

THE CURRENT STATE OF SAFETY MEASURES IN THE JAPANESE DOMESTIC SHIPPING INDUSTRY

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Abstract

Purpose: This study aims to clarify the current state of safety measures among domestic shipping companies in Japan. It examines measures to prevent ship accidents in the companies, most of which are small and medium-sized, and contribute to improve the safety of domestic shipping in the future.

Design/methodology/approach: Semi-structured interviews were conducted with six Japanese domestic shipping companies regarding safety measures.

Findings: "Ship visits," was the adequately implemented measure by companies and the companies themselves recognized it as an effective measure for safe navigation. Four safety measures that reflected differences in the efforts of companies were "safety management and manuals," "capital investment," "education and training," and "utilization of near misses." As some companies were implementing these sufficiently, it was clear that there was room for improvement and ingenuity by other companies.

Originality/value: Most previous studies on domestic shipping in Japan have focused on economics or commerce; however, this study is original in that it considers the issue from the perspectives of accident prevention and safety. Moreover, it considers comprehensive safety measures and not simply safety management. This study provides suggestions for safety measures for domestic shipping.

Keywords: Domestic Shipping, Safety Measures, Accident Prevention, Safety Management, Safety Culture

Introduction

Japan's domestic shipping transports 154.0 billion ton-kilometers of cargo in 2022 (Ministry of Land, Infrastructure, Transport and Tourism, 2024), making it one of the most important modes of transport, accounting for approximately 40% of domestic freight transport. In recent years, it has also attracted attention as a modal shift destination because it emits less carbon dioxide per unit compared to trucks. It is also expected to serve as an alternative means of transporting goods to trucks and railroads in the event of a major earthquake or other disaster and as a form of reverse logistics for transporting industrial waste and other materials. Additionally, because all domestic ships are registered in Japan and consist of Japanese crew, it is considered significant in terms of security and maintaining public order.

Conversely, the domestic shipping industry mainly comprises "owners," which are companies that own and lease ships, and "operators," which are companies that operate ships chartered from owners or their own ships, and transport cargo requested by shippers, with small and medium-sized owners constituting the majority. Additionally, because this industry has a multiple contract structure of affiliation and subcontracting, the relationship between the owner and operator tends to be fixed and stable. The bargaining power of many small owners is extremely low compared to that of shippers and prime operators, making them vulnerable to changes in the market environment (Tezuka, 2024).

Furthermore, shipbuilding requires a large amount of capital; however, the high investment risk makes raising funds difficult, while alternative construction is onerous (Tezuka, 2024). Consequently, aging ships is becoming a serious problem; the proportion of ships over 14 years old increased from 45% to 66% (based on the number of ships) from 2000 to 2023 (Japan Federation of Coastal Shipping Associations, 2024). Additionally, owing to the working system that requires long periods of continuous onboard work, the job is not attractive to young people (Mori, 2012). With 47% of seafarers over the age of 50, there are concerns about their aging as well (Japan Federation of Coastal Shipping Associations, 2024).

Such weaknesses can be factors that impede the safety of the Japanese domestic shipping industry. In other words, if the business is not stable, it is difficult to invest in safety measures in addition to regular expenses such as employee wages and costs related to ship maintenance and operations. However, neglecting safety measures increases the risk of accidents and occupational injuries; if they occur, the ship and crew are at risk and the business would be unable to continue. Therefore, ensuring safety is an important issue from the perspective of business survival, even for small and medium-sized companies.

Most research on domestic shipping safety in Japan has focused on companies' safety management systems. Hatamoto (2017), focusing on small and medium-sized companies and small domestic ships, proposed measures necessary for establishing a safety management system for domestic shipping by examining ways to improve the policy of utilizing ship management companies. Nagatani (2014) developed a safety culture measurement tool and pointed out the need to establish a safety management system, including partner companies, and assess branches based on an analysis using the tool. Habara (2009) presented a basic idea of the important elements of safety management based on human factor explanation models such as "4M" and "m-SHEL models" to establish a safety management system for ship operation. Although there are a few studies on safety management systems for domestic shipping in Japan, how companies establish safety measures or what problems they face in implementing them are unclear.

Therefore, this study aims to clarify the current state of safety measures among domestic shipping companies in Japan, by examining measures to prevent ship accidents in small and medium-sized companies, and contributes to improving the safety of domestic shipping in the future.

Transport Safety Management System in Japan

In Japan, the Transport Safety Management System is a measure for transport companies to ensure their own safety management. In 2006, following a series of transport accidents and serious incidents in the previous year, transport-related business laws, including the Coastal Shipping Law, were significantly revised, making it mandatory for companies to ensure safety. The Transport Safety Management System was introduced in conjunction with a major revision to transport-related business laws and commenced in October 2006. The system is based on the concepts of ISO9001 and consists of transport companies building a safety management system, which is assessed by the government. Revisions to each business law made it mandatory for companies to address three main points: first, the creation of safety management regulations and their notification to the Minister of Land, Infrastructure, Transport and Tourism (MLIT); second, the appointment and notification of a safety manager for each company; and third, the publication of their safety information (Kinoshita, 2019).

The guidelines indicate the specific actions that companies should take, and present the following 14 items: (1) responsibilities of top management, (2) safety policy, (3) safety priority measures, (4) responsibilities of the safety general manager, (5) personnel responsibilities and authority, (6) information transmission and communication, (7) collection and utilization of accident and near-miss information, (8) response to serious accidents, (9) ensuring compliance with relevant laws and regulations, (10) education and training necessary for establishing and improving the safety management system, (11) internal audits, (12) management review and continuous improvement, (13) document creation and management, and (14) record creation and maintenance. Each company can execute the series of steps in the PDCA (Plan-Do-Check-Action) cycle by addressing these issues. By repeating these steps, the safety management system would be improved step by step, and consequently, a safety climate and culture is expected to be established within the company. Meanwhile, the government would assess companies' safety management systems. This assessment differs from traditional audits or inspections in that it is intended to support companies' efforts to ensure safety and is non-binding. Specifically, it is conducted according to 14 items set out in the guidelines (Kinoshita, 2019).

The Transportation Safety Management System for domestic shipping applies to all registered operators, excluding owners. Specifically, according to an interview with the Safety Policy Division of the Maritime Bureau of the MLIT on July 27, 2022, the number of companies covered under the system was 597, which is approximately 21% of the actual number (2,849) of domestic shipping companies as of April 1, 2021. The assessment of all companies, which are approximately 4,500 in the maritime mode, including domestic passenger shipping companies, was completed in the fiscal year 2012; since then, the assessment has focused on companies with large transport volumes

(Kinoshita, 2017). In domestic cargo shipping, 597 companies were covered under the system, and 1,271 companies were assessed. Thus, many companies have only been assessed once to date.

Research Method

This study clarifies the status of the safety measures of domestic shipping companies based on interview surveys conducted by the author. Interviews were conducted with six domestic shipping companies. Table 1 summarizes the companies' profile. The target companies were selected to avoid bias in terms of type, size, and cargo transported.

The following six questions were asked in the form of free response.

- (1) Status of implementation of safety management (safety measures) and creation of manuals
- (2) Status of implementation of ship visits
- (3) Capital investment related to safety measures and reducing the burden on crew members
- (4) Status of implementation of education and training for seafarers
- (5) Status of collection and utilization of near misses

Issues in the analysis of domestic ship accidents include optimizing crew workload, stimulating communication among crew members, securing watch-keeping personnel, and creating a safety culture (Takemoto & Abe, 2023). Of these, securing watch-keeping personnel is an issue as the industry faces a crew shortage, and increasing personnel any further is unrealistic. Therefore, questions (1) to (5) were constructed based on safety measures that are considered necessary to improve the other three issues.

The interview results were organized according to these questions. These are then classified into measures that companies are taking and those they are not. In the latter case, I consider whether there are differences in the efforts of companies and how the government and business associations should be involved, as some measures cannot be implemented by companies alone.

companies	A	B	C	D	E	F
kinds of companies	Operator, Owner	Operator, Owner	Operator, Owner	Operator, Owner	Owner	Owner
number of employees	230	225	66	24	28	2
number of seafarers	5	25	21	0	25	0
number of ships	18	15	5	1	3	2
number of owned ships	1	4	4	1	2	2
main cargo transported	steel, scrap, gypsum, etc.	chemicals	scrap, coke, coal, cement, limestone, silica	machinery, wheat, logs, gravel, etc.	black oil, biomass	chemicals
interview date	July 25, 2023	July 8, 2023	October 7, 2021	August 8, 2023	July 28, 2023	August 4, 2023

Table 1: Overview of the Companies Interviewed

Results

The safety measures taken by the companies are shown below for each question.

First, regarding the status of their efforts under the Transport Safety Management System, of the companies interviewed, Companies A, B, C, and D are covered under the system. Although the timing varied, Company A, a major operator, was assessed by the MLIT six times, and Company B was assessed five times. In response, each company reviewed its internal audit methods and methods of collecting and utilizing near misses. However, Companies C and D, which are small, are not very familiar with the system, perhaps because they have not been assessed as often, and the system has

not had any impact on their safety measures. However, Company C had taken measures similar to the safety management system required by the Transport Safety Management System, such as creating, implementing, and reviewing safety, health, and compliance plans.

All companies have established and operate safety management systems except for Companies D and F, which do not employ their own crew members. Companies A and B operate according to the regulations of the Transport Safety Management System. Company C likely focuses on safety measures, such as establishing its own safety management system, because (1) the president, who is the top executive, has a proactive attitude toward safety, and encourages studying the "Study of Failure," and (2) the company adopts safety measures from land-based businesses, which have more advanced safety measures than the shipping industry. Companies B and E must handle the Ship Inspection Report (SIRE) Vessel Inspections. Furthermore, although Company E has not obtained the International Safety Management (ISM) code certification, it operates based on this code. Companies A and E have dedicated safety officers within their organizations.

As each company introduced a safety management system, the operations were systematized, and safety measures were addressed in an organized manner. Specifically, the top management's commitment to safety has been strengthened, crew handovers and training have become smoother, meetings have become a habit before work, and the operational standards for vessels have been clarified. Consequently, the companies stated that safety has improved since the introduction of the system.

However, companies have realized that close communication between shore-based employees and ship crew members through ship visits is effective in reducing accidents. By communicating with shore-based staff to improve the problems they face daily and showing a willingness to support their work, seafarers' motivation to do their jobs can increase, which can ultimately lead to them trying to operate safely. Therefore, the introduction of a safety management system alone is not sufficient to ensure safety, and steady efforts by shore-based staff to improve the onboard environment daily are necessary for seafarers to perform better.

In principle, the responsibility for the education and training of crew members and capital investment in ships and other equipment lies with the owner, as they are contractually obligated to maintain seaworthiness. However, companies A and B, which have many chartered ships, provide support to ship owners while taking measures primarily for their own ships. Company A established a ship management company as a group company, which then performs ship management and crew dispatch on behalf of the owners of its affiliated ships, thereby reducing the owners' burden of labor management and other matters. Company B also conducts regular visits to chartered ships, safety training for seafarers during docking, and organizational training for owners. Company E also received support from its operator, such as the provision of educational materials.

Companies C and E are particularly proactive in terms of seafarer education. Company C has a good environment because it owns a vessel specializing in seafarer training. Additionally, it does not just conduct training, but also adopts a method that makes use of the "Study of Failure." Company E changes its training methods for new employees depending on whether they are new graduates or have experience as seafarers, a detailed approach that can only be achieved by a small company. Furthermore, pre-boarding training provides seafarers with information about the ship and the work that occurs during their leave before they board the ship, which has the advantage of helping seafarers quickly adapt to the job and preventing them from making mistakes. Company D asked another owner to cooperate and hold a training session with a current captain as the lecturer. Training is more effective when the captain, seafarers, or people with experience on board talk about their own experiences, as this makes it easier for crew members to better understand the issue that affect them, rather than having employees on land provide training to them.

All companies interviewed collected and utilized near misses. Particularly, proactive efforts were observed in companies A and C. At company A, the staff of the Ship Safety Management Office compiled cases reported by their seafarers, commented on the causes and countermeasures, and provided feedback. If necessary, staff also visit the ship to explain and instruct in person. If feedback is given only by distributing documents, some crew members may not check it; however, by providing feedback with explanations and instructions, they have time to think about it, which is likely to lead to improved crew behavior in the future. Company C conducts an analysis using a risk assessment

method, which led to the implementation of specific countermeasures. Additionally, company E's operator distributes prepaid cards as rewards to crew members who better report near-miss cases, to encourage more proactive reporting by crew members.

Discussion

Table 2 summarizes the companies' safety measures. The measures that were prioritized in all six interviewed companies were classified as "measures in which the company's efforts were sufficient," and measures in which the efforts varied by company were classified as "measures where there is room for improvement or ingenuity by the company." Furthermore, since there are measures that cannot be implemented by a company alone, these were classified as "measures that require the involvement of business associations" or "measures that require the involvement of the government."

	The company's efforts were sufficient.	There is room for improvement or ingenuity by the company.	The involvement of business associations is required.	The involvement of the government is required.
safety management and manuals		○	○	○
ship visits	○			
capital investment		○		
education and training		○	○	
utilization of near misses		○		

Table 2: Summary of Companies' Safety Measures

All six companies were fully committed to "ship visits." These visits are not only conducted for safety measures but have also been conducted for some time by owners to check vessel malfunction and the condition of the crew members. Company A saw a decrease in the number of accidents and problems since it began to focus on these activities by assigning dedicated staff, while Company F saw a decrease in the number of accidents and problems since it proactively communicated with crew members, even though they were not employed by the company. Other operators also recognized the importance of communicating with crew members, which can play a significant role in ensuring safe operations.

Next, regarding the four measures of safety management and manuals, capital investment, education and training, and utilization of near misses, there are differences in approaches among companies, suggesting that there is room for improvement and ingenuity.

There are differences in the efforts of each company in terms of the implementation status of safety management. Generally, tankers are subject to stricter regulations than cargo ships; therefore, safety standards tend to be higher. However, some cargo ship operators and owners, such as Company C, are also actively working on it. Ideally, safety staff should be assigned to the company organization; however, there are limits to what companies can achieve on their own because of labor costs. To achieve this, receiving freight or charter fees that reflect those costs is necessary. To ensure that freight and charter fees are determined based on cost calculations, business associations and the government must be involved and appeal to the shippers for review.

Seafarers must follow several safety guidelines. Company E has made efforts to reduce the burden on its crew members by creating documents that can be prepared on land. Thus, companies must organize multiple manuals and distribute them to crew members so they can concentrate on their original duties. However, if the owner operates a ship as a captain and the company has only one or two onshore employees, it is not easy. It is necessary for the government to impose regulations to

prevent accidents, but it should be understood that this can increase the burden on crew members, and a system that considers this issue, such as reviewing the documents to be submitted, should be designed.

Capital investment is costly; therefore, operators are more proactive in introducing it than owners. However, owners have a close relationship with crew members and are therefore able to introduce equipment in response to their requests. To reduce the crew's workload, systems that provide weather and sea condition information, support systems for night watchkeeping, shore power supply equipment, engines that use diesel oil (ISO standard: Marine Distillate fuel 3 cSt/40°C), and electronic devices such as computers have been introduced. Additionally, it would be desirable to introduce equipment that meets crew requests. While owners are primarily responsible for considering the introduction of such equipment, the cost of the installed equipment must be reflected in freight and charter fees by shippers and operators.

Although all six companies conduct education and training for crew members, allocating time to provide it at sea is difficult, so it is mainly conducted while the vessels are docked. Conversely, companies that allocate time to provide it before boarding or during ship visits station safety staff on shore. As in Company D, training not only conducted one-way by shore staff but also by current or experienced seafarers as instructors would be highly effective. As mentioned above in the section on the manuals, some small companies find it difficult to implement training on their own. In such cases, support may be needed, for example, from business associations or organizations such as the "Ocean Kyoiku Center," who can create educational materials or dispatch instructors.

The effectiveness of collecting and utilizing near misses lies not in compiling reports from crew members and presenting them as numbers, but in carefully examining the content, taking measures to prevent them, and using the information as educational and training material for crew members. Some companies that collect near misses have passive attitudes, with owners saying, "because the operator told us to collect them," and operators saying, "because it was pointed out in the assessment by the government." This may be because the collection and utilization of accident and near-miss information are included in the assessment of companies under the Transportation Safety Management System. First, companies must fully understand why they are collecting near misses and explain this meaning to crew members; otherwise, they will not function as safety measures.

This study clarifies the status of safety measures adopted by Japanese domestic shipping companies and explores the challenges in preventing domestic shipping accidents and improving safety. Interviews with six companies revealed that measures other than traditional ship visits were insufficient. Safety management and manuals, education and training, and the utilization of near misses were imposed on domestic shipping companies when the Transportation Safety Management System was launched. However, implementing these measures is difficult because freight rates, charter fees, and company personnel remain unchanged. Regarding capital investment, equipment cannot be introduced unless the cost is reflected in freight rates and charter fees. Therefore, support from the government and business associations is essential for these measures. Conversely, every time an accident occurs, the government establishes regulations and systems to prevent them, which increase the workload of companies and seafarers. There is concern that this will hinder the original safe operation. In the future, it will be necessary to choose to maintain what is necessary for safety and to abolish what has little effect compared with the effort.

This study summarized the current state of safety measures for only six companies; however, they do not necessarily apply to all companies. Japan's domestic shipping industry has complex and diverse contractual relationships and the details of its safety measures vary accordingly. In the future, it will be necessary to consider specific safety measures for each contractual relationship. Additionally, a questionnaire could be considered a future research method to clarify the measures taken by more companies.

Every company must deal with risks and safely perform its operations. Small and medium-sized companies have limited funds and personnel to spend on safety measures and must ensure safety under these circumstances. This study's results provide insights for small and medium-sized shipping companies and companies in other industries regarding their safety measures. These insights will also help governments understand the current state of safety measures at domestic shipping companies when considering future safety policies.

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