

TUGBOAT BUSINESS IN JAPAN AND ASIA ~ The present situation and issues of tugboat business ~

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Abstract

In a port, tugboats play a vital role for the safety of vessels. Tugboats, however, are rarely present in any study. Tugboat business in Japan is regulated only by the Harbor Act, but by the Marine Transportation Law. And tugboats services are mainly provided by local governments. This is because the tugboats are considered as one of port infrastructure. The situation is similar not only Japan but also a lot of other countries including Asian countries.

These situations have compelled tugboat business to hold back competition and to act in union. That implies tugboat business would run counter to current society that steadily promotes regulatory reform and competition in business. Tugboat business should be managed to supply public functions, though.

This paper has a final aim that clarifies the desirable tugboat business from the perspective of both competition and public. To clarify the issues and show the way, it should be of the tugboat business of Japan indicate the tugboat business in the future in Asian countries. Thus, the current situations and issues on the tugboat business are firstly identified. Some measurements for the activation of tugboat business are also examined.

I Introduction

Tugboats are used in harbors and ports to move ships in and out of berth and to move industrial barges around waterfront business complexes. They also play a role for the safety of ships and harbors. Tugboats and/or tugboat business are rarely present in previous studies or researches. This might be because that tugboat business has some particular properties which will be mentioned afterward in this paper. The limitation of gathering data in tugboats business would be one of the reasons.

Tugboats have a basic function of moving ships in and out of berth. Their functions have been diversified recently into ship docking, towing ships, securing the routes, salvaging ships, and precaution measures for loading/unloading activity.

In Japan there are a few legal systems over tugboat business. The *Harbor Act* of Japan describes that tugboats are one of port infrastructure (Section

5 Clause 13 of Article 2, Chapter 1). Although the officers and the crews on ships are regulated by the *Seaman Law* of Japan, the application to the tugboats crews differs by the institutions of tugboat; private companies and public sectors such as cities or port associations. Under the public sectors, tugboats crews are not applied by the *Seaman Law*. In addition, each port has its own control system of tugboat business. Thus, the nation wide legal systems over tugboat business are not quite functional.

Meanwhile tugboat business in Japan has enhanced its control system of surveillance, so-called a self-control system. That resulted in hindering the competition on the business and pulling back of the industry activation. Japan has been recently privatizing the tugboat business and changing the pilot system. That must have some effects on the tugboat business in Japan.

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Ships have been steadily growing in size. The number of port entry ship has also been increasing rapidly. The training crews could not support these conditions. In these situations, the safety of ships and ports must be one of the most important issues on maritime transport. Thus, the role of tugboats is even more expected than before.

This paper aims at identifying the current situation and the issues on the tugboat business in Japan from the perspectives of the balance of competition and cooperation. This helps other countries, who considering the privatization or competitiveness of tugboat business in their own country.

This paper is thus organized as follow:

- Section 2 reviews the history and function of tugboat.
- Section 3 examines the present situation of the tugboat business in Japan.
- Section 4 roughly examines the present situation of the tugboat business in Asian countries
- Section 5 identifies the issues on the tugboat business in Japan.
- Section 6 gives the summary of this paper.

It is necessary to note that the word of tugboats is used in private sector and towing boats in public sector. This paper takes the terminology of tugboat representatively. This paper would be the first study on the tugboat or tugboat business in Japan from the economics view point as well as the administrative.

II History and Functions of Tugboats

1. Birth of Tugboats

In the mid of 18th century, a tugboat was born in Europe helping large-sized ships with docking. Before the birth of the “Clermont” of *Fulmont*, a steam-engine equipped tugboat of the “Charlotte Danzas” was born in 1802. That means the first steam-engine ship is the tugboat. The “Charlotte Danzas” was made by S. Williams and navigated 19.5 miles pulling two sailing vessels to *Glasgow* against the wing for six hours.

2. History of Tugboats in Japan

In Japan the first tugboat was born late *Edo* era to early in the *Meiji* era. Japan had main ports open in those days. Small-sized ships towed large-sized ships in a harbor. The small ships happened to play a role as a tugboat and tugboat itself did not appeared yet. In the beginning of 20th century, each port started

to have government-managed piers and the need of towing ships was increasing. Thus, government established tugboats as a part of port infrastructure. The government-managed tugboats towed ships into a berth after all.

The control system of tugboats in Japan differs by harbors because of the difference of the situation of pier construction. Kobe port, for instance, was supposed to have land facilities by 1914 through the first seven-year government project “construction plan of Kobe port”. The second period project carried the construction of four tugboats from 1915 to 1922. Kobe Customs managed the tugboats.

Meanwhile two private companies possessed and operated piers; *Toshin Warehousing* (present *Mitsui warehouse Inc.*) and *Tokyo Warehousing* (present *Mitsubishi warehouse Inc.*). The *Toshin Warehousing* had two tugboats and the *Tokyo Warehousing* had one tugboat. *Mitsubishi Shipbuilding Company* and *Kawasaki Shipbuilding Company* also have two tugboats each. They operated their tugboats in their own piers. Tugboats were operated in each pier basically. On the other hand, tugboat companies took the cooperation strategy during busy period. *Toshin* ordered a tugboat of “Nunobiki maru” in 1920 to Mitsui Co., Ltd. (present *Tamano Shipbuilding Company of Mitsui Engineering & Shipbuilding Inc.*). The “Nunobiki maru” had 119.08 gross tons with 805 horsepower and 11.5 knots the highest speed.

Yokohama port shows another situation of tugboat business. According to a book of *Inland Sea Pilot Association 100 Years History of Japan*, there was not a moorage facility and the access to berths is easy in the beginning of 20 century. There are the demands of sea pilots instead. The training of Japanese pilots was the urgent subject to the *Meiji* government. That brought the implement of “Pilot Certification Rule for Western Ship” in 1877.

Several pilots had their own tugboats and they had a designation right of a tugboat in *Yokohama* port. Pilots required the towing service to their tugboats for their advantages. The special relationship between tugboat companies and pilots was formed. Tugboats were generally two-layer structured but three-layer structured tugboats were shown in *Yokohama* port. A special room for a pilot was there. This relationship had been continued until September 2006. The Association of Japanese ship owners proposed “Realization of the efficiency and

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fairness on tugboat business in Yokohama port” to Yokohama port for improving the strange relationship.

The Ministry of Land, Infrastructure and Transport of Japan explains the general pilot system as below:

“A pilot boards a ship and takes a responsibility of navigation in specified areas (39 areas in Japan) for safety. In cases of special conditions such as bad weather or severe congestion, a pilot on board is compulsorily required (10 areas in Japan).”

Pilot system contributes to marine environment as well as the secure maintenance of harbors and ships. The operation standard of tugboats is settled by Pilot Association nation wide. Pilots boarded 160,000 ships cumulatively in 2002. They are required to board on a more than 300 gross tons ship by The Ministry of Land, Infrastructure and Transport of Japan.

However, the Ministry has tried to mitigate the pilot regulations to increase the efficiency of ships operation and support the upgraded ports. The regulation turned into the application to over 10,000 gross tons ships in *Kobe* from July 1996 and over 3,000 gross tons ships (excluding dangerous article loading ships) in *Yokohama Kawasaki-ku* from July 1997. It mitigated over 3,000 gross tons ships in *Moji-ku* from July 2002 also. As a result, the number in using tugboats in those ports decreased sharply.

3. Functions of Tugboats

Tugboats play a main role of helping large-sized ships go in and out of berths. The functions of tugboats have been diversified in accordance with

the enlargement of ships. The increasing volume of dangerous cargo such like LNG and LPG would be one of the reasons.

Exclusive usages of tugboats are shown in recent; exclusive towing, exclusive guiding or guard and so on. The exclusive usages support the reduction of ship building costs. This is because exclusive tugboats are used separately in case of speed-required or power-required.

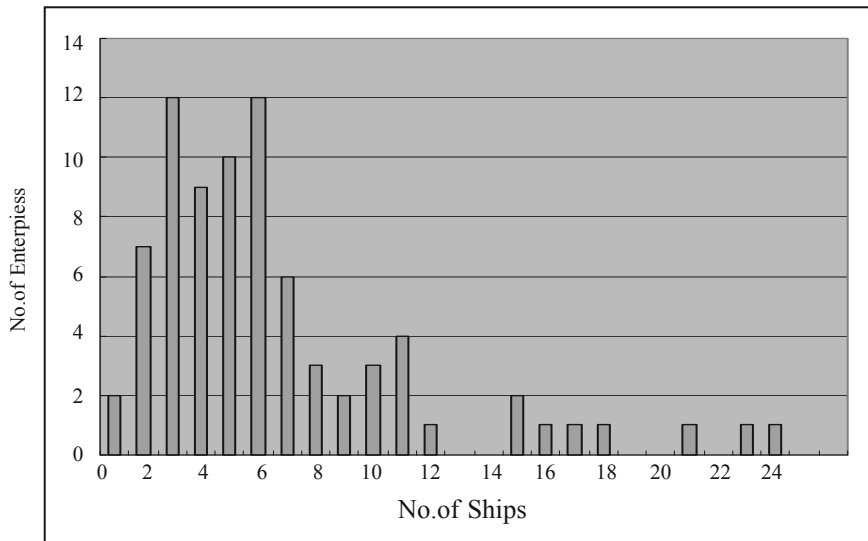
Followings are the functions of tugboats in recent days;

- Moving ships in and out of berth
- Guiding ships in case of dangerous cargo (LNG/LPG)
- Guarding ships during loading/unloading activity
- Docking
- Towing barges
- Salvaging and towing a wrecked ship
- Ocean towing
- Transporting
- Others

III Present Situation of The Tugboat Business in Japan

1. Tugboat Business in Japan

Tugboats have been considered as a part of port infrastructure by *Harbor Act* and provided by the local authorities in Japan. However, the operation of tugboats has been diversified by ports and areas. The first trial of privatization in tugboat business appeared in Kobe port in 1966. *Yokkaichi*, *Nagoya* and *Osaka* port are now trying to privatize of tugboat business.



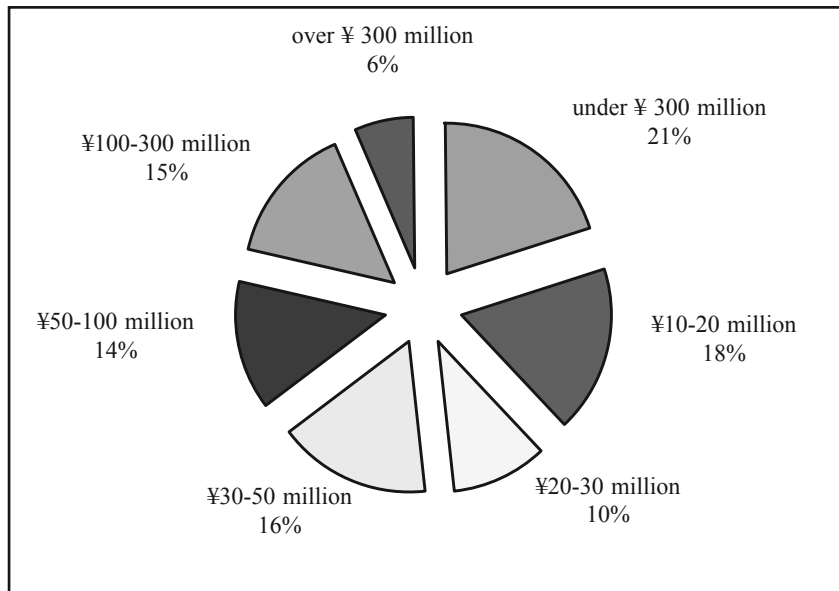
Data: Japan Harbor Tugboat Association

Figure 1 The number of operation fleets per tugboats company

In January 2005, Japan harbor tugboat association has 88 members in it; 9 local authorities or unions and 79 private companies. The local authorities own and operate 860 fleets of 87,658 gross tons. The private companies have 450 fleets of 84,805 gross tons. That means 5.7 fleets of 1,073 gross tons are operated by one company in average. Medium and

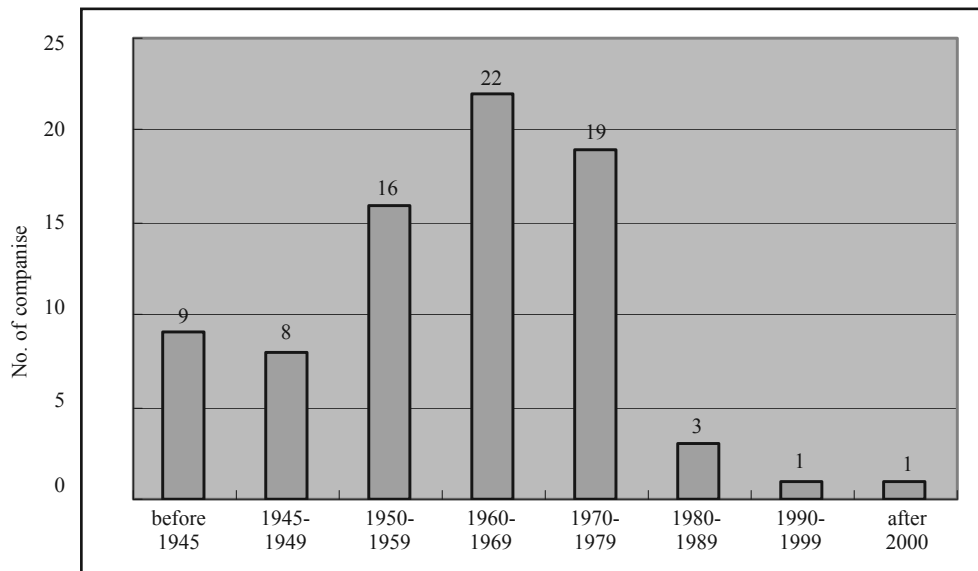
small companies operate less than 3 fleets, which represent 38% (See figure 1). Large companies that have more than 300 million Japanese yen in their capital stock show only 6% in tugboat business. On the other hand, less than 30 million companies account 49% (See figure 2). That implies that almost half of tugboat companies are medium and small sized.

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Data: Japan Harbor Tugboat Association

Figure 2 Tugboat company categories by capital stock



Data: Japan Harbor Tugboat Association

Figure 3 The number of newly entering tugboat companies by year

The estimated tugboat business market in Japan would be 80 billion yen to 100 billion. The foundation year of the tugboat companies is mainly reported until 1980 after the Second World War (See figure 3).

The number of port entry ships in Japan has been almost increasing approximately. The number

of tugboats, however, has been decreasing to 432 fleets in 2002 as the same fleets in 1980 after the largest number of 477 fleets in 1995 (See table 1). It might be inferred that there are the reasons in the performance improvement of tugboat companies and the introduction of bow thruster and/or side thruster to the containerships.

Table 1 The Number of port entry ships and tugboats

	A) Port entry ships	B) Tugboats	B/A
1975	58,870	416	142
1980	69,867	432	162
1985	73,865	465	159
1990	78,190	449	174
1995	81,465	477	171
2000	95,349	463	206
2001	97,010	452	215
2002	97,836	432	226

Remark: overseas vessel over 3,000 G/Tons and Inland sea vessels over 6,000 G/Tons

Data: Japan Harbor Tugboat Association

2. Classifications of Japanese Tugboat Companies

Japanese tugboat companies are classified into four groups by main stockholder: shipbuilding companies, large-sized shipping companies, shippers or consignees, and local-based private companies.

Shipbuilding companies had their own tugboats for their advantages of docking and still some companies keep their tugboats, for instance *Sasebo Heavy Industries Inc.*, *Ehime shipbuilding Inc.*, etc.

Large-sized shipping companies such as *Mitsui O.S.K. Lines* (MOL), *Nippon Yusen Kaisha* (NYK) and *Kawasaki Kisen* (KL) have a lot of tugboats by themselves. *Mitsui Warehousing Inc.*, for example, had owned and operated 6 tugboats in Kobe port until September 1989. The next month they established a subsidiary company, *Sanso Marine Co., Ltd.*, to operate tugboat business. They sold the

subsidiary to Mitsui O.S.K. Lines in 2005. *Sanso Marine Co., Ltd.* was renamed to *Kobe Tugboat* and reincarnated as a member of *Mitsui O.S.K. Lines* group in June 2006.

In the beginning of tugboat business in Japan, local-based private companies took the biggest share of the business. Some companies were established as a joint venture with a capital stock of major shipping companies. Almost other local tugboat companies were also merged by large-sized shipping companies. That made shipping companies, specifically three major shipping companies or their groups, have the initiatives in tugboat business (See table 2). Warehousing companies and stevedoring companies were the main players in tugboat business from Meiji through Taisho Era. Almost all of them, however, had disappeared and shipping companies have been performing their tugboat business.

Table 2 Classifications of tugboat companies by stockholders

Stockholders	Name of organization/company
Shipbuilding Company	Sasebo Heavy Industries, Ehime shipbuilding service, Tsuneishi port service
Major Shipping Company	MOL: Nihon Tugboat, Kobe Tugboat, Green Shipping etc. NYK: Nagoya Shipping, Sanyo kaiji, Naikai Tugboat, Kaiyo Kogyo, Nihon Kaiyosha etc. KL : Daito Corp., Nitto Tugboat, Seagate Corp. etc.
Shipper/Consignee	Sumikin Buturyu, Nihon kaiji Kogyo etc.
Local company	Fukuyama Port Service, Tomako Service etc.

Remark: Some cases show local authority possess like Osaka City, Nagoya City, Ishikawa-Prefecture

3. Tugboats Operation in The Main Ports of Japan

The type of operating tugboats is classified into three categories;

- A type that local governments or authorities possess and operate tugboats
- A type that private companies own tugboats and local governments or authorities operate the tugboats
- A type that private companies have and operate their own tugboats

The type of operating tugboat differs in each port. In *Nagoya* port and *Osaka* port, private companies manage the tugboat business. There are also many cases that a tugboat association is organized by private companies to negotiate with local government. In *Tsuruga* port a single private tugboat company performs its business, which means the monopoly market. Several companies are competing against each other in the inland sea. There is even a particular case in *Kawasaki/Yokohama* port; a joint company that

is cooperated by public sector and private sector. Moreover, some petroleum refining companies and iron/steel companies have the subsidiary company operating tugboats in their own berth (See table 3).

It could be noted that completely competitive market hardly exists in tugboat business in any ports. The local authorities and harbor managing institutions are participating in tugboat associations to exert influences on tugboat business. The competition over the tugboat business is also limited by the compliance among companies. There is the reason in the recognition that tugboat business is a part of port infrastructure and its functions must be provide by public sector such like local authorities.

It does not seem that monopoly market provides the qualified services. That is because market size is not large enough. If many companies compete with each other in a small market, they would not be guaranteed to get their profits. That would result in their failure to provide the qualified service. This posture put the tugboat market into monopoly market. In addition that has blocked a new entry even in the inland sea.

Table 3 Types of tugboat business operation in Japanese main ports

Sector	Operation type	Ports (as examples)
Public	Controlled by local authorities or port association	Nagoya Port (Nagoya Port Control Association) Yokkaichi Port (Yokkaichi Port Control association) Osaka Port (Osaka harbor Bureau, Osaka Port Tug Center)
Private	Controlled by a tugboat association	Kobe Port (Kobe Tugboat Association) Moji Port (Kanmon Tugboat Association) Hakata Port (Hakata Tugboat Association)
Private	Controlled by particular joint company	Yokohama/Kawasaki Port (Kokohama Kawasaki Tugboat Co.,Ltd)
Private	Competition market (private companies)	Inland Sea
Private	Monopoly market (monopolistic company)	Tsuruga Port
Private	Others (in private berth)	Shin Nihon Oil

Remark: Local or port authorities may participate in the tugboat associations

IV Present Situations of Tugboat Business in Asian Countries

The characteristic of Japanese tugboat business would be identified by comparing with other Asian countries as shown in Table 4.

The tugboat business of Hong Kong is being managed by the private companies. It is considered as a complete free competition market. It might be inferred that there is a reason in the history of being managed by U.K. until 1997. Large container ships entering to the Hong Kong port are supported by the lots of strong horsepower tugboats.

In case of other Asian countries, however, governments or port authorities manage the tugboat. Singapore privatized the tugboat business in 1997 and four admitted private companies have been providing tugboat services. The biggest one is *PSA Marine*, an affiliate of PSA group, managing its own 57 tugboats.

Thailand has a pilot regulation, which blocking the use of tugboats. PAT (Port Authority of Thailand) possesses and manages all tugboats. Dubai has accomplished remarkable economic development

in recent years. The tugboat business is under the control of the port authority in Dubai and the harbor master operates the tugboat service.

The pilot regulation of Thailand might lead the special relationship between the pilot and tugboat companies as like the experience of Japan. There are several ports that impose the tugboat charge, even when the number of the tugboats decreased due to the pilot regulation.

China has the type that a company can possess the tugboats. The harbor manager of China, however, possesses and manages them practically. All tugboats in Tianjin Port, for example, belong to *Tianjin Port Tug-Boat & Lighter* established in 1951 by the Tianjin port authority. As for the charge of the tugboat, there is a tariff of MOC (Ministry of Communication). Tianjin port has its original discount rate, though. Other Chinese ports show the similar situations with Tianjin.

As above, several Asian countries have their governments or harbor managers control the tugboat business. This paper is limited by the gathering data

on Asian countries' tugboat business. It is possible to say, however, that the variety in the type of the tugboat business is a common issue to many Asian countries as well as Japan.

Table 4 The situations of the tugboat business in Asian countries

Country	Ports	Situation
Singapore	Singapore	The tugboat business was liberalized in 1997. It was carried out by only PSA before privatization. There are the 4 Tugboat companies which received the official authorization in Singapore. PSA Marine, the biggest company possesses and operates 57 tugboats. Each company has own tariff, but the same level.
Thailand	Bangkok Laem Chabang	All tugboats are managed and possess by PAT (Port Authority of Thailand). Using tugboat is obligated by the Pilot Regulation.
UAE (Dubai)	Port Lashid Jubel Ali	All the tugboats belong to port, having exception of tugboats for digging or towing barges. The tugboat is managed by harbor master. The necessary number of fleet is decided by the discussion among the ship captain, pilot and harbor master. It is obligated that the tugboat uses it for in Dubai port. Port authority decides the charge of tugboat in accordance with harbor charge.
Hong Kong	Hong Kong	Tugboats possess and operate by 3 private enterprises with 28 tugboats. The charge there is an unification tariff and be revised in accordance with the prices rise rate. Also, there is the guideline of Pilot Association the use of the tugboat it is not compulsion.
China	Tianjin	All the tugboats in Tianjin Port possess and operate by Tianjin Port Tug-boat & Lighter Company, which shareholder is 100% by Tianjin Port authority. There is the tariff by MOC (Ministry of Communication), however, presenting the discount rate and lamp sum charge from the government charge. Tianjin Port Tug-boat & Lighter Company were established in 1951. At present, 16 tugboats are being run/possess. Soon 4 fleets have the horsepower of 5,000BHP. Also, there are the construction plans of 2 tugboats of immediate future 6,000BHP.
Korea	Pusan	Tugboat services are provided by seven private companies with 32 tugboats. Korea tugboat association coordinates the orders from shipping companies. The system is different by the port.

Table 4 The situations of the tugboat business in Asian countries

Taiwan	Kaoshuing Keelung	<p><Kaoshuing></p> <ul style="list-style-type: none"> ● South/Container berth; Port Authority possess and operates 12 tugboats ● North/Conventional berth; Privatized in 2007. Port authority does outsource tugboat service to two private companies. The companies have 9 tugboats and pay commission to the port authority. <p><Keelung></p> <ul style="list-style-type: none"> ● All tugboats are possessed and operated by Keelung port authority. <p>*All tugboats service will be privatized gradually, which is decided by the government.</p>
Cambodia	Phnom Penh, Sihanoukville	<p>Government owned agency KAMSAB (KAMPUCHEA SHIPPING AGENCY & BROKERS) as sole agent, and separately there are shipping agency.</p> <p>The order from the ship, firstly comes to shipping agent, then to KAMSAB, who arrange the order from the ship like tugboat, pilot and line handling etc., Tugboat operation are done by Harbor Master. All tugboats belong to the port. The charge is claimed by the tariff. Numbers of tugboat actually used judges the weather and the situation and the pilot decides it. However, even if it uses of how many, the charge is the same by the tariff.</p> <p>In the Phnom Penh port, there are two tugboats. The built year is old and near for 20 years. The horsepower is 350BHP and 55BHP respectively.</p> <p>The Phnom Penh port is a river port, and is enough that only a small ship enters the port. The Taiwanese ship company provide the container service to Ho Chi Minh and Phnom Penh with a small container ship. Numbers of container ships entering port are 35-40 per month.</p> <p>In the Sihanoukville port, there are five tugboats. The horsepower is 800BHP-1600BHP. There are 75-80 per month incoming ships including conventional and the container ship.</p>
Vietnam	Ho Chi Minh	<p>Each port and the terminal have and operate own tugboat. Tugboat ownership is divided into the following four categories in Ho Chi Minh.</p> <ul style="list-style-type: none"> ❑ Government owned shipyard ❑ Naval forces, New Port ❑ Government (Ministry of Transport) owned shipping company at Saigon Port. ④ Private Terminal company, ex. VICT <p>VICT has for tugboat and serve the ships coming into VICT terminal. VICT is joint venture company by NOL, Mitsui & Co., and SWATCO.</p> <p>In other ports, tugboats belong exclusively to the port and each terminal.</p>

Table 4 The situations of the tugboat business in Asian countries

Philippines	Manila	<p>Tugboat Market in Manila is free competition and four tugboat companies provide tugboat services. However, substantially near the monopoly market is formed by two companies, (SALVTUG,, HARBOR STAR SHIPPING SERVICES. INC.). Recently, MARINEMAX SHIPPING Corp. is growing up rapidly.</p> <p>The possession tonnage of four companies is as follows.</p> <p>SALVTUG (32), HARBOR STAR SHIPPING SERVICES. INC . (20) MARINEMAX SHIPPING Corp. (14) NORTH HARBOR TUG Corp. (4).</p>
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Data: Interviewing a person who is charged of tugboat business in each port.

V Issues on Tugboat Business in Japan and Asia

1. Review of The Properties of Japanese Tugboat Business

Japanese tugboat business and industry have six properties as below;

- Each port has different structures of the control or operation system in the tugboat business.
- There are few legal restrictions that judge the tugboat business. Loading passenger is managed by Maritime Transport Law. The towing activities of the tugboats are not subjects of Maritime Transport Law, though.
- Self-control and mutual surveillance system are working in the tugboat industry and completely free competition is hardly appeared.
- Tugboat business or industry has rarely enhanced the innovation of its management technologies. Most shipping line companies have been trying to improve their accounting methods in each navigation, contract or client to clarify their profits and losses. Trucking companies in pursuit of their efficient management have been applying new systems such as GPS system and have been trying to reduce the cost by immediately maintaining their trucks. On the other hand, many tug-

boat companies still have their rule-of-thumb accounting methods. Some tugboat companies are using IT technologies to control and operate their tugboats. AIS (Automated Identification System) could give the reduction of the fuel cost by showing the shortest way to mother ships. However, the efficiency of tugboat business has been behind the shipping companies and the trucking companies.

- Tugboat industry has been keeping its business in monopoly market. The market is too small in size, because the market is separately considered by ports. A company thus manages to have initiatives in each port.
- In a comparatively large market, plural companies are working together in mutual cooperation, which is blocking the entry of a new competitor.

To sum up, Japanese tugboat industry has kept its business from the free competition market and the cooperation concept has been considered to tugboat companies in the reason of the secure supply of towing service.

2. Issues on Japanese Tugboat Business

Most of the issues on the tugboat business have the excuses from its properties mentioned above. Tugboat business has carried out its func-

tions in a restricted market without being managed by the nation wide legal system. The pilot system would be one of the issues. Each pilot association has different standards for using tugboats. It does not depend on the legal system.

In addition, free competition has not appeared in Japanese tugboat industry. A new entry is not reported since 1980s. Moreover many companies in tugboat business have a low degree of management.

Rising fuel cost and shortage of the crews are also pressing the tugboat companies as well as shipping companies. It is conceivable that these issues bring an opportunity of the rationalization and management improvement to the tugboat business.

3. Issues on Tugboat Business in Asia

As for the tugboat business, service has been provided as public service with the hand of the country and the municipality in not only Japan but also a lot of countries. As a result, it is a general situation in many cases that it forms a monopoly market. Then, the management of tugboat business is not efficient in the most of market. It is expected that industry in ASEAN region the hard competition among the enterprises intensify by the birth of ASEAN integration market by 2015. The tugboat business is not an exception. It is forecast that the tugboat is insufficient from the increase of the ship that departs from the development of industry and the increase of the trade. Therefore, it is thought that efficient management of the tugboat business will become a issue in the ASEAN regional nations related to harbors in the near future. However, the tugboat business has not been performed to management and the research in respect of the business up to now. This study of tugboat business in Japan will

be an indicator when necessary to review tugboat business in ASEAN in near future.

VI Summary

Japan has performed transport policies from the perspective of free competition market and the policies have regulated transport industry for the safety and environment matters.

The tugboat industry has been kept from the free competition for a long time and now started to move into the free competition with the privatization of the companies. The privatizations shown in Nagoya and Osaka port, however, seem to have still difficulty in finding right direction conditioned to the balance of sufficient services and efficient operations.

The tugboat industry will face a tough period of competition not ever experienced. Some subsidiary companies of major shipping companies will be expected to play as an organization in this industry. The most important thing in the tugboat industry is to show the transparency in the competition and the cooperation.

This paper has clarified the present situations and the issues on Japanese tugboat business and industry in order to help them with their revitalization. The revitalization ways will be examined in other papers. The study on tugboat business and industry is sure to be useful guidance to the authorities and tugboat companies.

Forecasting 2015 of market unification in ASEAN, in all industries including tugboat will be in hard competition. This will show and guide to survive from the hard competition among the surrounding countries.

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