The Analysis of Approaches for the Cost Estimation and Pricing Methods for the Ocean Engineering Facilities Design Works

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ABSTRACT

Design of ocean engineering facilities (OEF) plays a major role in Russian Continental Shelf development. Development of science and technology poses increasingly difficult and intensive challenges for design engineers of these facilities, which require high level of design solutions and more efficient project management. Therefore, OEF design management issues are gaining a special urgency. One of the problems related to OEF design management in Russian Federation today is lack of cost estimation methods to implement. More commonly, a facility construction cost forms the basis for design cost estimation today. This article contains the results of analysis of current methods for evaluation and forecasting of design labour intensity, as well as methods for cost estimation of design in shipbuilding and related industries. It also includes statistic data of OEF design costs. Various approaches for cost estimation and pricing methods for design works of ocean engineering structures are presented in the article and the selection problem for the best approach to estimate the OEF design costs is considered.

KEY WORDS: Design; ocean engineering; cost estimation methods; pricing methods; forecasting.

NOMENCLATURE

HAM - hierarchy analysis method;
LNG - liquified natural gas;
OEF - ocean engineering facilities

INTRODUCTION

Currently in shipbuilding the cost of design works is determined by the following methods:
- Method for determination of design cost in percentage of object building cost (the cost of design works is estimated as the portion of design works in the total cost of the object);
- Method of target prices for design works (designing cost estimation of shipbuilding industry objects under corresponding normative documents of target prices for design works).

The publications devoted to questions of evaluating the labour input of design and engineering works in shipbuilding industry over last 10-15 years are practically absent (Matskevich V. A, Osipenko V. P, Petrov N.I., 2010).

Having considered the work fulfilled by Rhumb Shipbuilding Research Institute in 1991, «Standards for labour input and duration of civil vessels designing №299024-H-91», one can say that given standards are of interest with percentage distribution of design works labour input in phases, but usage of this distribution is possible only during vessels designing because given publication doesn’t contain any ocean engineering facilities.

Actual labour input of the engineering design development of supply vessel having been fulfilled by CDB "Baltsudoproekt", was found to be 3.6 times less than the labour input calculated according to Rhumb technique which can be explained by the reason that automated design increases the labour productivity of designers in 2.5-20 times in comparison in 1990s when these «Standards» were developed (Matskevich V. A, Lysenko V. L, Matskevich A.V., Osipenko V. P, Petrov N.I., 2011).

More commonly, a facility construction cost forms the basis for design cost estimation today. Engineering cost could be as high as 20% of the constructed cost for a small unique structure such as a floating structure supporting a wing energy plant. However, on a 500 million dollar field development it...