THE BUCHAREST UNIVERSITY OF ECONOMIC STUDIES

Business Administration Doctoral School

PhD-THESIS

Presented and publicly defended by the author:

RAUCH MANFRED

Title of the PhD-Thesis:

POSSIBILITIES FOR IMPROVEMENT OF BID SUCCESS RATE IN INTERNATIONAL PLANT ENGINEERING THROUGH THE APPLICATION OF PROJECT MANAGEMENT METHODS

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Bucharest, 2024

a) Content:

b) Keywords:

Project Management, Bid Management, International Plant Engineering and Construction, Project Management Methods, Bid Success Rate.

c) Summary:

International plant engineering is characterized by the uniqueness of the projects and their great complexity due to the interaction of different trades as well as the high technical and legal requirements and the multitude of project-specific risks. Studies by ETH Zurich found that around 60% of the cause of losses in order processing can be found in the offer phase.

The success of the offer preparation is therefore the basis for successful contract processing and the offer phase is therefore the central business process.

Since the 1990s, companies in this sector have increasingly used project management, as defined by various international standards such as the Project Management Institute (PMI, 2021) or the International Project Management Association (IPMA, 2021).

In the sense of recognizing patterns of problem shifting according to Senge (2017) and the functional analogy according to Karmasin & Ribig (2019), an attempt was made to apply project management, which has already been successfully established in the contract processing process, to the tender phase in an analogous manner and to determine how the application affects the success of the tender.

Research on the market and at other companies in the industry as well as in the relevant project management literature provided indications that project management methods are also used in the tender phase, but no concrete instructions for action or even a concrete prediction of profitability could be found.

To answer the question, both knowledge of the industry and the engineering/scientific boundary conditions as well as business management knowledge are necessary. The tender phase in plant engineering in general and in international plant engineering in particular is not accessible to a comparative study of a number of representative companies due to the uniqueness of the individual project tasks. For economic reasons, the companies naturally do not reveal their strengths and weaknesses in the tendering process. Furthermore, the same companies do not always apply for the same projects and only in exceptional cases do they apply for the same task a second time when a tender has to be repeated (and even then, it

cannot be assumed that the same companies will apply again). The aim was therefore to examine the effectiveness and efficiency of project management methods in the tender phase within a selected, representative company.

First, in accordance with the relevant literature, the task was narrowed down to international, construction-oriented plant engineering and to the basics of project management relevant to the study. Based on the project management standard of the IPMA and the PMI, 13 "central PM methods" (PMA, 2018) were described, which serve as a reference for the following study in the company under consideration. These are 1. Project Assignment, 2. Objects of Consideration, 3. Object Structure Plan, 4. Stakeholder Analysis, 5. Workpackage Breakdown Structure, 6. Milestone Plan, 7. Organigram, 8. Responsibility Matrix, 9. Workpackage Specifications, 10. Bar Chart, 11. Resource Plan, 12. Cost Plan and the Project Management Handbook as the 13th method.

Then, in a study, the efficient selection and prioritization of offers was analyzed and indicators (Key Performance Indices, KPIs) were determined. The key indicators are the “contribution to the corporate strategy”, the expected “margin” and the expected “order volume”.

The next focus was the analysis of the process and organizational structure in a company in international plant engineering, with the focus being on the selection and offer process. As an interim result, organizational weaknesses were identified and opportunities for improvement were developed.

In another study at a representative company, 26 exaples from a period of 12 years were systematically processed. In the first step, 385 observations were extracted from the totality of the available information (notes, lists, graphics, e-mails, minutes, internal reports and presentations, status reports, internal correspondence and service instructions). Observations that either reveal one of the 13 project management methods in the sense of the IPMA or
Contain experiences for other projects, so-called lessons learned were classified as relevant to the objective.
In the second step, the data series from the study were evaluated in quantitative terms. The number of project management methods used was compared with the project size, the use of personnel and the success of the offer. In addition, a formula was derived to estimate the costs of preparing the bid depending on the expected project volume, which can also be transferred to similar companies in the industry by adapting the average personnel costs.
The offer success rate was considered to be an important quantitative parameter. This is calculated as the quotient of the successful offers divided by the offers submitted. With regard

to the definition of "successful offers", a distinction must be made between "project management success" and "business success" because ultimately the actual award of the contract, i.e. the business success, also depends on external factors that the offer team cannot influence.

In total, 73% of the offers in the case study were successfully prepared and submitted (project management success) and 50% of all offers were then actually commissioned (business success).

The qualitative evaluation shows that the five methods 1. Project Assignment, 2. Objects of Consideration, 4. Stakeholder Analysis, 6. Milestone Plan, 7. Organigram and 10. Bar chart were successfully applied, but that there is also a need for action in terms of responsibilities, authorities and roles in the tender team, in the clarity of communication in the team and with the project partners and in the project completion after the tender has been submitted.

The quantitative evaluation of the case study shows that the actual order (business success) does not depend on the order volume. Offers for larger projects require a higher overall staff deployment, but the time required for the tender management does not depend on the order volume, but only on the number of methods successfully used.

The overlay of the qualitative and quantitative investigation shows that the PM methods 4. Stakeholder Analysis, 5. Workpackage Breakdown Structure, 6. Milestone Plan and 8. Responsibility Matrix have the greatest influence on PM success. Of these four main PM methods, the application of methods no. 4. Stakeholder Analysis and 6. Milestone Plan, as well as the time spent by the bid manager, had the greatest influence on business success.

From a quantitative perspective, for comparable companies in plant engineering, the hit rate can be expected to almost double when applying the main PM methods (from 33% to 71% in the company examined).

In the final summary of all studies, the findings were clustered with regard to the fields of action "bid management", "bid start", "teamwork and communication", "bid calculation", "bid completion" and "bid success" and formulated in the sense of a recommendation for action for use by similar companies.

d) Curriculum Vitae

PERSONAL INFORMATION

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WORK EXPERIENCE

01/02/2017– ONGOING

Technical Manager Group International

STRABAG Watertechnologies, Donau-City-Straße 9, 1220 Vienna

- Business Development (market research, acquisition, market strategy, bids);
- Team Leader (8 direct reports) and
- Branch Office Director Ghana (30 Employees);
- Project Management (Bid Management, Contract Management, Site Management)
- Coordinator of permanent office and project office
- Technical design and organisational concept;
- Project financing;
- Strategic cooperation (joint venture, subcontractor);
- Contracting, claim management;
- Procurement strategy, litigation;

01/06/2015- 30/01/2017

Project Manager, Department Manager Water

Edtmayer GmbH, Wien (Austria)

- Business Development industrial Water & Wastewater;
- Project Manager (4 - 8 project team members, divers, multilingual, 2 to 4 sites parallel);
- Coordinator of permanent residential offices in Vienna and Croatia
- Technical design and organisational concept;

01/06/2015- 30/01/2017

Project Manager, Department Manager Water

Edtmayer GmbH, Wien (Austria)

- Business Development industrial Water & Wastewater;
- Project Manager (4 - 8 project team members, divers, multilingual, 2 to 4 sites parallel);
- Coordinator of permanent residential offices in Vienna and Croatia
- Technical design and organisational concept;

01/10/2002– 30/09/2014

Project Manager – Regional Manager

WTE Wassertechnik GmbH - Branch Office AUSTRIA, Maria Enzersdorf (Austria)

- Business Development manager SEE (market research, acquisition, market strategy, bids);
- Team Leader permanent sales team (4 direct reports) and
- Project Manager (4 - 8 project team members, divers, multilingual, 2 to 4 sites parallel);
- Project Management (Conception phase, bid, design, purchase, contracting, execution, start-up);
- Coordinator of permanent residential offices in Serbia, Montenegro, Slovenia and Romania;
- Technical design and organisational concept;
- Project financing;
- Strategic cooperation (joint venture, subcontractor);
- Contracting, claim management;
- Procurement strategy, litigation;

01/11/1999– 30/09/2002

Project Manager

Lohberger & Thürriedl; Consulting Engineers, Linz - Freistadt (Austria)

Design, Procurement, Contracting, Site Supervision in :

- Drinking Water Treatment and Water Transport
- Sewerage Networks
- Waste Water Treatment
- Rain Water Treatment
- industrial Wastewater Treatment

- Constructed Landfills
- QMS: Managing the initial certification for QMS by Standard ISO 9001
- IT - Coordinator (branch Office Freistadt)

01/10/1995–31/10/1999

Freelancer (Project Team Member)

Lohberger & Thürriedl, Biogest; TB Frömmer, TB Wöss et al, (Austria)
Construction Engineer (CAD); Technical Calculations; Process Design
Geodetical Survey, Testing and Laboratory Analysis

EDUCATION AND TRAINING

01/10/2015–30/09/2024

PhD Studies

EQF level 8

Bucharest University of Economic Studies
PhD in Economics/ Business Administration I EQF level 8 I

16/09/2014–12/04/2019

Executive Management MBA

EQF level 8

Donau-Universität Krems (Austria)

Organisation, Business Law, Labour Law, Ethics in Business, Sustainable Development; Human Resources, Financing Management, Marketing Management, Business Administration; Entrepreneurship

01/09/1990–30/06/1999

Dipl.-Ing. Water Management & Environmental Engineering

EQF level 7

University of Natural Resources and Life Sciences, Vienna (Austria)

General: Hydraulics, Soil Science, Structural Design, Statistics, Planning
Occupation: Water Treatment, Waste Water Treatment, Landfill, Architectural Design

Master Thesis: "Optimization of Waste Water Treatment Plant in Dairy Industry Ried im Innkreis"

01/09/1984–30/06/1989

Matura (College Diploma)

College for Electrical Engineering, Linz (Austria)

PERSONAL SKILLS

Mother tongue(s): German

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C1	C1	C1
Spanish	B1	B1	A1	A1	A2
Romanian	A2	A2	A1	A1	A1
Serbocroatian	A2	A1	A1	A1	A1

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user
Common European Framework of Reference for Languages

Communication skills

- Presentations and Speeches; Press Releases, Public Information
- Contract negotiation (Civil works, Operation, Consortium/Joint Venture, Sub contracts, Supplier)
- Negotiation Manager in Application procedures for building Permit, Water Permit

Organisational / managerial skills

Executive Management:
- Head of Department SEE since 2005 (Responsible for HR and Budget)
- Technical Director of branch Office Austria since 3/2006.
- Sales Director SEE (4 direct reports)

Project Management:
- Role of Sponsor / Project Owner since 2006 (Team Development)
- Role of Project Manager since 1999 (Social Leadership, Motivation)

Social Competence:
- Team Leader in Project Teams (4 - 9 members plus subteams)
- Divers Team structure (Engineering, legal, finance...)
- Intercultural Leadership (Teams origin from different countries, branch Offices)
- Team Language English

Job-related skills

Project Management:
- Resource Management; Project Work Plan (Bar Chart)
- Work Breakdown Structure, Gant / Pert
- Project Cost Plan, Calculation, Controlling
- LEAN Management in Construction

Legal:
- Contracts
- Procurement Law
- Liability law, Patent Law, Environmental Law

Sales and acquisition:
- Project acquisition (AUT, CEE, SEE)
- Project financing, funding (Worldbank, IPA, EBRD, EIB,...)
- Organisational Models (PPP, BOT, dbfo, Concession, ...)
- Competitive Bidding, Calculation by national and international Standards in works and Engineering

Design & Site Supervision:
- Process Design (particularly in water and wastewater Treatment)
- Conceptual Design, Detailed Design
- Geodetical Survey, 3D - Modelling
- Hydraulical calculations,
- Site Supervision, Site measurement
- Plant Start up

Computer skills

- Very experienced in Office applications (Word, Excel, PowerPoint)
- Very experienced in MS Project
- Good experience in AutoCAD

IT - Coordinator and IT - Security Officer at WTE branch Office Austria

ADDITIONAL INFORMATION

Certificates

- zSPM, Certified Senior Project Manager (IPMA Level B)
- QME, Qualified Management Executive (EN 17.024)
- Authorization for Engineering (Consulting Engineers)
- Authorization for Management Consulting

Memberships

- PMI Project Management Institute, Chapter Austria
- PMA Projekt Management Austria
- WdF Economical Forum of Executives
- DWA German Association for Water and Watewater Deposit and Landfill.
- Alumni Boku Vienna
- ÖEAV Austrian alps community.

Honours and awards

SMBS (University of Salzburg Business School) from 2003 to 2008:
Lecturer at Seminar "Legal environment and procurement law in Project Management"

ÖWAV (Austrian Water and Waste Management Association):
Member in working comittee “Procurement Law”.

WKO (Austrian Chamber of Commerce) from 9.2009 – 6.2017
or Immigrants: Supporting academic immigrants.

Publications

03/2015: ÖWAV - Guide Book 33: Guide for Procurement Procedures in Water, Wastewater and Deposit Management, 2nd Edition;
Casati C.; Rauch M.; Götzl P.; Holoubek M.; et al

04/2007: MUT Masterplan Environmental Technology;
Ministry of Land, Water, Forestry

02/2007: Partnership instead of privatisation:
Rauch M.; Journal IWA; Water Utility Management International

10/2005: Needs to involve the private in water and wastewater?
Rauch M.; Bulletin 15th National Conference; Patronatul Serviciilor Publice Romania

10/2005: Methods for cost efficient Organisation and Procurement of WWTP
Rauch M.; Starkl M.; Wiener Mitteilungen, Book 194, Vienna

11/2021–ongoing

"Design & Build Water Treatment Plant Sekondi-Takoradi", Ghana

Client: Ghana Water Company Ltd.

Position: Project Director, Branch Office Manager

Description: Capacity 100.000m3/day; raw water intake, pre-sedimentation, flocculation, dual-media filtration, disinfection, clear water reservoir, high lift pumping station

Services provided: Detailed Engineering and Procurement of electromechanical Equipment, Pipe Laying, Civil Works & Installation, Training of local Operator, Commissioning

Financing: Commercial Loan (Export Credit Facility)

08/2020–11/2022

"Engineering, Procurement & Construction of Water Supply Tongu3", Ghana

Client: Community Water and Sanitation Agency

Position: Project Director, Branch Office Manager

Description: 174 km Water Supply Network, Pumping Station incl. Reservoir, 4 Water Towers, for 11.5 mio EUR

Services provided: Detailed Engineering and Procurement of electromechanical Equipment, Pipe Laying, Civil Works & Installation, Training of local Operator, Commissioning

Financing: OeKB (concessional Loan)

11/2011-12/2013

"Design & Build WWTP & SIP Podgorica", Montenegro

Client: ViK Podgorica, Montenegro

Position: Bid Manager
Description: Public Procurement Process WWTP 275,000 P.E. incl. Sludge Incineration Plant and Main collector.
Services provided: Conceptional Design, incl. Process Design Operation Cost and Guarantees, Organisational Design
Tasks assigned to Expert: Plant layout, Technical and economical feasibility, Process Design Wastewater and Sludge incineration, Calculation, Contract management
Financing: City of Podgorica

01/2010-02/2014

"Design & Build WWTP Tivat - Kotor", MNE

Client: Vodacom

Position: Bid manager
Description: Public Procurement of Design & Build of WWTP 72.500 P.E., O&M for 3 years (yFidic)
Services provided: Conceptional Design, Calculation, Process Design
Tasks assigned to Expert: Process Design SBR, Calculation, Contract management, Risk Management, Court trial, legal issues, Feasibility
Financing: KfW

01/2010-02/2014

"Design & Build WWTP Bar", MNE

Client: Vodacom

Position: Bid manager
Description: Public Procurement of Design & Build of WWTP 90.000 P.E., O&M for 3 years (yFidic)
Services provided: Conceptional Design, Calculation, Process Design
Tasks assigned to Expert: Process Design SBR, Calculation, Contract management, Risk Management, Court trial, legal issues, Feasibility
Financing: KfW

01/2013-07/2013 **"Design & Build WWTP Butila – Sarajevo", BiH**

Client: ViK Sarajevo

Position: Bid manager
Description: Public Procurement of Design & Build of WWTP extension to 600.000 P.E., rehabilitation and O&M for 5 years (yFidic)
Services provided: Conceptional Design, Calculation, Process Design
Tasks assigned to Expert: Process Design, Calculation, Contract management, Risk Management, Court trial, legal issues, Feasibility, Project Financing, Concrete rehabilitation,
Financing: Worldbank

07/2010-09/2014 **"Design, Build, Finance and Operate of WWT Budva", MNE**

Client: Municipality Budva, MNE

Position: Project Manager
Description: WWTP Becici (100.000 P.E.), Rezevici (3.400 P.E.), Buljarica (27.500 P.E.), Collector, Pumping Stations, Network extension and rehabilitation
Services provided: Civil Works and Installation, Site supervision
Tasks assigned to Expert: Contract Management, Process Design, Legal issues, Claim Management, Project financing,
Financing: City of Budva, State of Montenegro, EVN, KfW-Ipex

10/2011-06/2011 **"Design, Build, Operation and Finance of DWTP Zrenjanin", SRB**

Client: Vodovod Zrenjanin, Srbija

Position: Project Manager
Description: Drinking Water Treatment Plant for 300 Liter/s or 17.800 m³/d
Services provided: Conceptional Design, Pilot Plant Testing (3 Litre/s), Detailed chemical and physical analysis, Process Design Specification, Detailed Design, application for building permit
Tasks assigned to Expert: Purchase, Contract Management, Claim Management, legal issues, Feasibility of Process, Risk Management
Financing: Vodovod, Autonomous province of Vojvodina, EVN

05/2010-12/2010 **"Concession WWT Sentjernej", Slovenia**

Client: Municipality Sentjernej, Slovenia

Position: Project Manager
Description: Public Procurment Process for Concession (Design, Build, Finance, Operate) of WWTP 3,500 P.E. and sewerage network.
Services provided: Conceptional Design, incl. Process Design Operation Cost and Guarantees, Organisational Design & Project Financing
Tasks assigned to Expert: Calculation, Organisational Concept, contract management, project financing, Quality management
Financing: EVN & Volksbank Ljubljana

01/2000-12/2001 **"Pressure Pipe from Ebensee to Bad Ischl, AUT"**

Client: Saline Austria AG, AUT

Position: Project Manager
Description: Pressure Pipes (4 parallel) DN 200 for Saline Water from Wells to Saline Industry
Services provided: Geodetical Survey, Design of Operation shafts, hydraulic calculation, pipes and pump dimension, plan of pipe laying, procurement, site supervision, start up
Tasks assigned to Expert: Geodetical survey, Hydraulic Design, Layout and Crosssections, Losses and Operation demands, selection of pumps and material,

O&M Plan, Safety Applications
Financing: Saline Austria AG

10/1999-11/2001 **“Drinking Water Plan Schenkenfelden, AUT”**

Client: Municipality of Schenkenfelden

Position: Project Manager
Description: Storage Tank 4.000 m³, Pressure Pipes, Sand Filter, Chloride Dosing Station
Services provided: Geodetical Survey, Conceptional Design, Detailed Design, Procurement, Site Supervision, Claim Management, Quality management, Start up,
Tasks assigned to Expert: Hydraulic Design, Layout and Cross sections, selection of pumps and material, O&M Plan, Safety Applications, Remote Control, SCADA, Procurement, Site Supervision, Quantity Survey,
Financing: Municipality of Schenkenfelden, Kommunalkredit

Date: 15.07.2024 Signature : .....