

Maritime Policy - Charting Seas
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Abstract

Every maritime nation has an obligation to provide means to safety of life and material at sea, protect the marine environment, prevent disasters due to collision of seagoing vessels and provide support to sustainable development of nation's economy. The focus on exploitation of marine resources is drawing attention of all littoral states for improving their economy. Oceans are a large pool of resources in respect of living and nonliving. In addition the dynamic aspect of the ocean is drawing attention for harnessing non-conventional energy using Oceanic parameters such as waves, temperature, currents and winds.

In this context the role of Hydrographic departments of maritime states is significant. Brief overview of the role of Hydrographic departments and the functions carried out by these agencies in the old conventional era and the in the current technological era are discussed. Various products that are required for the maritime community for which these agencies provide support are briefly dwelt upon.

The contribution of these agencies is not visible for the investment as direct return by the sale of products generated by them. However, the services provided by these agencies significantly contribute a nation's growth indirectly and if we quantify these benefits, the investment on these agencies are very cost effective in over all investment of nation infrastructure requirements. It is highlighted that national planners must give serious thought to look in to funding these important agencies to enable them to perform their responsibilities ably and contribute to the sustainable development of nations economy.

Hydrographic departments provide the spatial database for water areas for GIS applications in the marine environment like its counterpart on land based GIS database for GIS applications.

Background:

National Hydrographic Departments of the Maritime States provide essential services within the national transport infrastructure. Hydrographic services support safe and efficient navigation helping the nation in safeguarding the life and properties at sea, facilitate the protection of marine environment and support the government in sustainable development of national maritime resources. Hydrographic departments are funded within the Government from the ministries to which these agencies are attached. Majority of these departments are attached to the Ministry of Defence of the country under Navy. Some of the nations have these departments under Ministry of Transport or Environment or Shipping and Transport. This is based on the policy of the nation or organisational structure in assigning the department.

In a significant area of the world oceans, the lack of adequate navigational charts is a real threat to safety of life at sea and marine environment. Many of the Global community either in

Administration or in Peoples are unaware of the significant contribution of Hydrographic Departments to the growth of the nations economy, which is primarily based on sea trade.

The Hydrographic Services of the developed maritime nations are the oldest institutions of Government, which were established in the last three centuries. In the 20 th Century, these agencies have contributed significantly to the expansion of world trade. Hydrographic Services have been successful in the last century in improving the safety and efficiency of the trade through sea-lanes across the continents around the world. Ironically, these services are taken for granted like other services such as water supply, power supply etc.

The technological explosion in the past few decades has changed the way of life on the planet Earth. It embraced all the activities of mankind whether it is on land, in air or in sea. The rapid growth consequent to the technological explosion embraced the scenario at sea also significantly. There is rapid growth in marine activity in the oceans around the world needing more sophisticated, accurate methods of providing information on the sea routes and associated information/data in near real time.

This evolution has placed greater responsibility on Hydrographic departments of maritime states around the world. In this present century the sustainable development of oceans is a major issue for the mankind. In the light of this major concern for the mankind on the planet earth, Hydrographic services of maritime states have to play a crucial role in the sustainable development.

Maritime states have to recognise the importance of these Hydrographic Departments role and support their activities. Most of these agencies are constrained by the lack of resources in terms of funding, infrastructure and skilled manpower to meet ever-increasing requirements of the maritime community.

Maritime Activities

There are several types of marine activities and a variety of vessels are used for these activities. In maritime activities every vessel going out at sea requires a nautical chart. The type of activity for which, vessels plying the seas, needing safe passage at sea can be categorised as follows:

- a) Commercial vessels carrying different types of cargo and of different sizes range from small vessels of 1000 tons to super tankers, container carriers of over 1million tons.
- b) Passenger vessels of varying sizes
- c) Commercial fishing vessels
- d) Naval vessels for protection of national territorial integrity in the sea and preventing encroachment by other nations for exploration and exploitation of resources in Exclusive Economic Zone (EEZ)
- e) Coastal policing agencies for protecting Exclusive Economic and Fishing Zones of national jurisdiction.
- f) Recreational sailing and fishing boats
- g) Pollution control

- h) Offshore resource exploration (Non Living)
- i) Scientific Research
- j) National maritime boundaries as per Law of The Sea Convention

Role of Hydrographic Offices

Supporting above activities of maritime nation, Hydrographic Offices contribute significantly by providing various services to the maritime community. These include:

- a) Conducting regular Hydrographic Surveys of the sea areas, Ports and Harbours using state of art technology to delineate the sea bottom configuration.
- b) Compiling accurate navigational charts of the area on different scales for use by vessels going out at sea.
- c) Updating of Charts by of issuing Notices to Mariners periodically notifying important changes in the charts for the attention of mariner.
- d) Compiling sailing directions for use of mariner.
- e) Issuing Radio Navigational Warnings (RNW) by Coastal Radio Stations for any impending activity, which may endanger safety of vessels plying in the vicinity.
- f) Compiling and Publishing of various publications such as List of Lights, List of Radio Signals, Pilots, Vessel Traffic Services etc.
- g) Providing special operational charts for the naval vessels

The traditional role of HO has now changed with the impact of technology explosion in maritime activity. The digital environment on the bridge of ship necessitated the induction of electronic charts integrated with shipboard sensors for position, direction, speed and depth, to have real time situation analysis capabilities to the navigator.

Impact of new Technology

Technological evolution in the past five decades has changed the way activities in marine environment and these are in the fields of:

- Computers
- Communications
- Digital sensors for various shipboard equipment
- Data acquisition
- Software development
- Display Techniques
- Internet Technology
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This has invariably forced the concept of traditional charting practices in vogue to change with the demanding needs of the mariner.

Surveying ships

Surveying vessels are fitted with new electronic gadgets, communication systems, Position fixing systems and other navigation equipment with digital outputs. In addition the data acquisition and logging has gone digital. This facilitates accurate and more volume of data acquisition compared to conventional manual method of hydrographic surveying.

The acquisition of hydrographic data from the survey grounds has changed radically from conventional time consuming methods to digital and automatic logging. The software packages perform all quality checks and ensure the quality of the acquired data is maintained in the final output. Raw data acquired is stored for any future processing needs for other scientific applications. This modern method results in accumulation of large volume of bathymetric data. The voluminous bathymetric data acquired from the surveys requires good processing capabilities and this process takes care of generation of Fair sheets either in digital or analog form.

Chart Production

In conventional chart production involves, a lengthy process of compiling a chart from the input of several analogue sources and bring them on to a common compilation scale, validate and generate print compatible originals. This process is time consuming and maintaining consistency and quality will be a complex task. Once a chart is compiled and this is used for preparation of fair drawing originals used for chart printing. In this part of the task, the drafting technology has changed by using computer based plotting, which provides uniform, consistent and quality product for printing. New methods evolved in printing by using digital techniques to generate color separates for printing multi colour charts/maps. All these facilitate speedy and more presentable quality output of paper charts for use by the navigator at sea. Further these digital files are easy to handle for editing and updating the information.

The use of digital techniques for chart compilation from the source data which either in digital form or in analogue format facilitates quicker and provides a quality output. The analogue format fair sheet is converted to digital format. The digital form of paper chart earlier used for accelerating the paper chart production has now taken the front seat and directly used in the ships for navigation.

Electronic Navigation Chart

However, this format of digital chart has limitations as it is generated by proprietary software format and environment. Different permutations and combinations were tried to overcome this problem for universal use by the maritime community.

In this context International Hydrographic Organisation (IHO) has developed standards for the digital data exchange and how this data is to be displayed on shipboard system. The database is called Electronic Navigation Chart (ENC) and is based on IHO S57 transfer standard. IHO S57 standard is universally accepted by all HOs and are in the process of creating datasets in this format. It is necessary to understand the concepts of S57 data model by producing agencies to

create an efficient and accurate ENC file for use by the navigator at sea. This requires good in depth knowledge of navigational chart concepts and its use by the navigator at sea for safe navigation.

ENC database created is independent of software and hardware platforms on which it was created. The very format facilitates use of the database easily once the end user creates an interface reading tool. ECDIS manufacturers are also to comply with the equipment standards defined by International Maritime Organisation (IMO) as carriage requirement on board vessels of SOLAS class for various equipments. All these regulations are meant for safety of life and material at sea.

Electronic Chart Display and Information System (ECDIS)

Shipboard display system is not a simply display of ENC but it is an integrated system combining various navigational sensors output provided with ENC in background for real time navigation. This system is called Electronic Chart Display and Information System (ECDIS). It is a tool in its entirety for real time navigation and can be considered as GIS application in marine environment. ECDIS has proved over the past few years as a potent tool for navigator for safe navigation at sea in all weather conditions and round the clock throughout the year. The main objective of the ECDIS system as mandated by IMO is for

- Safe navigation
- Prevention of collision at sea
- Protect marine environment from pollution as result of disasters at sea between vessels.

Status of HOs in new Technological Era

Most of the developed HOs are in the forefront and absorbed the new technology changes in their activities. The only lacuna is the adequate number specialists to handle the jobs resulting in the acquisition of voluminous data from survey grounds. To meet the demands of the mariner, HOs have been seeking the support of industry in various services. This may be for data acquisition or data processing or production of end user products.

HOs have addressed the need for modernisation in the following fields:

- Induction of Modern survey vessels with state of art technology for data acquisition.
- Induction of computers and software packages for processing survey data.
- Acquisition of modern cartographic systems for chart production.
- Acquisition of appropriate software for production of IHOS57 Compliant ENC datasets.
- Induction of robust QA/QC mechanism.
- Training of manpower in modern technology
- Setting up ENC Distribution System
- Issue of Notices to Mariners through Internet
- Digital products for List of Lights and other publications
- Creation of Hydrographic Source database

Maritime Policy

Designing a Pragmatic Maritime policy of coastal nation is necessary to obtain economic benefits necessary for the development of the nation. This includes some items related to environment in which the maritime activity takes place. These activities can be categorised as follows:

- a) Safe and efficient operations of maritime traffic control
- b) Coastal Zone Management
- c) Exploration and Exploitation of Marine Resources
- d) Environmental Protection
- e) Maritime Defence

To address these areas, it is necessary to have Hydrographic Service. This Hydrographic Service conducts surveys for systematic data collection on the coast and in the near by seas to produce various products for dissemination of information to support maritime community in its activities.

Many of developing nations' HOs are not able to keep pace with these changes due to resource crunch and lack of skilled manpower. Many of these HOs have limited resources and depend upon the developed HOs for support and International Aid Agencies in developing nations. Unfortunately, these developing nations have other priorities to use the external aid.

In Hydro International journal of September 2003, Commander Robert Ward, Royal Australian Navy, Head of Doctrine and Futures, Australian Hydrographic Service, in the column 'Insider's view had stated " There are 73 Member states of the IHO. I doubt if any of them really feel that the importance and value of hydrography to their national infrastructure and economies is either understood or fully acknowledged by their governments. This is then reflected in the level of both financial policy support that they receive and in turn, their ability to fulfill the objectives and the programmes of the IHO."

The above view gives a clear picture about the importance attached to the Hydrographic Services for many of the littoral states. It must be viewed as an important aspect in nation building and sustainable development of available marine resources for the nation. It is part of support service for infrastructure. Well-established infrastructure for a nation is identified as having good road network, power supply, transport facilities such as railroad network, airports, ports and harbours.

While addressing the funding of Hydrographic service by national planner, the revenue generated by these products cannot be quantified in terms of sale proceeds as the production cost of these products are prohibitive if we take in to consideration of the data acquisition, processing, printing and distribution costs.

While assessing the fund allocation to this service, it is essential to view the over all benefit to the nation in regard to the following aspects:

- a) Safety of life and material at sea
- b) Environment protection
- c) Protection of marine resources for nation development
- d) Nation's Defence and protecting territorial integrity
- e) Growth of national trade with other countries
- f) Scientific research in marine environment.

If a nation desires to meet the above needs for the development of nation, each of these aspects are investment oriented and if the planners make analysis of the investment in Hydrographic services in the over all development objectives based national planned expenditure, it will be less than 0.2 %.

If we view the above aspects in macro scale the benefits to the nation for funding Hydrographic services is far more than the investment. A method of revenue generation is to realise the investment can be carried out by levying a token surcharge on various maritime agencies using these products would definitely off set the investment and enable the service to be most effective in realising its responsibilities in nation building.

Conclusion

As indicated in previous paragraphs the role of Hydrographic Department is taken for granted all over the world. Interestingly, it can be stated that in India, its role is of silent crusader and not known to most of the people and in fact many government agencies dealing with marine activities may not be aware of it. In many countries this department is part of navy under Ministry of Defence. This inhibits prioritization in budget allocation of allotted funds to the defence preparedness of a nation and Hydrographic Departments in such cases may not have the required priority in fund allocation.

The hydrographic department in India has been in service for the past 50 years and is celebrating its golden jubilee, which incidentally coincides with 300th year of establishment of first Marine Survey of India by East India Company in 1703. It is time that we salute this silent service contributing to nations economic development.

The need is to sustain the growth of this service by providing necessary support by the government and ensure it is the leading agency in the Indian Ocean region in the coming decades. The funding of this service is to be taken as separate entity in over all national planning to make it an effective agency to discharge its responsibilities in nation's growth. The marine spatial database is necessary to be part of National Spatial Data Infrastructure.

(The above article is compiled from different published literature and the documents available in IHO site. The views expressed in the article are purely personal views of the author and do not reflect an agency to which he is connected in his profession as consultant.)