



INVESTMENT PREDICTABILITY OF CONVENTIONAL AND INNOVATIVE PROJECTS

Authors:				
Erik de Bree	BBKA consultancy	Terborg, NL	Consultant	bbka@upcmail.nl
Henk Akse	Traxxys	Woerden, NL	CEO / Consultant	henk.akse@traxxys.com
Geert Henk Wijnants	Stork	Utrecht, NL	Principal consultant	geerthenk.wijnants@stork.com

ABSTRACT

In the 20th century cost estimating has matured into a professional skill with ever increasing predictability of cost. Estimators use proven methods and have broad access to key figures, derived from estimates based on historic investment results and project metadata, and normalized cost information based on various comparable projects.

Nowadays estimators are increasingly faced with new challenges. Processes need to be flexible in order to adapt to rapid changing availability of energy and varying product demand. Stricter requirements with respect to emission levels drive the introduction of new technologies in otherwise 'conservative' industries. Increasingly interconnecting process feeds demand innovative solutions. Adaptation to these requirements call for iterative estimating processes. One aspect deserves explicit attention: ensuring that projects remain within time and budget. Since design changes hugely affect total cost, aspects like managing the redesign process have to be taken into account during the estimating process. These developments widen the portfolio of technologies to be considered, thus affecting the cost estimating profession.

The aim of this article is to describe the evolution of the cost estimating profession driven by these new challenges. How will the cost engineer be able to keep the predictability – and thereby the reliability – of cost estimates at a high level while giving sufficient path for innovative design options?

Our solution is firstly to focus attention on a process function level like mixing, heating, power supply, reacting, cooling, product storing, etc. On this level cost data can be made available. We re-evaluated existing project data to establish scaling relationships that can generate cost data at desired output.

Secondly, with respect to novel/innovative projects we strengthen the cooperation between cost estimators and in-house professionals like chemical/process and mechanical engineers. They specify novel process designs using proven engineering practices that yield main equipment dimensions and process functions. Cost engineers then need to reliably convert this type of output into estimates with sufficiently high accuracy.

We present two case studies to support our message. We envisage an ever accelerating application of novel technologies in a relatively 'conservative' industry. This will require additional skills from the cost engineer, as well as a closer cooperation with process engineering professionals.

The authors contributed to this paper as members of the Special Interest Group 'Cost Engineering in the Process Industry' (SIG CEPI), of DACE, NL. Please visit [Cost Engineering Process Industry - DACE](#) for more info.

TABLE OF CONTENTS

ABSTRACT.....	1
TABLE OF CONTENTS.....	2
LIST OF FIGURES.....	3
LIST OF TABLES.....	4
INTRODUCTION.....	5
The context	5
The issue	5
Consequences for the profession of Cost Engineering.....	5
AN EVOLVING WAY OF WORKING	6
The traditional way of estimating.....	7
Validation traditional way of estimating.....	9
Current way of estimating	9
Validation of the current way of estimating.....	10
Casus 1: the energy distribution sector	10
THE CHANGING PLAYING FIELD	14
What is changing ?	14
The cost engineer has to go back to the future ?	14
FUTURE WAY OF WORKING: ESTIMATING NOVEL TECHNOLOGIES	15
Context: what if we don't have the information in our database?	15
Casus 2: Estimating the unknown – a 20,000 ton/yr CO ₂ to CO plasma plant	16
CONCLUSIONS AND RECOMMENDATIONS.....	19
Conclusions	19
Recommendations	19
LIST OF REFERENCES	20

LIST OF FIGURES

- Figure 1: Simplified IDEF diagram of the parametric cost estimating process
- Figure 2: The 'traditional' cost estimating flow
- Figure 3: The 'hybrid' or 'near future' cost estimating flow
- Figure 4: Process flow chart to obtain a BOQ
- Figure 5: Estimating pyramid project information
- Figure 6: Example cost key figure capacity High Voltage substation
- Figure 7: The 'future' cost estimating flow
- Figure 8: Process block diagram
- Figure 9: Single train capacity as function of reactor pressure
- Figure 10: Maximum capacity as function of reactor diameter
- Figure 11: Process flow diagram

LIST OF TABLES

Table 1:	AACE Recommended Practice
Table 2:	Example labor norms: preparing and pouring concrete floors
Table 3:	Example BOQ input on generic estimating modules
Table 4:	Estimating generic parts with quantities