 1: Cargo claim operators

Question 1: Who will be the one dealing with cargo claims in your company?

1. Staff in operation department
2. Staff in claim and legal department
3. Independent law firm

Question 2: How many people are in charge of handling these problems in your company?

Question 3: Please assess beginners’ understanding and skills for dealing with cargo claims in your company

1- Not background at all
2- Shallow knowledge, only understand the basic concept
3- Deep knowledge, able to use knowledge in practicing
4- Expert

<table>
<thead>
<tr>
<th>No</th>
<th>Understanding and skills</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shipping/logistics background</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Law background</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cargo claim</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Question 4: Is there any training program related to cargo claims in your company? If yes, please let us know which method that your company use for training?

1. Short term training course
2. Training class
3. E-learning program
4. Expert system

Section 2: Cargo claims procedure

Question 1: Please assess the frequency of methods which are used for dealing with cargo claims in Vietnam.

1: Never 3: often
2: Seldom 4: Usually 5: Always

<table>
<thead>
<tr>
<th>Methods</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never ↔ Always</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. Settlement</td>
<td></td>
</tr>
<tr>
<td>2. Reconciliation</td>
<td></td>
</tr>
<tr>
<td>3. Arbitration</td>
<td></td>
</tr>
<tr>
<td>4. Court</td>
<td></td>
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</tbody>
</table>

Question 2: What are the main reasons leading to the delay or prevention of cargo claims?

1. Lack of proof
2. Lack of document
3. Lack of experience and expertise
4. High expensive

Question 3: What are the other reasons?

-------------------------------------------------------------------------------------------------------------------------
Question 4: Which is law applied in most cases?

1. Vietnamese law
2. English law
3. Other law

Question 5: What is the most difficult matter that the staffs have to deal with when handling the cargo claims?

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Sincerely Thank you!