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A REVIEW PAPER ON FEASIBILITY STUDY OF DREDGING EQUIPMENT FOR RIVER RECLAMATION PROJECT

Mohd Amir Hamza* and Sarthak Singh Rajput

Department of Civil Engineering, Integral University, Lucknow, 226026, India

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ABSTRACT

This paper review and analyses issues relating to the uptake of dredging equipment in the river reclamation project. In India, there is limited utilization of dredging equipment in river reclamation which causes the delay in dredging or dredging demands is not fulfill in scheduled time. The selection of dredging equipment is the most important factor for river reclamation. It highlights the comparative analysis of cutter suction dredger's in reclamation activities. This review paper concludes comparative analysis between dredging equipment for opting best equipment in the sense of cost, time, and quality.

INTRODUCTION

India's economic growth during the last decades impress the world. In order to sustain this growth, investment in large infrastructure and development projects have been initiated and dredging is in the forefront of many of those projects.

The scope for dredging in India is potentially vast, looking at the prospects of development and maintenance of existing major ports, building new ports, offshore resources exploration, demand from navy and more interestingly the projects consider for national waterways. The capital dredging demand during 2012-2017 is about 639 million cubic meter and that of maintenance dredging during the same period is about 521 million cubic meter. This requires the employment of substantial number of dredgers of varying capacities. The minor sector dredging demand of about 100 million cubic meter, during the said period, offers additional opportunity for dredging.

The Indian dredging industry is facing extreme challenges. The speed of project allocations and implementation is very slow. India has private players in the dredging market, but many of them are not planning to get operations done in India due to the present policy and contractual issues which are yet to be fixed. The size of Indian dredging industry is estimated to be of around 20,000 Crore. The maritime agenda of India focuses on to invest around 200 billion in the dredging projects at Indian ports till the year 2020.

Literature Review

Grand River Waterway Dredging Feasibility Study (2017),In this report the dredging is calculated by The hydrographic survey and hydraulic data that were collected provided the information necessary to create a three-dimensional comparative model. Between the use of field equipment and computer software, a detailed calculation of dredge volumes for three alternative plans was accomplished. A form of hydraulic dredging is recommended to remove the accumulated riverbed material along with the supplemental use of mechanical dredging equipment to extract the submerged objects within the project limits. Hydraulic dredging is typically a faster process that allows for easier disposal over long distances but it is anticipated that submerged objects will require alternate equipment for removal. [1]

Kishore & Us (2015),As per this literature in India mainly using of cutter suction dredger and trailer suction hopper dredger respectively number of grab dredger less in India.[2] Jishnu, Jose & Satheesh (2014), As per this literature, Indian ports are under big expansion plans and the needs for dredging are everlasting. In India, the main market is for maintenance dredging as compared to capital dredging and the major player

Corresponding author:* **Mohd Amir Hamza
Department of Civil Engineering, Integral University, Lucknow, 226026, India

is the Dredging Corporation of India (DCI). Recent changes in the Dredging policies in India is paving out way for private participations. The rate of hike up in the development of ports in the recent years has made many private and public players increase their dredging capabilities than before.

- The major fleet of Dredgers in India is owned by The DCI and among the private players, Jaisu Shipping Co. Pvt. Ltd, Kandla owns the largest number of dredgers.
- At present DCI operates 12 TSHDs, 3 CSDs and 1 Backhoe Dredger in India. So, the total fleet of dredgers owned by DCI is 16. [3]

Han, Schaefer & Barry (2013),The process of reclamation includes maintaining water and air quality, minimizing flooding, erosion and damage to land properties, wildlife and aquatic habitats caused by surface mining. The final step in this process is often topsoil replacement and re-vegetation with suitable plant species.

Dredging methods are divided into two primary categories, hydraulic and mechanical, with each consisting of a variety of equipment types. The impacts will vary between the individual extraction methods, with many involving some form of disturbance or excavation of the seabed while others simply involving suction of unconsolidated material from the seabed. [4]

Brouwer, K (2010), author said what factors should be considered in selecting dredging equipment. The choice depends upon the requirements of the dredging work; environmental and site conditions; equipment availability; and soil characteristics. Many of the factors that determine the equipment selection can be analyzed after a site investigation. [5]

Mostafa (2012),The proposed site comprises a low elevation sandy beach and lagoon. One of the main aspects of this project is to study the possibility of land reclamation using fill material from offshore sources rather than onshore quarries. Another aspect is the method of lagoon drainage and its environmental impacts. This paper presents some challenges associated with the design phase of the project and presents the feasibility and preliminary environmental impact assessments of lagoon drainage, dredging and land reclamation. The study indicated that use of dredging spoils is attractive as it is cost effective, requires less time and has less overall environmental impacts. The environmental assessment methodology used in this study can be applied as a preliminary assessment of land reclamation projects at coastal areas. [6]

Palermo, Schroeder, Estes, & Francingues (2008), the dredging component must be compatible with the components subsequent to the removal operation. The treatment and disposal options under consideration, size and capacity of disposal sites, distance from dredging site to treatment or disposal sites, and constraints associated with throughout for transport, storage, rehandling, treatment, or disposal will be major factors in selecting compatible dredging equipment and approaches. In many cases, the inefficiencies experienced at environmental dredging projects result from constraints associated with components of the remedy other than the dredging itself. [7]

Corporation, MACTEC Engineering (2011),Dredging is a mature technology, used primarily for sediment mass removal. Though dredging may have little positive impact on short-term risk reduction, the removal of target sediment mass is expected to effectively reduce long-term risks. [8]

Newman & Lawton (2011), Dredge equipment size selection is significantly influenced by fill site size and dredging requirements including total dredging volume, required production rate, and site conditions. To determine the appropriate dredge size, it is assumed that the marsh restoration sites are confined by either naturally occurring features or by contractor constructed containment dikes and dewatering structures, the fill depth is 2 to 4 feet, and the excavation depth is a maximum of 25 feet. Inland marshes generally have a water depth of 3.5 feet or less, with the naturally occurring open water channels ranging in depth from 4 to 5 feet. Based on the assumptions listed above, CSDs with a maximum 20-inch dredge size are best suited for inland marsh restoration. [9] IADC / IAPH, (2010), the choice of dredger to be used on a specific project is determined on the basis of:

- Soil or rock conditions.
- Transport options.
- Dredging area configuration, including pre-dredge and post dredge water depths.
- Placement requirements. [10]

Erftemeijer & Robin Lewis (2006), Dredging is required in many ports of the world, to deepen and maintain navigation channels and harbor entrances. Elsewhere, commercial sand mining and extraction of sand and gravel from borrowing areas is meeting an ever-increasing demand for sand for construction and land reclamation. Excavation, transportation and disposal of soft-bottom material may, however, lead to various adverse impacts on the marine environment (USACE, 1983; ABP research 1999). [11]

According to Turner (1996), the production of a hydraulic dredge is only an expression for the solids transported. The production equation in its simplest form then becomes the average flow rate of slurry times the average percent solids. This production rate equation will be incorporated later as a component of the overall production cycle rate. [12]

Bay (2006), Reclamation is a way to increase our land supply. The purpose is to recover land that has lost its productivity and to make it usable again. Reclamation is also commonly used to refer to creating dry land from an area covered by water such as sea, lake and swamp (L. Hopkinson, 2003). Reclamation also means a process of creating new, dry land on the seabed (UNESCO, 2005). [13]

Levec and Skinner (2004), explained that boat speed during data collection must be considered for two reasons. First, transom-mounted transducers may cut out at faster speeds due to greater turbulence around the transducer. By reducing boat speed, loss of depth signals will be minimized. Second, the sound waves are generally pulsed at intervals of around one to two seconds which results in a time lag between pulses. [14]

Gruber (2010), An externality is a cost or benefit that is experienced by someone who is not a party to the transaction that produced it. Externalities arise whenever the actions of one party make another party worse off (negative externalities) or better off (positive externalities), yet the first party neither bears the costs nor receives the benefits of doing so. [15]

Zilberman (1999), explained that externalities are a type of market failure. When an externality exists, the prices in a market do not reflect the true marginal costs and/or marginal benefits associated with the goods and services traded in the market. [16]

Sullivan (2012), The Benefit-Cost Ratio (BCR) is the ratio of the equivalent worth of benefits to the equivalent worth of costs. It is a parameter used to determined feasibility of a project. The project is feasible when BCR > 1 (Sullivan et al, 2012). Such an indicator has been used in decision making in a variety of fields: water-supply projects, transport, land usage, health, education, research, etc. [17]

Jonkman(2004), investigated the cost-benefit analysis methods in the decision-making on flood damage mitigation. Different types of costs have to be included: costs of investment (fixed and variable) and the costs of maintenance and management. [18]

Randall (1998), lay the groundwork for cost estimating of cutter suction dredge work on the Waterway and present the use of pipeline transport fundamentals and cost engineering over long pumping distances. This work stresses the importance of an accurate production estimate when preparing a project, and identifies cost components applicable to all dredging projects. [19]

CONCLUSION

Dredging is very essential for many reasons. It is required to deepen the access channels, river reclamation, installation of offshore drilling platforms etc. Dredging, if employed in the proper way, it can remove subaqueous pollutants and improve water quality. Evolution in the field of technology of equipment is been very wide and essential. Dredging equipment is the new equipment used in place of excavator specially in rivers. The use of dredging equipment will increase the productivity, reduce the resources and the utilization of time will also be reduced as it is the advance technique which makes the work easier. The research will head with the comparative analysis of the dredging equipment.

References

1. Grand River Waterway Dredging Feasibility Study (May 3, 2017), Prepared for: State of Michigan, Department of Natural Resources Department of Technology, Management & Budget.
2. Kishore, E. A., & Us, R. (2015). The Prospects of Dredging and Indigenization of Dredger Design in India The Prospects of Dredging and Indigenization of Dredger Design, (June).
3. Jishnu, S., Jose, P. M. J., & Satheesh, B. P. K. (2014). Requirements of Volume of Dredging and Capacity Enhancement of Dredgers in India. *International Journal of Design and Manufacturing Technology*,*5*(3), 60–67.
4. Han, Q., Schaefer, W., & Barry, N. (2013). Land Reclamation Using Waste as Fill Material : A Case Study in Jakarta, *7*(6), 318–327.
5. Brouwer,k (2010), The Selection Of Dredging Equipment, Marintec Offshore China.
6. Mostafa, Y. E. S. (2012). Environmental impacts of dredging and land reclamation at Abu Qir Bay, Egypt. *Ain Shams Engineering Journal*, 3(1), 1–15.
7. Palermo, M. R., Schroeder, P. R., Estes, T. J., & Francingues, N. R. (2008). Technical Guidelines for Environmental Dredging of Contaminated Sediments, (September).
8. Corporation, E. I., MACTEC Engineering & Consulting, I., & LimnoTech. (2011). Feasibility Study for the Buffalo River, New York.
9. Newman, M., & Lawton, D. (2011). Imagine the result Feasibility Report Innovative Dredging Initiative. Engineer, (March).
10. IADC / IAPH. (2010). Dredging for Development.
11. Erftemeijer, P. L. A., & Robin Lewis, R. R. (2006). Environmental impacts of dredging on seagrasses: A review. *Marine Pollution Bulletin*, 52(12), 1553–1572.
12. Turner, T.M. (1996). "Fundamentals of Hydraulic Dredging," 2nd Edition. American Society of Civil Engineers Press.
13. Bay, C. D. (2006). Impact of coastal reclamation on environment casestudy: danga bay, johor, (April), 1–89.
14. Levec, F., & Skinner, A. (2004). Manual of Instructions Bathymetric Surveys. Canadian Ministry of Natural Resources.
15. Gruber, J. (2010). Public Finance and Public Policy (3rd Edition). Worth Publishers.
16. Zilberman, D. (1999). Externalities, Market Failure, And Government Policy: Lecture Notes. University of California at Berkeley.
17. Sullivan, W.G., Wicks, E.M., & Koelling, C.P. (2012). Engineering Economy (15th ed). Pearson Education, Inc.
18. Jonkman, S.N., Brinkhuis-Jak, M., & Kok, M. (2004). Cost Benefit Analysis and Flood Damage Mitigation in the Netherlands. HERON, Vol. 49, No. 1 (2004).
19. Randall, R. E., Edge, B. L., Basilotto, S. J. Graalum, S. J., Miertschin, M. And He, Q.(1998). "Alternative Dredging and Disposal Methods for The Texas GulfIntracoastal Waterway (GIWW)". Final Report Submitted to Texas Department Of Transportation, Austin, TX.

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