Planning, Leasing, and Intermodal Facility Development: Perspective of the Engineering Department of Sea-Land Corporation

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The key to the future, for the third generation of the shipping industry, lies in effective planning. The traditional view of planning as synonymous with engineering design and with a window of up to 5 years into the future must be abandoned. Instead, planning must be seen as a process, a series of activities that occur in a logical order or sequence. Goals and objectives must be projected into a more distant future, perhaps some 15 or 20 years hence. To be effective, planning must incorporate certain key elements. This input is provided by those who effect, and are affected by, the plan. The complex interactive nature of all of the elements that are involved in a marine or intermodal terminal operation must be considered in developing plans.

Change is the word that most accurately describes the shipping and transportation industry as it exists today. Three or four thousand years ago, Phoenicians and Greeks began to ply the Mediterranean in boats, taking cargo from one port to another, trading and bartering before returning to their point of origin. Their vessels were loaded by hand (or by back). They carried goods that either originated along the sea coast or found their way to the port on the backs of men, women, or mules. Intermodalism for these ancient shippers was relatively uncomplicated; and labor, from what we understand, was relatively inexpensive.

From that time until the early 1950s, the shipping industry grew, but it did not really change much. True, boats grew into ships and vessels, and engines and vehicles brought the cargo from inland areas to the ports faster, but the vessels were still mainly loaded by manual labor with the support of various lifting devices. It was not until the mid1950s that the maritime or shipping industry, as we know it today, felt the seismic vibrations that followed the first containerized cargo voyage. The industry has not been the same since.

The 25 years that followed that historic event have been characterized by a rush to exploit and expand this "second generation" of the shipping industry. Operators, shippers, developers, investors, and manufacturers all hurried to get in on this new and changing method of shipping cargo. The 25 years that began in the mid-1950s were marked with more advancement, inventiveness, and expansion that had occurred in the previous 25 centuries.

As has been proven in many growth industries and companies, volume and expansion generate profits and additional opportunities. These factors often tend to cover or mask deficiencies, inefficiencies, and duplications of effort.

If the second generation of the shipping industry was characterized by unmitigated growth, we perhaps are entering a third generation--one characterized by the recognition that resources are limited; competition is keen; and controlled, planned expansion in total transportation, not in shipping alone, is the key to the survival of shipping companies and the industry.

PLANNING

Vessels, facilities, intermodal operations, equipment, information systems, human resources, and financial constraints cannot be viewed independently; they must be viewed as a system. Integrating these elements into an efficient, high-productivity, low-cost system requires meticulous planning as well as management support and involvement in planning. Figure 1 shows the planning process that is in use by Sea-Land's Engineering Department. The value of the process is that it provides for

- Anticipation of current needs,
- Ease of communication,
- Control of planning,
- Technological innovation,
- Flexibility,
- Future expansion,
- Productivity,
- Operational efficiency,
- Lower than competitive costs, and
- Guarantee that the system will function effectively.

The tasks shown on the first line in Figure 1 are basically fact gathering. Specific data are gathered and detailed relative to the existing physical assets of a facility. These data include acreage, types of equipment, parking, berthing, leases, cranes, container-handling equipment, and office space. Operational data on vessel types, arrival frequencies, and container mix, as well as the number of container lifts, loads, mix by size and type, and productivity measures by equipment type are part of the input.

Market projections are provided by management with input from the marketing and business planning units. Corporate strategic objectives are also reviewed and considered at this point.

From this information a Facility Needs Analysis is developed. Requirements for parking, berth length,

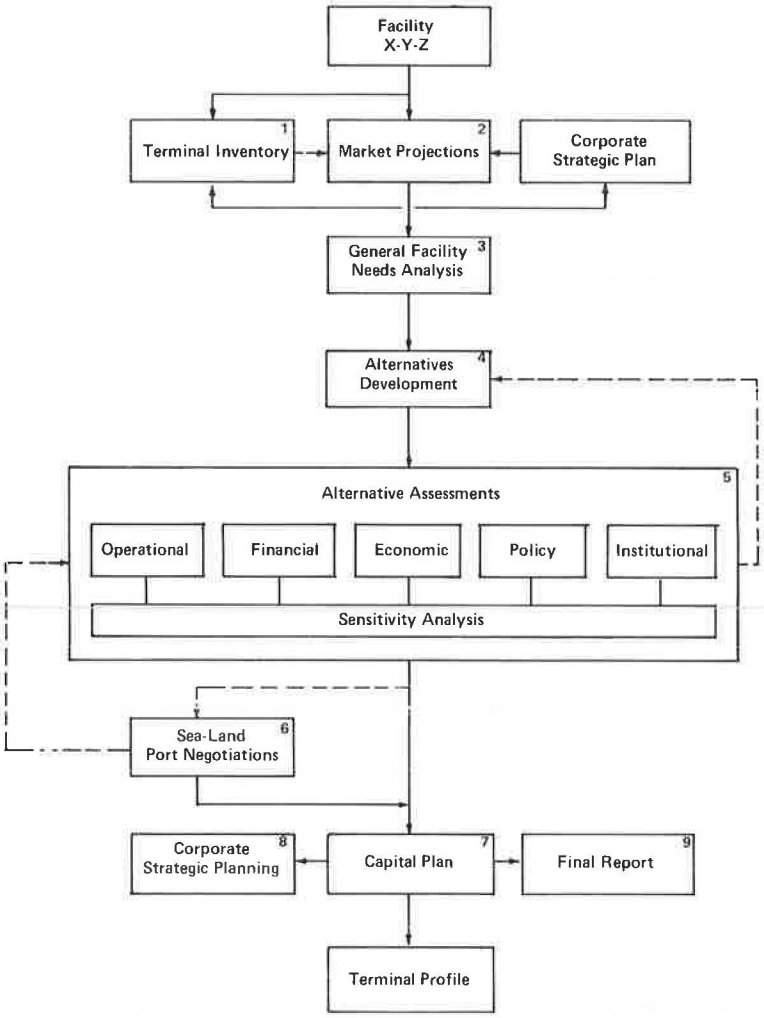

FIGURE 1 Planning process.

cranes, gates, container freight station (CFS), maintenance, and buildings are developed. For example, the container yard utilization and needs are developed on the basis of the number of vessel calls, inbound and outbound schedules, and container movement before and after vessel sailings over a sufficient period of time (generally 1 to 2 weeks) in order to identify peak need requirements. Historical data gained from that facility are also considered. Seasonal trends, lifts per hour, and average weights per box are all part of the input.

The next step, Alternatives Development, is to define all possible solutions that satisfy the long-range facility requirements. This step highlights the major differences among the available choices, particularly in terms of capital and operating costs, and the need to project those costs into the future. It is done in a quantitative manner that involves finding as many potential solutions as are deemed feasible and applying numbers to them.

The next phase, Alternatives Assessment, addresses each potential solution in detail, including an analysis of operational, financial, economic, policy, and governmental factors. This phase includes

1. Conceptual and preliminary engineering that entails
   - Collection of engineering data,
   - Formulation of general facility outline,
   - Optimization of subsystems, and
   - Affirmation of budget level estimates.
2. Detailed engineering that will result in
   - Definition of spatial parameters,
   - Specifications and plans,
   - Contract documents, and
   - Final cost estimates.

The potential solutions can now be ranked and the most desirable alternative or alternatives identified.

The end result or finding may, in addition, require negotiation with the local port authority. The result of that negotiation, if unfavorable from a business perspective, may require a reevaluation of the alternatives and in some cases dictate seeking another more compatible location for the proposed operation.

The final phase is to integrate the selected best alternative into the Corporate Capital Plan, the Strategic Plan, and the Terminal Profile developed earlier in the planning process. Thus the "process" of planning is rigorous, disciplined, and logical. It provides a firm basis for making management decisions that will ultimately affect a facility's future profitability.

A NEW APPROACH IS NEEDED

As noted earlier we must change the way we think about the way to do business and change the way in which the future is perceived. Part of the long-range

planning process requires that terminal facilities be viewed from an even broader perspective than in the past. This can mean, in the case of a marine terminal, a redefined relationship with the landlord, the port authority. It is readily apparent that land is a rapidly shrinking resource. Horizontal expansion opportunities are limited, and vertical expansion is expensive. Traditional land lease practice can have the effect of locking tenants and landlords into agreements that could work to the disadvantage of either or both parties. For example, if a tenant benefits from a low rate, the landlord could suffer because he is not maximizing revenues. On the other hand, if a tenant's traffic volume drops as the result of the loss of a major account, the tenant's fixed costs continue and profits are likely to be eroded.

With available suitable land rapidly diminishing as a resource, a port developer should be responsible for optimizing the use of existing land for the benefit of all tenants. In doing so the port developer will also be serving its own best interest.

In recent times the concept of revenue sharing has been increasing in popularity among some port authorities. Some typical forms of revenue sharing in use are

- Half wharfage,
- Volume discounts, and
- "All in" box rates.

The revenue-sharing concept is not new to other forms of real estate leasing. Retail stores for years have paid a percentage of sales, as rent, often on a sliding scale. This is known as "participation" leasing.

If a port developer is going to participate, however, he must also anticipate. The port authority should not expect to share in a tenant's revenue unless it has provided a terminal that accommodates the tenant's needs and volumes in a dynamic sense.

It has been shown that generally the overall throughput for a given port can be projected with relative accuracy. Wide swings in volume tend only to be between the operators within a given port. As one operator's business is expanding, another's will most likely be contracting. Although the size of each operator's piece of the pie will continue to change, the overall size of the pie will remain relatively stable.

A truly innovative port developer should be able to support this expansion-contraction cycle by providing the necessary land, equipment, and other resources in a manner that supports the operators' volume. The end result will be to aid the operators experiencing expanding volume, maximize the developer's revenue, and at the same time protect the operators with shrinking volume from bearing unnecessarily high fixed costs.

A terminal developer who elects to operate under the revenue-sharing concept will need to consider the following planning and design factors.

Yard Area-to-Berth Length Ratio

The length of the berth should be sufficient to accommodate the vessels in the various trade routes and services using the port. In addition to vessel length, frequency of call and vessel turnaround time will determine berth use. By the same token cargo density and free time will dictate the size of the yard area servicing the wharf. High productivity required in serving the Far East trade could result in low productivity for the same yard used in the Alaska trade. High productivity does not necessarily mean high use or efficiency based on equipment turnaround times, which vary by trade and location.

Compatible Container-Handling Equipment

Container cranes and other handling equipment should be interchangeable for use on an adjacent operator's terminal. In some instances container cranes have experienced a utilization rate as low as 10 percent. Interchangeable cranes will not only reduce initial investment costs but will also cut the cost for labor, maintenance, and spare parts inventory. This could reduce the waiting time impact caused by either an insufficient number of compatible cranes or crane breakdown.

Intermodal Facilities

Intermodal facilities should be in relatively close proximity to the marine terminal. Although being adjacent to a marine terminal certainly has its advantages, other factors such as access to long-haul rail and truck routes should be considered in planning. Future terminal designs should seek to accomplish a reduction in the number of handlings between the shipside crane and the intermodal vehicle to be used in order to allow for better utilization of labor, equipment, and facilities.

Flexible Leaseholds

Berth availability and yard areas assigned to a given operator should be based on business volume. Leases and facilities should be designed to accommodate the periodic expansion and contraction of the required leaseholds of individual operators. It benefits neither the port nor the tenant to have half vacant or overcapacity terminals, or both, in the same port. Both conditions are costly to the users of the port.

Maximum Wharfage

Wharfage agreements, in addition to having volume discounts, should have provisions for a ceiling on cost of use. Current arrangements have no downside risk for the landlord. If business is bad, the port continues to cover its minimum cost while the tenant may not be in a position to pay the maximum rental charge. On the other hand, when business is good, the landlord shares in the revenue produced, ad infinitum. Although a tenant may be paying a discounted wharfage on high volume, he can lose net revenue because of the increased operating expenses experienced when he is unable to meet the theoretical maximum throughput of a wharf.

Having addressed the process of long-range planning and a perception of the desirable future nature of landlord-tenant relationships, the author would like to share his company's experience in developing intermodal facilities in Chicago and in Little Ferry, New Jersey.

INTERMODAL TERMINAL DEVELOPMENT

Why should a shipping line develop company-owned and company-operated intermodal facilities? The following factors emerge from the planning process application described previously:

1. Advantages
   - Time savings,
   - Cost savings,

- Improved customer service, and
- One step closer to door-to-door service.

2. Disadvantages
   - Extra link to control,
   - Extra constraint,
   - Limited flexibility,
   - Extra capital expenditures,
   - Extra communication link,
   - Extra regulatory considerations, and
   - A new set of criteria in the construction and planning phase.

Because of the advantages, Sea-Land opted to build intermodal facilities. However, it was found that the existing expertise in developing marine terminals was taxed to its limit when applied to intermodal facilities. Some of the problems that were encountered are discussed next.

Location

Marine terminals are normally located on harbor channels or rivers. Limitations to building or expansion can often be overcome with dredging and other forms of civil works or, in some cases, by moving upstream. Truck terminals can, within reason, be located almost anywhere. But rail-based intermodal facilities must be located with a railroad's servicing track system. Railroads were built primarily to serve major commercial and industrial centers in areas that are generally built up and where available land is limited and usually at a premium in terms of purchase price or rental rates. Because of this it was not possible to develop an ideal or model facility and then find the land to accommodate it. What was necessary was to first find available land adjacent to a railroad, see if it could be adapted to terminal use, and then adjust the facility requirements to meet the available land constraints.

Owner Support

In building a marine terminal, the host port authority generally is vested with the responsibility and authority to acquire and lease land, grant permits, condemn, finance, build, and provide other services necessary to expedite the opening of the terminal. On the other hand, in buying or leasing an industrial site for intermodal terminal use, the operator must first obtain permits, variances when required, and rights of ingress and egress to major highways. He may also have to negotiate with one or more municipalities, a county, the state, the Environmental Protection Agency, and regional planning boards in order to get the necessary approvals to build and operate an intermodal facility.

Design

There is no real stereotype for designing a particular intermodal facility. Terminals designed by railroads attempt to meet the needs of their customer--in this case the container-carrying shipping company. Experience indicates that these terminals often do not give high priority to equipment care, paving, or the turnaround time of drivers. In the marine-rail interface, an intermodal terminal is really an extension of the marine terminal, where the client is typically a customer who is picking up or delivering a box. In this situation, driver turnaround time is considered critical. Ideally, a straight line land geometry and linearity of track are preferred to facilitate the loading process. It must also be kept in mind that the design must be adapted to the geometry of the available land.

Operations

Because the intermodal terminal is viewed as an extension of the marine terminal, there are essentially no major differences in terms of container-handling equipment, training, or support systems. Adjustments are necessary for surface-bearing loads of handling equipment, accommodating double-stacked car height (relative to overhead electric lines), and overpass tolerances. Probably the only real new accommodation that is necessary to add to the intermodal facility is an air line to feed the train brake system, something which is not normally found in a marine facility. Other than these relatively minor considerations, the physical requirements for Chicago and Little Ferry were not unlike those found in marine facilities that have been designed and constructed for years.

SUMMARY

Dealing with change is the cornerstone to the Sea-Land approach to facility development, whether an intermodal or a marine terminal. The long-range planning process described can become the vehicle to rationally control change. The author has proposed a new concept of future long-term planning for the development and leasing of terminals viewed from the terminal owner's perspective. He has indicated the change toward which an operator would hope to see the industry as a whole move. Also illustrated is the experience of a marine terminal operator in developing an intermodal facility. The author believes the key to maintaining effective terminal operations is learning to read the future, planning for it, and then changing to meet the new requirements.