PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

# A Forward View of British Shipping

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# A forward view of British shipping

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The author's theme is that the forward view of British shipping over the time span being considered will be to a large extent a view of existing ships. The industry is too capital intensive, too highly geared and operates at too low a level of profitability to admit of a very rapid change. Developments in the future must be based on the profitability of the present. It must be anticipated that in the early part of the period considered, a great part of the developments will be concentrated on improving the efficiency of the existing industry. Future developments will be dictated by techno-economic considerations. It is likely to be the middle 1980s before the scene is substantially changed by nuclear power and fluidics. A major technical development of the middle part of the period will be the growth of a fleet of liquid gas carriers for which gas turbines will provide the main propulsion system.

This paper lies within the techno-economic section of the Symposium and is designed to stimulate discussion and to avoid detailed technical considerations.

The foreground of the forward view, as seen by the author, who is, of course, expressing his personal views in this paper, consists of the existing industry and existing ships. The scene will change over the period as the ships now on order are delivered, and change again as further ships are ordered and come into service. However, the industry as a whole is now too highly capitalized, too highly geared and operating at too low a level of profitability to admit of further rapid technical change. Because of this and because the time span is comparatively short it is possible to envisage the rest of the view.

Internationally, shipping is a growth industry. Over the past 10 years world trade has increased at 8 % per annum and there is every reason to believe that over the period this rate of increase will be more or less maintained. The development of the Common Market will increase world trade and although to some extent this will be trade across frontiers and not across oceans, the fact of the overall increase, together with the demands of the developing countries, makes it likely that seaborne trade will continue to expand at a similar rate. To retain its position, therefore, the U.K. fleet must increase by some 75 % by the end of the decade and it seems that, allowing for all the imperfections of these measurements and projections, an investment in the region of £3 000 000 000 is required to achieve this.

The theme of this paper is that the future of the industry depends upon its profitability now and in the immediate future. The temptation is to look towards new developments to be incorporated only in new vessels, but the finance for such developments is dependent upon the operation of the existing industry and, as the forward view being considered in this meeting for disussion is only some fifteen years, while the average age of the British fleet only 8 years, a great deal of the development energy with which we are concerned must go towards improving the efficiency of the ships already existing or on order today.

The contribution of British shipping to the U.K. balance of payments, itself the key to national growth, is substantial – £402 M in 1970, the last year for which full figures are available. Clearly this contribution must be sustained if the British people are to see the same increase in their standard of living as is likely to be enjoyed by the other developed peoples – there being no equally efficient source of replacent for shipping earnings easily available; yet, if

these large sums are not invested in the industry, this will not happen. Improved profitability is therefore of paramount importance to the nation as well as to the industry and if it can be achieved the rest of the view is bright and attractive with prospects for an expanding industry. Without it, the money will not be forthcoming.

Although present profitability is essential to provide the funds for future developments, more than this is required. British owners must judge that there is a reasonable chance of future profitability. This means that they must see a prospect of competitive costs and remunerative freight rates. The forward view need not necessarily be one of an expanded industry rich in new developments. There are ample examples of what can happen to a country's shipping when its costs rise too far above the international average. Unless British costs remain competitive the forward view of the industry will be of a subsidized rump, quite different from the present scene.

Freights are already under pressures, from tax free operators and government assisted fleets, which tend to produce income levels unsatisfactory to British owners who must operate inside the tight fiscal regime of a highly developed and organized industrial society. Entry into the Common Market, although likely to produce an increase in world trade in the long term, seems certain to increase wage costs in the short.

Shipping is an international industry, merchants consign their goods to the cheapest carrier with an acceptable reputation for reliability and service. In theory a nation with a high standard of living, and consequently with high labour costs, should be able to offset these, relative to those of the nations with lower standards and lower labour costs, by deploying the advantages which normally go hand in hand with high costs: for instance, an integrated economy, efficient transport and communication systems, a developed capital market, a skilled labour force, developed management techniques. However these advantages are minimized in the shipping industry because the most modern and efficient vessels are available on attractive credit terms to almost every owner, and there are competent navigating and engineer officers prepared to serve on ships other than those of their own nationality. Likewise, repair and port facilities and the services of shipbrokers are available to any shipowner regardless of his residence.

However the position is changing a little in favour of the high cost nations. The impact of wages on total costs is now, in all but a few types of ship, due to the high capital value, less than it was when North America priced itself out of the free international shipping market. Costs are still vital, but competitive profitability is also an important factor. By competitive profitability is meant the situation where a certain level of return will compete successfully for capital in some national economies, or attract capital into tax free off shore operations, while being insufficient to attract it in others. Discussion of this problem seems to have no place at this meeting but it will be an important factor in shaping the future of the British shipping industry. Although the level of profitability in the shipping industry may be more acceptable in some countries than in others, it is clear that it is everywhere subject to violent fluctuations, which make the timing of new investment of paramount importance, and persistently too low for comfort. One problem owners face is lack of control of their market, it seems questionable whether such large investments are made elsewhere in industry with so little control of revenue and one wonders if these vast speculations will continue; perhaps the present low market in the dry cargo field will push owners towards some form of cooperation which will help to damp out the more violent fluctuations of the freight market; perhaps the through-transport system based on the container will at last enable liner operators to resist downward pressures on rates.


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The shape of the industry in the future will be influenced by economic considerations and changes will be the result of techno-economic forces. What form will these developments take and how should research effort be directed to facilitate them? Because wage costs are so often the factor which distinguishes the costs of different national operations and because every extra man in the crew represents an increase in the owners' liabilities in respect of medical treatment, repatriation and other social security benefits, one must expect continued pressure to reduce crews and wages costs. These factors have less relevance in most of the very expensive vessels which catch the eye today and will undoubtedly have less relevance for the ships likely to be ordered in the future; but for the present, for the great majority of the industry which represents a vast investment which owners cannot afford to write off, they are of paramount importance. Much progress has already been made in increasing the efficiency of ships' crews and in reducing the numbers to realistic levels. So far as the most modern units of the existing fleet, designed for unmanned engine room operation and general purpose crews are concerned, there seems little scope for further reduction; while for the older vessels the heavy capital expenditure needed to obtain the necessary certification will not be justified. Between these extremes are valuable vessels which will probably be modified to greater or lesser extents and work must clearly be done on the problems of introducing unmanned engine room operation in such vessels.

A major problem faced by British owners is a manning structure which already results in the catering department bearing far too large a size ratio to the total crew. It seems likely that following the pressures of international competition, the period will see the reduction of this department and the incorporation of its personnel into the general purpose concept. Associated with this there will be a general spread of the use of washing machines, for clothes and dishes, a widespread introduction of pre-cooked meals and microwave ovens, perhaps paper sheets and pillow slips may be used, or disposable crockery; not very exciting developments, but clearly in these mundane fields there is the need for research.

One must wonder if vessels will continue to carry radio officers as such; with satellites circling overhead wireless telegraphy should become a thing of the past and with the proliferation of modern navigational aids, every deck officer will have to become a competent operator of electronic equipment, why not also a proficient signals officer? Was there a radio officer as such on the Apollo space-craft? Research is needed to develop sets providing clear voice communication world-wide and to perfect and reduce the cost of shipborne teleprinters, which seem to be the ideal method of communication.

However for all the economic pressures, there is a limit to the extent to which crews can be reduced without impairing reliability or incurring heavy maintenance costs in the repair yard. Work study, planned maintenance, replacement maintenance units and the use of riding squads will become more widespread. The number of ships at sea where work study techniques have been used to ascertain the total maintenance work load, to measure it and to specify the methods by which it is carried out, is small indeed, as is the number of ships where comprehensive planned maintenance systems detail the plan for every maintenance job that must be done; yet this stage has been reached in many industries ashore and will undoubtedly be reached in many more fleets at sea. The author has no doubt that the careful systematic study of the maintenance requirements of a ship can and does produce material economies.

It has been truly said that a large part of the maintenance costs in which shipowners are involved is due to the human factor, to less than perfect operation of the ship and her equipment,


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and it is clear that shipowners depend most heavily upon the men who go to sea in their ships and on the care with which they have learned and apply the skills of their trade.

Unless there are good men prepared to go to sea on British ships, owners cannot hope for much of a future for British shipping. Let there not be any doubt, however, the good men are there, the problems are to keep them there and to recruit the next generation of seafarers.

Increasing sophistication, comfort and standard of living ashore, coupled with earlier marriage are facing all developed countries with problems so far as recruitment and wastage of personnel are concerned and the old methods of recruitment and conditions of service are already changing under these pressures. Clearly it will become difficult to man vessels where engine room staff have to stand watches or where the crew members have to spend hours with a chipping hammer in hand.

The author has discussed general purpose manning, work study and planned maintenance and at the same time has pointed to areas where further crew reductions should be possible. But the implication is clear. None of these things will lead to anything but chaos unless steps are taken to educate and train seafarers of all ranks to enable them to carry out new responsibilities. As crews are reduced and new techniques introduced it will be imperative that considerably more effort than has been evident so far, be expended in this direction. This is not to say that nothing has been done, far from it, indeed in recent years there has been a great awareness of the need for high standards all round, for better basic training, re-training and up-grading of knowledge. The need is to translate necessity into action in all sections of the industry. This is not something which can be achieved by the few. The forward view must therefore be taken by all if the effect is to be achieved. Regardless of how efficient any management may be, ultimate success or failure lies in the ability to operate its ships more efficiently than its competitors. All the talk, the schemes and the planning will be useless unless the industry has capable men to carry them out – and the men in this case are the seafarers.

The author believes that another area in which much progress remains to be made is in the selective and scientific interviewing of applicants to join the service so that those without aptitude for life at sea or life together in a closed community can be eliminated and the wastage rates, which at present are unacceptably high, can be brought to more tenable levels. Increasing service by women at sea is to be expected, particularly in the catering department and as navigating officers and the problems this will involve also require study.

More will be done to adapt existing ships than has been the custom in the past. Crew costs and manning difficulties will encourage adaptation to unmanned engine room operation, the introduction of sophisticated coatings and the modification of accommodation. The ecologists and anti-pollutionists will force changes, relative to the discharge of oil and sewage, upon owners. The high capital cost of ships will make adaptation of existing tonnage more attractive economically than has been the case in the past. Research must be directed towards improving methods of modifying existing ships both alongside and at sea.

Insurance represents one of an owners highest costs and the need to minimize accidents so as to avoid undue increases in this area seems likely to induce owners to accept new developments in the fields of navigation and traffic regulation. These will be particularly suitable to be adapted to the advantage of existing ships. Weather routing will be developed to a much greater extent than at present and the fitting of facsimile weather chart receivers will be extended. Inertial and satellite navigation systems are already capable of being developed and the spread of Decca and other navigational techniques will mean that Masters


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will always know with certainty the exact positions of their vessels. However, it is in closed waters, like the English Channel, and in approaches to major ports that the greatest change will be seen. In these areas fear of pollution will lead to the advocation of total zonal control on vessels. It will be said that aircraft approach airports in thick fog and cloud, they enter holding patterns and navigate in blind-flying conditions at speeds exceeding 600 km/h. There is no obligation upon them to 'proceed at a moderate speed, having due regard to the existing circumstances and conditions and while the fact that they would fall out of the sky if they did so may have been the catalyst to produce the systems which now protect them, it is the efficiency of these systems and not the nature of the aircraft which makes this possible. However, on water vessels are manoeuvring in only two dimensions and the problems of controlling the multitude of fishing boats and pleasure craft are likely to be considerable. If total zonal control could be achieved vessels would be able to maintain speed in fog and poor visibility. Factors like these will enable vessels to make their passages from port to port with much greater regularity and predictability. Organization ashore will improve, the date and time of a ready berth will be predictable, the practice already adopted in the liner trades of adjusting speed to arrive on time with the resulting optimization of fuel consumption will spread to tankers, bulk carriers and general cargo tramps. All this will involve an alteration in traditional tramp shipping documents so that vessels no longer need to race to be first at the pilot to get first turn at the berth.

On the larger and more costly of existing ships and this will apply increasingly in the future, the cost of out of service time outweighs all other considerations and operators continually exercise themselves to reduce loss of time to a minimum. Avoidance of accidents by the employment of efficient, highly trained crews and the careful design of vessels is recognized as important – in the Chamber of Shipping's performance data scheme there already exists the beginnings of a guide for British owners to reliable equipment – but much work remains to be done in the study of the various types of sequences of events which lead to accidents. Even with perfect operation, the cost of essential out of service time on large ships is enormous and the difficulty of obtaining dry docks poses problems. Research must clearly be directed towards developing schemes to permit routine bottom cleaning and painting, checking of sea valves, propellers, shafting and rudders to be done afloat.

There will, of course, be new developments in the design, construction and propulsion of merchant ships during the period but the author expects to see these in the more humdrum and less spectacular fields, such as: the widespread use of sophisticated coatings to reduce maintenance and decoration work, the improvement of propulsive efficiency by the use of shrouded propellers or the development of plastic superstructures. An increasing realization that the maintenance load for each ship is determined at the design stage and that the shipbuilder's choice of design and equipment is not necessarily the best for the shipowner will lead to a progressive strengthening of the industry's own design teams. In the comparatively short time span with which this paper is concerned, it is likely that most developments will be in the extension of existing techniques and the development of existing technology.

It seems likely that in the container ships of the future and in the liquid natural gas field, the gas turbine will be used increasingly as the prime mover. Multi-engined, medium speed diesel plants seem already to be making incursions into the field of the slow running diesel engine. At the top end of the power range, owners seem to be drawing back slightly from the more extreme developments in the steam turbine fields and in some recent designs slow running


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diesel engines in a multi-engine installation have been used in the power range until recently the prerogative of the turbine. One wonders if the steam turbine plant has passed its zenith. All the time experience is being clocked up in the navies of the U.K. and the U.S.A. of the operation of nuclear plants but it seems unlikely that even the end of the period will see this form of power in use commercially at sea.

The tanker is the most efficient and convenient transport vehicle afloat and one must expect to see developments aimed at achieving these advantages for the carriage of other cargoes. Already sulphur is successfully transported in molten form; the fertilizer trade should soon be able to move its raw material in liquid form; gas is increasingly being carried in tankers; moves are afoot to transport iron ore concentrates as a slurry which can be pumped on board and pumped ashore. Will the dry bulk carrier disappear? probably not in the period under review

It must not be forgotten that it is the development of world trading patterns, the increasing organization of commerce and the size and strength of the trading units which has made possible the development of the tanker, the container ship, the molten sulphur carrier; the liquid gas carrier and most other major advances in transportation techniques. These have been developed and exist, not as some masterpieces of the designer's art, but as part of total systems of production, transport and marketing. When looking for a guide to future developments, one should look to see the areas in which total systems of this nature can develop. Usually they are pioneered by organizations which control the whole of the through-transport system but when once the step forward is taken, a market develops and independent and perhaps smaller owners will order tonnage of a similar type. During this stage it is often the case that simplifications and improvements take place. Once the need is established technology comes quickly to support it.

Other factors will be at work as well. Demand for food in Asia will increase, developing countries possessing sources of raw materials will increasingly demand that at least the initial processing is done locally. The trades of the world may change from a pattern of predominantly grain, raw materials and finished goods to one of grain, semi-processed materials and finished goods: this would certainly have the effect of slowing up the rate of growth of the volume of world trade. However, it is shortage, or the fear of shortage, of tonnage availability which spurs many of the longer term forward looking developments and in this connexion one must not fail to appreciate that at this time there is a substantial over-supply of tonnage in the bulk trades of the world and that projections appear to indicate that this will continue until 1975. On the previous pattern this predicts a lean time for the shipbuilders of the world and a restriction of the funds flowing into design and development of new tonnage as shipowners struggle to preserve their cash resources and to meet their debt service. It also means, however, that shipyards become more interested in specialized designs and in new conceptions, thus creating a favourable opportunity for those with the resources and with the vision to develop new systems.

From the 8% growth rate an investment requirement for British shipping has been projected and a warning given that it should not be taken for granted that these sums will be forthcoming. However, on the assumption that they are, an attempt must be made to envisage the sort of industry they will be used to construct. It has been postulated that the major new developments will take place in the areas where a total transportation system can be developed. It is difficult indeed to judge whether these new systems will be developed on the basis of British flag tonnage. Much depends on the relative movement of international operating costs. At the moment the British shipping industry is extremely competitive and there exist the units


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with the resources and the skills necessary to develop and operate new types of vessel. Much depends upon the part played by British industry generally in developing the requirements for new total transportation systems.

But whether British flag ships are involved in the pioneering of new systems or not, there will, of course, come the stage when the new and specialized ships are built for charter by independent operators and the U.K. industry is well placed to take a large share in new developments at this stage. The time scale under consideration is not a very long one such as would see the end of world oil supplies or the working our of existing mineral deposits; and the scope for really new developments seems limited. It seems likely therefore that in the bulk trades the major investments will be made in ships of the existing very large crude carriers, ore/bulk/oil, oil/ore and bulk carrier types. In the case of the former, in view of the restrictions imposed by the depth of waters, it even seems probable that the size may not change appreciably. Conventional liners will be progressively replaced by container ships, 'roll on/roll off' vessels, tug/barge combinations and the Lash concept; and the next generation of general purpose tramps is likely to be in the 100 000 ton range. Thus the composition of the fleet will undoubtedly change – the average ship will be much larger and faster. This picture poses problems of pollution prevention and navigation and it is clear that a great part of the research effort will have to be deployed in producing systems for construction, operation and navigation which increase safety.

To summarize, by the mid-1980s there is every reason to believe that the British shipping industry will be substantially larger than it is today. Perhaps not in the number of units, but certainly in terms of cargo/distance capacity and capital employed. To achieve this, however, the problem of competitive profitability must be solved and costs in every sense must remain competitive. The foreground of the forward view of British shipping is the industry as it exists today and if this is not profitable, the middle ground and the background with all their attraction and promises will turn out to be mirages. Research effort must therefore initially be directed to the development of maintenance and management techniques which will help to control the cost of operating the existing fleet. In the newbuilding field research effort must be directed towards obtaining reliability and low maintenance costs, as well as towards the improvement of propulsive efficiency and the reduction of cargo/distance costs. Systems of navigation and traffic regulation must be developed to give as nearly as possibly guaranteed safety to the new generation of vastly expensive and, from a pollution point of view, potentially dangerous ships of the future.



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