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Containerships: A Point of Departure or a Panacea?

Dale S. Brown Jr.
University of Rhode Island

UNIVERSITY OF RHODE ISLAND
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RESEARCH PAPER

CONTAINERSHIPS

A POINT OF DEPARTURE OR A PANACEA?

by

Dale S. Brown Jr.

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Signed Dale S. Brown Jr.

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PREFACE

Purpose. The advent of containerships has revolutionized the world's shipping industry. In the United States' struggle to compete for world markets and to improve military logistical support, it must keep abreast of current innovations in sea transport. An examination of the role played by containerships in this new technology must include the exploration of certain key questions. What is the best way to utilize this form of transport? What characteristics should these ships have? What are the best container sizes? Should the ships be self-sustaining, or should they call at ports with discharging facilities? How should companies determine legal problems concerning responsibility when loss occurs? Would developing countries, with limited port facilities derive greater benefits from LASH, Sea Barge, SEABEE, or Helicopter discharged containers? This paper will explore the different facets of these problems facing the shipping industry.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

The Problem.

> It took several years, much salesmanship, and near perfect performance to prove that putting preloaded containers into ships was an economical and profitable way of operating steamships. Once the shippers became convinced that they benefited by improved delivery of goods, they began to demand container service on other trade routes. With this change in attitude, the early trickle has become a flood. The rush to build new ships to transport containers, or to modify or convert old ships to fit them for the new mode, has been without precedent in world shipping history.[1]

This statement reflects the scope of the revolution which has been taking place in shipping. The sweeping changes began in 1957, when Malcolm P. McLean, who subsequently became president of Sea-Land Service, Inc., the largest containership operator in the world, introduced three C2 cargo ships, which had been modified to carry 226 containers, into the U.S. Atlantic coastwide trade. Each of these containers measured eight feet in width and eight-and-a-half feet in height, and thirty-five feet in length. They differed from the trailers towed by trucks only in that they were detached from the wheeled

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[1] Lane C. Kendall, "Lash and Seabee New Ideas in Logistics." United States Naval Institute Proceedings, February 1969, p. 140.

chassis and were constructed with reinforced corners to allow stacking in ship compartments which resembled elevator shafts. Due to their size and construction, they could, at the point of destination, be placed on conventional over-the-road chassis and towed away from the ship's side. It was not until ten years after the first converted containerships made their debut and proved their worth, that the first containerships were built which were new constructions and not merely conversions from older cargo ships. Since that time rapid progress has taken place. On 22 January 1972, Tass, the official Soviet press agency, reported that the Soviet Union had announced the launching of its first containership in a continuing thrust to expand its merchant fleet, already among the largest in the world.[2]

Due to the fact that U.S. Military Services are greatly dependent on ocean transportation, it is of vital importance that the military scrutinize and evaluate these technological changes from the logistical point of view. Such changes in the U.S. Merchant Fleet will have some effect on military strategic planning.

Containerization. This concept is based on the loading of break-bulk cargo in simple steel or aluminum boxes with

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[2] "Soviet Launches First of 200 Containerships," The New York Times, 23 January 1972.

doors at one end or at the side. This represents the initial attempt in transportation history to standardize unit sizes of bulk cargo to be handled by truck or rail transport, dockside loading equipment, and the cargo vessel. The containers, being available in different structural forms, i.e., tank shaped, wire meshed, or open structure which could be folded flat for storage, are very flexible. Standardization of container size, fittings and equipment is necessary for efficient operation. One of the great advantages of containerization is that the container can be sealed at the point of origin and not opened until the point of destination, thus reducing the risk of loss of cargo due to pilferage or misplacement. Further benefits are derived from less in-port time thus greater productivity.[3]

The sequence of cargo movement by containerships could be outlined as follows. The cargo is loaded into a container at the point of shipment, from which it is moved by rail or road to the ocean terminal, where it is loaded aboard a ship. After the sea voyage, the container is offloaded from the ship to the overseas container port. From here the container is moved to its ultimate destination by road or rail transportation.

The advent of shipment by containers implies the need for designing a new variety of equipment for the efficient movement

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[3]Donald D. Breed, "Mother ship pays a call," Providence Sunday Journal Business Weekly, 12 March 1972, p. I-12-13.

of containers. This equipment includes specialized truck chassis, railroad flat cars and mobile container stackers and transporters. Additionally, it has been necessary to build ocean terminals with the special dockside cranes and stowage areas required for effective use of containers. These new constructions and modifications have resulted in a dramatic reduction in ocean transportation costs for bulk materials within the last 15 years.[4]

The military shipper has been concerned with the necessity of designing a special ocean vessel for carrying the containers. The military has named such vessels "cellular containerships," because inside the holds there are cellular structures of angle-iron forming container guides onto which the containers are loaded. Due to the fact that container movement inside the ship is vertical only, large hatch openings are required. These ships operate only from especially designed container ports which have highly automated gantry cranes to load and unload the ships.

Due to the automated nature of this operation, it is possible to load and unload a container during four minute intervals. Port time can be cut to hours rather than weeks through the efficiency of this operation. For the first time in history, general cargo can be handled with the same efficiency as bulk cargo.

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[4] R.P. Holubowicz, "The Other Revolution," United States Naval Institute Proceedings, October 1970, p. 43.

CHAPTER II

MILITARY LOGISTICAL REQUIREMENTS

Current Status. Navy sponsored container cargo has jumped from 3% in the late 1950s to 41% today. In the fiscal year of 1968 the Navy reported a saving of two and a half million dollars directly attributable to the expansion of the container mode of transporting materials.[1]

Due to the fact that the U.S. military community must rely heavily on commercial enterprises to support wartime operations, it would seem imperative that ocean shipping have the capability of supporting military operations during periods of hostilities.

In Fiscal year 1969, 30.9 million measurement tons of military cargo was sealifted. This figure was greater than any year since World War II.[2] This is also more than the 28.5 million measurement tons shipped in 1953 during the Korean conflict.[3] However, in a later publication of the Defense Transport Journal, Vice Admiral Ramage points out some shortcomings of containerships.[4] He states that during initial

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[1] Rear Admiral Bernard H. Bieri, Jr., "Containerization Impact," Defense Transportation Journal, May-June 1970, p. 49-50.

[2] U.S. Navy, Military Sea Transportation Service, RVN Sealift Digest (Washington: September 1969), p. 4-5.

[3] Lawson P. Ramage, "Rebuilding Sealift Power," Defense Transportation Journal, September-October 1969, p. 77.

[4] Lawson P. Ramage, "Comments on Containerization," Defense Transportation Journal, May-June 1970, p. 63.

stages of deployment in response to military contingencies in underdeveloped areas, total reliance on the use of containerships is impractical due to the nonavailability of cargo handling equipment. Containers cannot be handled until the necessary support units have had sufficient time to construct port and depot facilities to accommodate both the ships and their containers.

Nevertheless, the use of containerships by Department of Defense shippers for export cargo has grown steadily in both tonnage and in actual number of containers from the first quarter fiscal year 1967. Containerization has not reached its full potential as it is now being used by the Department of Defense. Approximately 50% of all military cargo could be moved by this system.[5]

Some military logisticians have expressed the view that greater exploitation of containerships could have been used in recent years by the Department of Defense, especially in South Vietnam. However, it seems doubtful that port facilities there justify increased usage of containers. Furthermore, the Vietnam conflict has been adequately supported without the requisitioning of commercial ships. This action is within the realm of Presidential power during wartime.

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[5] U.S. Navy, Military Sea Transportation Service, Presentation for the Joint Logistic Review Board (Washington: 19 June 1969), p. 47.

Future Possibilities. Obviously military demands on transportation during periods of international unrest depend on the intensity of combat operations. In view of the fact that limited police action or regional involvement appears to be more likely in the near future than a global confrontation, the scale of military transportation will have to be adjusted to the extent of U.S. regional involvement. Because the current fleet is able to adequately support the combat operation in Vietnam does not insure its capabilities in a future war. The Military Sealift Command has voiced reservations about the ability of the U.S. Merchant Marine's capability to support a major mobilization for war.[6] In part the reason for this concern is the age of the U.S. Merchant Marine fleet. As old ships are scrapped, they are not being replaced by new ones on a one-to-one basis. For a one year period which ended in April of 1969, 57 dry cargo ships were scrapped.[7] Now it appears that the lost capability of the fleet may be compensated for by the replacement of scrapped ships with containerships.

Now other problems concerning the flexibility of containerships arise. Is there a lack of support operations in underdeveloped areas? Containerships must be either

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[6] Ibid., p. 44.

[7] "Ship Scrapping," Marine Engineering/Log, 15 June 1969, p. 220.

self-sustaining or call at ports with discharging facilities. Chassis or some other means of conveying the large container vans at the point of destination must be provided.[8] Other problems concerning loading and offloading will be covered in Chapter V.

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[8] Bieri, p. 50.

CHAPTER III

RAMIFICATIONS OF THE USE OF CONTAINERSHIPS BY THE MILITARY

Economic Factors. There are a number of economic advantages of containerships which merit some examination. Perhaps the greatest economic advantage is that of minimizing in port time by the efficiency of offloading techniques.[1] Whereas the loading or unloading time of a ship by conventional methods may range from five to eight days, a containership usually takes from twelve to thirty-six hours. This results in lowered labor costs. Furthermore, the weight of packing which is computed along with the weight of actual cargo, is generally reduced, resulting in further economy. Also of importance is the reduction of loss from damage, misplacement and pilferage, due to the fact that the containers remain sealed until they arrive at their final destination. This is of special significance to the military in helping to assure receipt of vital material in good condition.

Since it would be possible to utilize containerization for over 50% of military cargo and only 11% is now containerized, further economic opportunity lies ahead for military shippers.

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[1] Donald D. Breed, "Mother ship pays a call," Providence Sunday Journal Business Weekly, 12 March 1972, p. I-12-13.

Logistical Support. At the beginning of the Vietnam conflict there was a great tie-up of harbor facilities. Cargo ships had to anchor offshore and wait, sometimes for weeks, for available harbor offloading facilities. This was costly in both time and money and increased the number of ships necessary to support the operation. The later use of containerships helped to alleviate this situation and break the "log jam."

One of the most obvious advantages of container shipping to the military logistician is better supply support.

In peacetime containers offer an opportunity to the military to maintain a position of readiness. Formerly, the military had to pack and move supplies in small lots. This was time consuming and resulted in the misplacement of some items which were vitally needed in wartime. Prepacking materials in containers during peacetime could increase U.S. readiness for rapid deployment of support materials.

LASH/SEABEE Potential. The LASH and SEABEE barge-carriers offer a possible alternative to the Fast Deployment Logistic Ship (FDL) project, which has been shelved by Congress due to budget restrictions.

Both the "lighter aboard ship" (LASH) design and the "sea-barge clipper" (later called the "SEABEE" in honor of the Naval Construction Battalions) incorporated large barges

or lighters.[2] These could be loaded by the shipper and unpacked by the receiver, assembled by the ship operator and held to await the ship, and taken aboard in a matter of hours, climinating the customary terminal activity. Although it was more costly to construct these ships than containerships, the initial expense was offset by the efficiency gained. If the military used these ships, the overseas port commander would be given a fleet of lighters to expedite shipping. These could also be used for unloading conventional ships.

The ships could carry not only lighters and barges, but also, other cargo such as containers, helicopters, landing craft, and patrol boats.

The acronym of LASH was evolved by Friede and Goldman, a firm of naval architects, who later set up a subsidiary that operates under the name of LASH Systems, Inc. The inspiration for the design was the need of the Prudential Steamship Company of New York for a shipping method which would permit large, fast, expensive ships to pick up or offload cargo at the small ports in the Mediterranean where the company's Victory ships had made calls for twenty years.[3]

Prudential envisioned the construction of large, watertight containers which could be floated into small ports.

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[2] Col. Lane C. Kendall, "Lash and Seabee, New Ideas in Logistics," United States Naval Institute Proceedings, February 1969, p. 140.

[3] Ibid., p. 141.

Thus it would be possible to combine the advantages of using modern ships with continuing service to loyal shippers. Prudential and later Pacific Far East Lines, Inc. accepted the LASH design.

The hull of the LASH is 770 feet long, 100 feet wide, with a draft of 28 feet. Geared turbines of 32,000 s.h.p., coupled to a single screw, will allow the craft to achieve a speed of 23.5 knots. Sixty-one lighters with an internal capacity of 18,500 cubic feet may be carried. Each lighter can handle a deadweight of 380 tons, and weighs about 440 tons when lifted on board by the ship's huge gantry crane. This 450-ton crane travels the length of the deck to deposit each lighter into the proper hatch where it is secured for the sea voyage. At the end of the voyage the gantry crane moves the lighters to the stern of the ship where they are lowered into the water to be taken ashore by waiting tugs. The recipient of the cargo is then free to unload the lighter at his own convenience, while the ship is already on the homeward-bound voyage.

It is evident that the ship port-turnaround time is reduced and therefore the productivity of the ship is increased. Furthermore, without structural modifications, the LASH can be used to carry containers instead of lighters. When it is thus loaded, discharge by heavy-lift helicopters is possible.

In many ways the SEABEE is comparable to the LASH, only larger. They are 875 feet long with a draft of 31 feet and a capacity of 1600 standard containers.[4] Cargo is normally carried in barges weighing 850 tons when loaded. Each is 94½ feet long, 35 feet wide, and 13 feet 5 inches deep, with a fresh-water draft of 10 feet 8 inches. Instead of using a crane, the SEABEE has a stern elevator, 99½ feet long by 73 feet wide, which has a maximum lifting speed of six feet per minute. Thirty-eight barges, a full load, can be discharged in eight hours. The SEABEE costs $32 million to build as opposed to $21 million for the LASH.

The J.J. Henry Company of New York designed the SEABEE for the Lykes Brothers Steamship Company of New Orleans. Military interest in the SEABEE stems from the fact that the ship can deliver a large quantity of cargo to any port or harbor without being delayed by inadequate local cargo-handling facilities. The barges, containing cargo, could be discharged at the convenience of the military port commander or could be towed to other destinations. Since the SEABEE can be unloaded in about eight hours, the time during which the ship would be exposed to hostile activity is reduced. Furthermore, the ship's capability of carrying oversize units, landing craft, and

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[4] "U.S. Yards Complete Group of Fine, Fast Vessels," Marine Engineering/Log, 15 June 1969, p. 142.

helicopters makes it particularly attractive to the military.[5] Both LASH and the SEABEE are completely self-sustaining ships. They are therefore potentially more valuable to the military than large, fast containerships, like the "American Lancer." This type of ship is usually dependent on shore cranes to load and discharge it. The installation of shipboard cranes would require about nine months.

This section has dealt with some of the more obvious advantages to the military utilization of new concepts of the lighter transporter and the barge carrier. Some of the problems of both civilian and military planners will be taken up in Chapter V.

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[5] Kendall, p. 143.

CHAPTER IV

TECHNOLOGICAL CHANGES IN THE UNITED STATES MERCHANT FLEET AND COMMERCIAL SHIPPING

Commercial Shipping. The present U.S. privately owned dry cargo fleet consists of some 600 ships with an average age of approximately 20 years. Of these approximately 100 are containerships. In terms of capability the average containership can replace about two conventional dry cargo ships. However, because the container fleet is made up of a number of conventional ships which were converted from conventional cargo ships which are smaller and slower than their newly constructed counterparts, this replacement factor is lower than what might be expected. It is anticipated that new containerships will have an average replacement factor of more than four to one by 1973.

The American Lancer, which was mentioned in Chapter III, is an example of the second generation of containerships. It is capable of carrying 1,200 twenty foot containers, has a cruising speed of 21 knots, makes a round trip from the United States to Europe every 21 days, and replaces 17 standard World War II freighters.[1]

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[1] "U.S. Shipping Steers Back into the Money," Business Week, 13 December 1969, p. 53.

Containerships have steadily become a larger part of the fleet since 1965, when they represented only 5% of the fleet. Bethlehem Steel has been a forerunner in the construction of containerships. The specifications for such vessels currently constructed by Bethlehem Steel are shown in Appendix I.

Prudential Grace Lines. Prudential Grace Lines is a pioneer in the LASH concept. Some shippers feel that this concept may be the last hope for U.S. shipping. At the port of Providence, this is the development which holds the greatest potential for expanded volume.[2] During the first week of March 1972, Grace Lines LASH Italia made its first visit to Narragansett Bay. It was on-loading cargo at Davisville and showing the flag: two American flags that are painted on the huge gantry crane which moves up and down the cargo area of the 820 foot vessel. Before the visit of Italia, Rhode Islanders had seen only lighters or barges which are towed here regularly from New York, where the usual practice is to off-load barges from one of three "mother ships." Prudential Grace has expressed a preference for Providence over Boston for a New England destination. It is closer to New York, and tows of up to 12 barges can be brought here, whereas the

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[2] Donald D. Breed, "Mother Ship Pays a Call," Providence Sunday Journal, Business Weekly, 12 March 1972, p. I-12-13.

Cape Cod Canal can accommodate only eight-barge tows. Competition between Boston and Providence for LASH business is apt to continue.

LASH appeals to U.S. steamship lines because it makes the best use of high priced labor. Furthermore, the steam-turbine-powered LASH ship is able to cross the ocean quickly and discharge cargo at a number of ports rapidly. Because of the utilization of special containers Italia docks at only 3 or 4 of the 17 or 18 Mediterranean ports at which it calls. The vessel carries a regular crew of just 38--17 deckhands, 13 engineers, and 8 stewards. In the U.S., Prudential Grace mother ships call only at New York, Baltimore and Norfolk on a regular basis. On a recent trip to New Orleans "Italia" picked up a refrigerated lighter for the first time.

Barge-Carrier Ships. The projection for 1973 of 131 containerships includes 14 recently developed barge-carrier ships which are under contract in U.S. shipyards. In utilizing this concept, the shipper loads his cargo into a large barge or medium sized lighter at either an ocean or river port. The ligher or barge is then moved by tug to the ocean-going ship's side, where it is loaded aboard. In delivery to the overseas port, the barge is off-loaded outside the congested port area and towed to piers or through inland waterways to their final destination. Both the LASH and its larger

counterpart, the SEABEE are considered barge-carrier ships. The latter is highly flexible, combining the characteristics of a barge-carrier, roll-on/roll-off vessel, containership, heavy lift vessel or tanker.

Roll-on/Roll-off Ships. This is still another category of the current containership fleet. These roll-on/roll-off ships are capable of carrying wheeled vehicles and hold special interest for the military in the form of flexibility and reduced transit and port handling times.[3]

The Ponce de Leon, a large vessel of this group, is owned by Transamerican Trailer Transport. It is a 700 foot ship capable of making 26 knots, which was designed for rapid drive-on loading. It was built with three large side openings which were connected by ramps to the dock and leading to the interior of the ship to three trailer and two auto decks. This ship carries 260 forty foot trailers and more than 300 cars and trucks on a New York to San Juan run. It is possible to load and unload the ship in eight hours under optimum conditions.

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[3]"Roll-on Ships Gather More Cargo," Business Week, 10 May 1969, p. 74-76.

CHAPTER V

PROBLEMS ENCOUNTERED

Although containerships, LASH and SEABEE vessels are an exciting innovation in the shipping industry, they also have potential limitations in both military and civilian use.

Limitations of Containerships in Use by Military. The advantages of the LASH concept were discussed in Chapter III. Now some consideration should be given to possible drawbacks.

The LASH is designed for loading and discharging the lighters in still water or landlocked harbors and rivers. It would not be practical to carry on this type of operation where heavy swells and strong winds are experienced.[1]

Second, the huge gantry crane which moves along the length of the deck is the only means of loading and discharging cargo. If any casualty makes it inoperable this automatically stops further movement of cargo.

Furthermore, the lighters, which are not self-propelled, are not designed for beaching. Their great size (61 feet long, 31 feet wide, and 13 feet high, with a capacity of 380 tons) complicates the unloading process when no berth, complete

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[1] Lane C. Kendall, "LASH and SEABEE, New Ideas in Logistics," United States Naval Institute Proceedings, February 1969, p. 142.

with crane, is available. Since the lighters are not self-propelled, they must be towed in from the anchorage, or held in an assembly area. Hostile aircraft could find them a convenient and attractive target.

Objections to the SEABEE which reduce her value to the armed forces are similar to those raised in regard to the LASH.

Just as the LASH is totally dependent on the gantry crane for hoisting cargo, the SEABEE is totally dependent on the massive stern elevator to transport cargo to and from spaces. A major catastrophy could force the vessel to return to home port for repairs. This could be even more costly if her entire cargo of barges were still aboard.

Like the LASH, the barge handling procedures of the SEABEE are planned for still water. The archistect has indicated that the installation of a flume system for stabilizing the ship in turbulent water could be installed. However, the ship still is subject to a pitching action.

The barges, which are so heavy that they can be handled only by the ship's elevator, have no propulsion system and cannot be beached.

While it is economically advantageous to the ship owner that the SEABEE can replace about four conventional C2-type dry cargo ships, this does not have a bearing on the ability of the armed forces to respond to emergencies.

First one ship can only be in one port at a time. Second the loss of several large containerships in wartime would make the U.S. military logistic support highly vulnerable. The trend to fewer ships of greater capacity is noted; therefore, it is imperative that preventative measures be taken by the military to counteract enemy threats to ocean shipping in time of war.

Problems in Commercial Shipping in Utilization of Containerships. Commercial shipping companies have encountered some of the same problems in the implementation of the containership concept as the military.

Specialized equipment for loading and unloading must be kept in operable condition.

Additionally, if the shipper is to realize the optimum benefit from the growth of containerization, he must consolidate small shipments to lower transportation costs.

Some of these problems are being overcome. The S.S. Doctor Lykes, one of the most revolutionary commercial cargo vessels in the world, has simplified the loading and discharging by utilizing an elevator which submerges. The barges are floated over it. On deck self-propelled transporters move the barges into stowage.[2] The keel for the Doctor Lykes was laid on 15 July 1970. It was the first commercial ship built at the Quincy Shipbuilding Division since the 1964

[2]Charles W. Covey, "Doctor Lykes--the World's Most Versatile Cargo Ship," Under Sea Technology, December 1971, p. 14.

acquisition of the yard by General Dynamics. The completion date for two sister ships, Almeria Lykes and Tillie Lykes is set for 1972.

The general manager of the Quincy shipyard, Lloyd Bergeron, made the following comment about the ships: "These extraordinary ships posed unique design, construction and quality control challenges. The Doctor Lykes is the first ship General Dynamics has built modularly from the ground up. To meet the tight time and cost schedule, 177 steel sections, some weighing over 100 tons each, were prefabricated offsite and moved by cranes to the ship's framework. This technique compressed the time the ship had to remain in its building position and was a major factor in our ability to meet the delivery schedule."[3]

Shipbuilders are striving to make structural improvements to further enhance the value of containerships for commercial and military usage. As problem areas are resolved, containerships may play an even greater role in the competitive shipping business.

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[3] Ibid., p. 15.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Up to this point, military utilization of containerships has, for the most part, been considered separately from commercial shipping ventures. This separation can be overemphasized for as commercial ocean carriers respond to current trends in the shipping business, the military, which is heavily dependent on ocean shipping for logistic support, is directly effected. Containerships already play a significant role in the U.S. Merchant Marine dry cargo capability and statistics suggest an even greater involvement in the future.

This paper has attempted to focus on various aspects of the container revolution. It is evident that the benefits derived from containerization are countered to some degree by problems arising from this new concept.

The lack of flexibility of loading and discharging cargo is among the major problems. An alternative to the gantry cranes utilized by the LASH and the elevator employed by the SEABEE might be SHEDS (Ship/Helicopter Extended Delivery System). The use of helicopters could solve problems involving destroyed ports, port congestion, or lack of necessary port facilities in underdeveloped countries. The success of a system employing helicopters would necessitate a ship with a suitable area for helicopter pick-up, the helicopter system,

and the unitized cargo. If such a system were used port congestion could be bypassed and delivery could be made to inland areas, or coastal areas where no port facilities were available. One question which would have to be resolved would be whether it would be more economical to have the helicopter serve in a land-based capacity, or to carry the helicopter aboard the ship. Initial studies conducted by MSTS indicate that utilization of a helicopter discharge system could be cost effective if properly employed.[1] Two drawbacks to the SHEDS system are the vulnerability of helicopters in a combat zone and the fact that they could be used in this capacity only on ships which were self-sustaining.

In planning for the future, military logisticians should keep in mind both the advantages and the limitations of containerships. Their advantages of speed and size are limited by their lack of flexibility, scheduling problems, and vulnerability.

Port facilities should be scrutinized for capability to effectively handle discharged cargo from large containerships. In some cases emergency port facilities should be developed or alternative methods considered. Military ownership of container ports is questioned considering the number of commercial container port facilities available. More studies

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[1] Joseph A. Brogan, "Military Sea Transportation Service, "Official Proceedings, Department of Defense Container Usage Briefing for National Defense Transportation Association (Washington: 23 September 1969), p. 37.

are necessary to determine whether small shipment consolidation points should be operated by the military or by commercial firms.

As in the case of any innovation, the concept of containerization has inherent problems along with obvious advantages. With careful study and further implementation of the concept, we should see even greater strides made in the shipping industry. These advances would benefit both the military and commercial enterprises.

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APPENDIX I

CONTAINERSHIP SPECIFICATIONS

Bethlehem Steel Corporation Containerships

General Particulars

Length--Overall	720'-5½"
Breadth	95'-0"
Draft	31'-0"
Displacement	34,700 long tons

Machinery--Steam Turbine

Shaft Horsepower - 32,000
Single screw

Estimated Sustained Speed - 23 knots at 29'6" draft.

Container Count

In Holds	20'-0" container		40'-0" container
No. 1	16		--
2	116		--
3	178		--
4	192		--
5	56		20
	558		20

On Deck

No. 1	16		--
2	114	or	57
3	132	or	66
4	132	or	66
5	132	or	99
	572		288

Total Carrying Capacity

Maximum Number of 20' containers 1084-20' and 90-40'
" " " 40' " 574-20' and 378-40'

Capacities of Containers

20'-0" container - 50,000 lbs.
40'-0" container - 67,500 lbs.