



***ESTABLISHING CORE COMPETENCIES FOR IMPLEMENTING SUCCESSFUL
CONSTRUCTION PROJECTS IN TRADING COMPANIES***

By

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- ❖ To my thesis advisor, Dr Kostas Kontesis, for his great contribution to the completion of this thesis. I will always remember his guidance and support.
- ❖ To my family for their encouragement to the completion of this thesis.

VITAE

Anna Chronaki

Anna Chronaki works as a sales and projects engineer in Carrier Hellas Air-conditioning SA. Her responsibilities include providing varied levels of engineering, designing and executing small or large air-conditioning installations. This includes designing any kind of air-conditioning system which is followed by the planning, controlling and implementing of all the processes related to the selling and installation of the machinery.

Carrier Hellas is a trading company but undertakes construction projects as well in order to increase its sales and thus its profits. The author is responsible for the implementation of the final air-conditioning study and the final offer to the customer, as well as the planning, controlling, executing and closing of the project. She executes the financial control of the project and gives technical directions to the subcontractors of the project. Her decisions are very crucial to the success of the project and her responsibilities are correspondingly high.

She has a broad range of technical skills in air-conditioning machinery and considerable experience in managing construction projects. The last two years, she is involved with a great number of large installations of air-conditioning machinery in chain toy stores all over Greece and Balkans. Conclusively, the author's position includes numerous leadership and project management opportunities and challenges.

ABSTRACT

This thesis is dedicated to the problems occurring when trading companies are "forced" to act as constructors of their products in order to maintain or increase their sales. In this case, establishing a clear procedure of implementing successful construction projects in trading companies is very important.

Understanding the major problems of the existing condition in implementing projects is one of the most important steps of this study. Ways to deal with the problems will be defined with the aim to create an effective procedure of implementing construction projects successfully. Solutions to this problem clearly set expectations as to the number and extent of construction projects that can be undertaken by the company, as well as the best tools and techniques used for their implementation.

Business process re-engineering is being applied to the existing procedures of trading companies and recommendations for further development in this area are mentioned. The goal of this study is to determine ways for trading companies to gain customer satisfaction through a complete series of services.

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1.0 INTRODUCTION

1.1 Nature of Study

Currently, there are numerous sales of machinery or other products that are being lost because customers expect the trading company to undertake the installation of the equipment that they sell. In this case, one of the most common problems is the lack of available qualified staff to implement this kind of construction projects. Communicating to the customer that the company is capable of undertaking the entire installation of the selling products, and developing strategies for implementing projects successfully has direct impact on the company's profits and reputation.

1.2 Needs Assessment

Stakeholders for this thesis include the Sales department and Service department of Carrier Hellas Air-conditioning SA, other departments within the corporation, as well as the subcontractors involved in the project. This thesis will provide stakeholders with a view of:

- The roles and responsibilities of each team member of the construction projects.
- The proper tools that the Service department needs in order to manage construction projects.
- A clear procedure for implementing construction projects.
- Other success or failure contributors that may be identified in the course of research.

1.3 Purpose of the Study

The author expects that research and interviews conducted for this thesis will revise current procedures and policies as far as the implementation of projects is concerned. All the necessary changes and additions will be made to the existing procedure in order to improve conditions at the workplace and successfully complete every project.

1.4 Significance to Your Workplace

Carrier Hellas Air-conditioning SA is a multinational trading company of all kinds of air-conditioning systems. Its main business is to sell air-conditioning and refrigerant equipment as well as spare parts related to any of the sold machinery. Furthermore, it undertakes many installations of the machinery sold by the sales department in order to increase its sales and thus its profits.

This research will help the author understand the problems of the existing procedure for implementing projects. It will provide an understanding of the existing procedure and ways to improve this procedure with an aim to complete projects more easily and more quickly. Solutions to this problem clearly set expectations as to the number and extent of construction projects that can be undertaken by the company, as well as the best tools and techniques used for their implementation.

1.5 Relation to the Program of Study

During PM501 (Introduction to Project Management), instructor Gary Hills taught us specific concepts and techniques useful in project management. We examined various organizational structures as well as ways to plan, begin, carry out, control and close project processes. Moreover, we were taught about the importance of selecting projects that serve the organization's mission, objectives and goals. This course highlighted the need for a clear and tangible understanding of the vision.

During PM504 (Project Planning and Control), instructor Kostas Kontesis taught us that planning is central to project management. Through this course, we examined project and scope definition, how to conduct feasibility studies, how to define and sequence activities, how to create plans, and how to use planning tools effectively. We were also taught about ways to establish and analyse measures to determine the success of a project. This course

highlighted the need for a complete and thorough procedure for controlling projects using many tools and techniques of project management.

During PM512 (The Customer in the Project Process), instructor Jan Hilbi taught us that client, customer, and stakeholder satisfaction are keys to a successful project. Through this course, we were taught about the importance of creating and sustaining a client focus, client and prospective client relations, training and client presentation and selling skills. This course highlighted the importance of identifying the real clients, customers and stakeholders and identifying their actual needs and wants. Having a satisfied customer means increasing the company's profits. In this research, the need of implementing a successful installation of the selling machinery means increasing your sales and number of customers.

1.6 Definition of Terms

Opportunism - Getting a new government or over seas contract, expanding an already profitable area of their business.

Dealer – A firm engaged in trading

2.0 PROBLEM STATEMENT

2.1 Problem

Multinational trading companies which sell machinery or other products sometimes undertake big construction projects with a view to sell a large amount of equipment to big customers called “key accounts”. A trading company’s main business is to sell its products. Sometimes, the market conditions in construction industry “forces” these companies not only to sell its products but to offer the necessary services in order to install it too. These big trading companies sometimes don’t have the appropriate background in managing such construction projects. These kinds of projects must be completed on time, on schedule and within scope like all projects. Requiring staff, who lack the skills or time, to manage post-sales installations results in lost sales and decreased profitability.

2.2 Rationale

The main duty of a sales department within a trading company is to sell its products. The sales staff must increase their sales from year to year, always based on the sales market.

One of the main causes of lost sales and decreased profitability in a trading company is the involvement of the sales staff in other business duties rather than sales. Managing construction projects of every magnitude, big or small, requires significant time and special skills. Selling machinery is a completely different task from installing machinery.

The installation of selling products can be a one-day project to one-year project depending on the amount of the products being installed and other difficulties of the project (e.g., technical difficulties, project location). Some construction projects last many years, too. The good management of these projects must be done by qualified staff and other project team members. Establishing a clear and effective procedure in order to control these kinds of projects is the best way to have the desirable results. Moreover, selecting the qualified staff

for executing and controlling construction projects in a trading company is a very important task.

The author's personal experience has shown that working as a sales engineer in a multinational trading company, as well as executing and controlling construction projects simultaneously, are two very difficult tasks that have to be implemented by different staff. Disengaging the sales persons from their involvement in the execution and control of the installation of the machinery they are selling will provide them additional working hours to increase their sales, and thus the company's profits.

2.3 Hypothesis

This study expects to show that in order to successfully manage construction projects in big trading companies as well as increase sales and the company's profits, a complete team of qualified members and a clear process that defines roles and responsibilities and the ways of executing, controlling and closing these projects must be developed. In that way, the sales department will only deal with the procedure of selling the equipment and all the installations will be implemented by the projects department.

3.0 REVIEW OF LITERATURE

The research conducted for this study consisted of reading a variety of books and articles related to construction industry and effective procedures for implementing construction projects. Extensive research through the Internet and personal interviews with organizational development experts and project managers of several companies concluded in effective results for this study which are presented in this chapter. The literature used for this thesis is old due to the fact that the transition trend of trading companies to contractors is recent. This trend is caused by the continuously increasing competition in the field of the globalized economic sector.

According to Knoepfel (1992), construction is a key sector of every society, economy and culture. Most of the management, design, construction and maintenance activities are carried out by small and medium-size private companies. Large construction companies are undertaking a considerable share of the market in construction projects.

The management of construction projects can be very complex sometimes. It requires knowledge of modern management as well as an understanding of the design and construction process. Construction projects have a specific set of objectives and constraints such as a required time frame for completion. While the relevant technology, institutional arrangements or processes will differ, the management of such projects has much in common with the management of similar types of projects in other specialty or technology domains such as aerospace, pharmaceutical and energy developments.

3.1 Introduction

Project management has been applied in construction more than in any other industry. The Project Management Institute (PMI, 2004, P. 8) defines project management (PM) as “the application of knowledge, skills, tools and techniques to project activities to meet project requirements.” The preparation, design, construction and start of operation of a modern small

or large construction facility is a complex project. Constructed facilities are large objects and they may have a relatively long life. They are interrelated to their specific local environment which means that each has its own particularities and it needs capable management and engineering.

3.2 Construction contractors

Companies that undertake the supervision of building constructions are usually referred to as constructors. According to Barrie (1981), the general contractor coordinates various tasks for a project while the specialty contractors such as mechanical or electrical contractors perform the work in their specialties. There are installation contractors too that act as material and equipment suppliers. Their role is very important in the project since the conditions of delivery of materials and equipment affect the quality, cost, and timely completion of the project.

The role of a general contractor is to coordinate all tasks in a construction project. Unless the owner performs this role or engages a professional construction manager to do so, a good general contractor who has worked with a team of superintendents, specialty contractors or subcontractors together for a number of projects in the past can be most effective in inspiring loyalty and cooperation. The general contractor is also knowledgeable about the labor force employed in construction.

Specialty contractors include mechanical, electrical, foundation, excavation, and demolition contractors among others. They usually serve as subcontractors to the general contractor of a project. In some cases, legal statutes may require an owner to deal with various specialty contractors directly. In the State of New York, for example, specialty contractors, such as mechanical and electrical contractors, are not subjected to the supervision of the general contractor of a construction project and must be given separate prime contracts on public works. With the exception of such special cases, an owner will hold the general

contractor responsible for negotiating and fulfilling the contractual agreements with the subcontractors.

3.3 Trading companies as constructors

There are many trading companies that provide turn-key projects to their customers meaning that they install the parts that they are selling. According to Bonny and Frein (1980), the production work performed by establishments in this subsector is usually subcontracted from establishments of the general contractor type or operative builders but, especially in remodeling and repair construction, work also may be done directly for the owner of the property. Specialty trade contractors usually perform most of their work at the construction site, although they may have shops where they perform prefabrication and other work.

There are substantial differences in types of equipment, work force skills, and other inputs required by specialty trade contractors. Establishments in this subsector are classified based on the underlying production function for the specialty trade in which they specialize. Specialty Trade Contractors usually provide both the parts and labor required to complete work. For example, electrical contractors supply the current-carrying and noncurrent-carrying wiring devices that are required to install a circuit. Plumbing, Heating and Air-Conditioning contractors also supply the parts required to complete a contract.

3.4 The changing environment of the Construction Industry

Lang and Mills (1979) point out that “the construction industry is a conglomeration of diverse fields and participants that have formed a team as a sector of the economy”. The construction industry plays a central role in national welfare, including the development of residential housing, office buildings and industrial plants, and the restoration of the nation's infrastructure and other public facilities. Construction refers to all types of activities usually associated with the erection and repair of immobile facilities. Contract construction consists of a large number of firms that perform construction work for others, and is estimated to be

approximately 85% of all construction activities. The remaining 15% of construction is performed by owners of the facilities, and is referred to as force-account construction.

Furthermore, Lang and Mills (1979) mention that ‘‘a new market trend in construction industry is that of some owners looking to contractors or joint ventures as a resource to design, to build and to finance a constructed facility’’. For example, a utility company may seek a consortium consisting of a design/construct firm and a financial investment firm in order to have total liability during construction and eliminate the risks of cost escalation to ratepayers, stockholders and the management. This new market trend of joint ventures has become more important in the international construction market where contractors often win contracts by offering a more attractive financing package rather than superior technology and good quality.

A final trend which deserves note is the increasing level of trading companies executing construction projects. In the modern competitive business world, the choices a company makes when it accepts and adopts new market trends, in order to meet its customers’ expectations and develop competitive strategies, determines its future success. For that reason, many trading companies act as constructors and must have the appropriate staff and organizational structure in order to undertake projects that involve the installation of the parts that they are selling. In that way, these companies may be forced into very risky positions if they intend to stay in the competition.

3.5 Process re-engineering for effective implementation of construction projects

The success parameters for every project are in time completion, within budget and with requisite performance. Trading companies that undertake construction projects must establish effective procedures and formulate teams to execute this kind of projects. The major maladies with project planning and implementation have been cost and time overrun and quality non-

achievement. An overall organizational approach with an appropriate integration of available techniques can result in avoiding those maladies.

Today's challenging business environment "forces" organisations to be more competitive. A constant challenge for them is change which represents growth, opportunity and development but threat, disorientation and upheaval as well. In this case, restructuring alone is insufficient in achieving and sustaining the improvements needed to remain competitive. Sustaining growth and remaining competitive are two great challenges to the management. In today's business environment, the customer needs to evolve extremely quickly due to increased mobility of the resources and development of media and technology.

A management approach that is used in many organisations which seek for success is Business Process Re-engineering (BPR). This approach is aiming at improvements by means of elevating efficiency and effectiveness of the processes that exist within and across organizations. According to Hammer and Champy (1993), BPR is "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed." Davenport (1990) has defined the BPR as "the analysis and design of work flows and process within the organizations". Talwar (1993) points out that the business structures, processes, methods of working, management systems and external relationships through which we create and deliver value must be rethought, restructured and streamlined.

BPR represents a range of activities concerned with the improvement of processes. It must be strategically driven and supported by the senior management of the organisation in order to be successful. In construction, successful re-engineering of projects requires the perfect marriage of technical and human elements. Existing activities that are implemented by different departments are integrated into a single complete process designed to fulfill a specific business goal. However, problems arise in function-based organisation structures

when business functions are integrated because new processes with multiple functions are easily impeded by departmental barriers. In a team-based organisation, the process execution is easier because work teams consist of workers from relevant departments so department barriers don't exist and business resources can collaborate effectively to achieve the process targets. Conclusively, there are basic differences between team-based and function based organisation structures so the organisation and the human resource need to be reorganised to match the redesigned processes.

3.5.1 Human resource planning in business process reengineering

Human resource planning for future project loading is equally essential for trading companies which implement construction projects. Decenzo (2005) points out that "human resource planning is a process by which an organization ensures that it has the right number and kinds of people, at the right place, at the right time, capable of effectively and efficiently completing those tasks that will help the organization achieve its overall strategic objectives." Employment planning is the next step in which the number and types of workers needed for the organization to meet its overall goals are defined.

Effective human resource planning directly influences the success of the BPR. In most approaches of human resource planning, the laborpower needed for construction projects is defined based on the assumption of a steady organization structure for executing processes or some forecast human resource requirement depending on mass sampling survey with statistical analysis.

Cheng, Tsai and Xiao (2005) have created a team-based human resource planning (THRP) model which combines the BPR philosophy, team approach and simulation method. This model is useful in determining the corresponding maximal project loading of laborpower and vice versa, the laborpower required for expected project loadings. Figure 1 depicts the four phases of the THRP model.

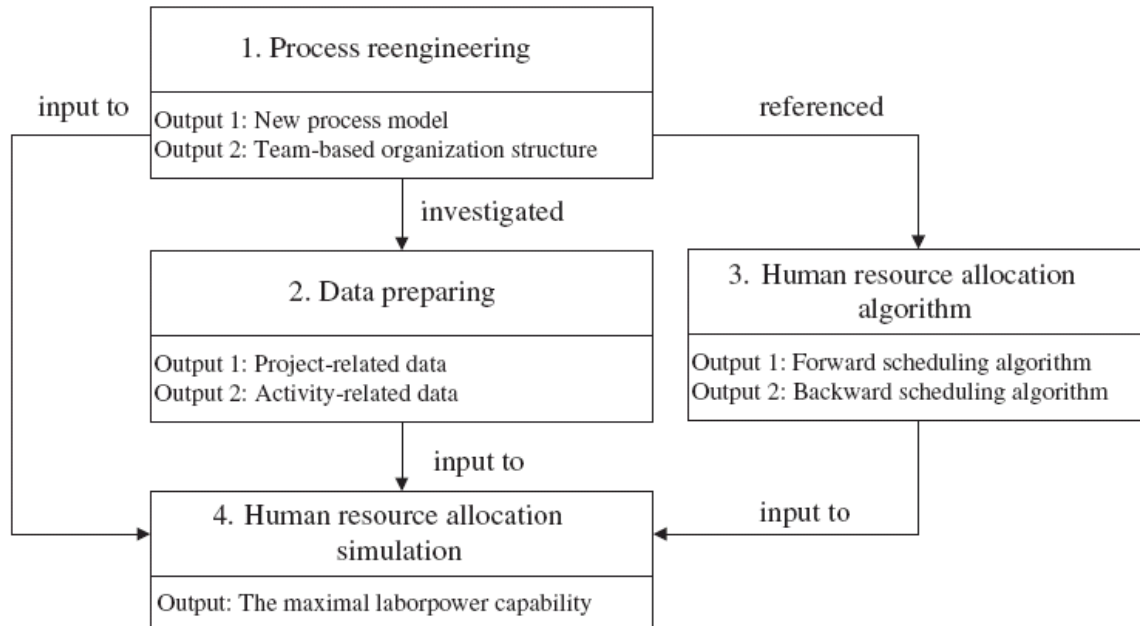


Figure 1

The first phase is the process reengineering phase, in which a new processes model and a team-based organization structure are designed. At the end of this phase, all organizational functions that are split in different departments are integrated into new independent and complete processes which will be followed by new allocated teams. Furthermore, any existing problems can be identified and analysed, concluding in effective solutions for the construction projects. The following three phases serve the allocation and simulation of the laborpower needed for the companies which have reengineered their processes for implementing construction projects.

3.5.2 Methodologies in business process reengineering

Some supporters of business process re-engineering mention that doing business through functional teams, vertical hierarchies and clearly defined tasks isn't so successful anymore. Better quality and service, more variety as well as prompt delivery are the main customers' wants. Companies focus on processes that interact on a horizontal base through which information moves at speed and not on processes that interact on a vertical base because there

are many barriers between departments that can bring about major difficulties and delays. Re-engineering involves reviewing and redesigning existing structures and methods and substituting them with new systems based on an analysis of work processes. The use of information technology (IT) is conceived as a major contributing factor for reaping the achievable benefits fully. IT has been used for supporting the existing business functions, that is it was used for increasing organizational efficiency, it now plays a role as enabler of new organizational forms, and patterns of collaboration within and between organizations.

3.5.2.1 The Hammer and Champy methodology

According to Hammer and Champy (1993) there are six main steps in Business Process reengineering which are analyzed below.

1. Introduction into Business Reengineering

Before initiating the process of reengineering the CEO describes briefly the current business situation in order to start actions. Moreover, the CEO introduces the vision to the employees of the company and the need for reengineering.

2. Identification of Business Processes

In this step, all processes in the organization are identified and the ways they interact within the company and in relation to external factors such as customer requirements.

One deliverable is a graphical display of all processes or tables which depict the list of processes.

3. Selection of Business Processes

The third step serves to select critical processes which have the greatest effect to customers. The reengineering of these processes will lead to high value for the company's customers. Another criterion for process selection is the ease of reengineering it.

4. Understanding the Selected Business Processes

This step involves comparing the current state of the selected processes to the required state. It concentrates on the performance of the current processes as opposed to what is expected from them in the future. Great emphasis is laid on understanding the process as a whole rather than its functionalities.

5. Redesign of the Selected Business Processes

This step is characterized by Hammer and Champy (1993) as the most creative of all. It involves redesigning the process both technically as well socially (the work environment). Development plans can be a deliverable of this step.

6. Implementation of Redesigned Business Processes

The last step involves the implementation phase of the Business Reengineering project. According to Hammer and Champy (1993) the success of the implementation is met, once the five preliminary steps have been properly performed.

The Hammer and Champy methodology provides useful guidelines in order to reorganize business activities and processes. On the other hand, it has some limitations as mentioned below:

1. There is no learning process prior to vision creation. The customer needs, partners' needs, as well as competitor and non-competitor capabilities must be defined and well-known in order to create a vision, values and goals for the organization
2. The roles of key people aren't defined which is very important in the success of the vision so the Hammer and Champy methodology lacks in this part.
3. There is no given to involvement of the workforce into the process. The human and organizational issues that may arise in BPR should be incorporated in the methodology as they play a significant role in the final result.
4. There is no performance measurement step. The redesigned business process should be evaluated in order to measure its positive or negative results.

3.5.2.2 The Manganelli and Klein methodology

According to Manganelli and Klein (1994) concentrate on those Business Processes, that directly support the strategic goals of the company and customer requirements. They prefer Product development (a knowledge process) as a Business Process. They believe that organizational impact, time, risk, and cost are obstacles to success. Their methodology breaks into five steps:

1. Preparation

The first step includes questions made to all directly involved persons to define goals and to prepare for the Business Reengineering project.

2. Identification

This step defines a customer oriented process model of the organisation, as well as selects key business processes for redesign.

3. Vision

The third step serves to define at which performance level the processes currently deliver, and which higher level is required for the future.

4. Redesign (Technical and Social Design)

This step breaks into two parallel sub-steps: Technical Design and Social Design. The Technical Design deals with Information Technology Design to support the new processes. The Social Design step serves to design new work environments for the people, including organizational and personnel development plans.

5. Transformation

The fifth step is meant to implement the redesigned processes and work environments within the organization.

Manganelli and Klein (1994) claim that BPR is more successful than incremental change initiatives, which tend to fail more often. They believe that BPR is an on-going process

critical to an organization's success in a competitive market place. They disagree with the opinion of most executives in corporations that BPR represents a series of incremental advances in information technology (a new network, a new software package) and market opportunism. Finally, Manganelli and Klein (1994) address the people side of Business Reengineering, but only as far as implementation issues are concerned. Taking the conclusion further, and applying it to the sources of existing methodologies, they appear to see Business Reengineering as yet another systematic and marketable approach for fast and cost-efficient implementation of planned change.

3.6 Project management in construction projects for trading companies

Trading companies that implement construction projects must focus on the basic guidelines of project management. The Project Management Institute (PMI, 2004) focuses on nine distinct areas requiring project manager knowledge and attention:

1. Project integration management to ensure that the various project elements are effectively coordinated.
2. Project scope management to ensure that all the work required (and only the required work) is included.
3. Project time management to provide an effective project schedule.
4. Project cost management to identify needed resources and maintain budget control.
5. Project quality management to ensure functional requirements are met.
6. Project human resource management to development and effectively employ project personnel.
7. Project communications management to ensure effective internal and external communications.
8. Project risk management to analyze and mitigate potential risks.
9. Project procurement management to obtain necessary resources from external sources.

These nine areas form the basis of the Project Management Institute's certification program for project management. In construction projects, these nine areas must also be taken into great consideration in order to have effective results. In this study, a procedure for implementing successful construction projects in trading companies will be formulated taking into account the above nine areas of project management and control.

3.7 Design and Construction process

In the planning of every construction project, it is important to recognize the close relationship between design and construction. These processes can best be viewed as an integrated system. Design is a process of creating the description of a new facility, installation or other kind of construction usually represented by detailed plans and specifications. Construction planning is a process of identifying activities and resources required to make the design a physical reality. Hence, construction is the implementation of a design envisioned by architects, civil engineers and specialty engineers. In both design and construction, numerous operational tasks must be performed with a variety of precedence and other relationships among the different tasks. Later in the design process, constructability reviews must be performed by the design team.

Good project management in construction process must pursue the efficient utilization of labor, material and equipment. Improvement of labor productivity should be a major and continual concern of those who are responsible for cost control of constructed facilities. Material handling, which includes procurement and inventory, requires special attention for cost reduction.

Goodpasture (2002) mentions that "projects are often chartered to design and deliver improved processes and organizational functionality. A value-adding process begins with materials or information in a form not useful to users, applies a process to them, and produces a product or service that is useful."

All the above processes of a construction project must be efficiently handled through project management. Harold Kerzner (2003) mentions that, various organizations used to see project management as something in the way, that only large companies needed project management, that project management means employing more people incurring to more costs and therefore decreasing profitability, that project management is really an-eyewash, create more problems either in terms of power or quality etc. In fact, all these arguments were delaying organizations to take a more proactive role in the contribution of project management as a science and as the ground for all projects.

3.8 Material Procurement and Delivery

Kerzner (2003) refers to contracts and procurement in his book "A systems approach to planning, scheduling, and controlling". He states

Procurement can be defined as the acquisition of goods or services. Procurement (and contracting) is a process that involves two parties with different objectives who interact in a given market segment. Good procurement practices can increase corporate profitability by taking advantage of quantity discounts, minimizing cash flow problems, and seeking out quality suppliers. Kerzner (2003, p 812)

The main sources of information for feedback and control of material procurement are requisitions, bids and quotations, purchase orders and subcontracts, shipping and receiving documents, and invoices. According to Tersine (1982), the material procurement must be well organized in order to avoid shortages and delays. In most construction projects, the constructor will handle the procurement of the materials with the best price and performance characteristics specified by the designer. Sometimes, overlapping and rehandling in the procurement process is unavoidable, but it should be minimized to insure timely delivery of the materials in good condition.

Having a clear and effective procurement process means having a list of certified and checked suppliers. The suppliers play a very important role in construction projects and in the long-term viability of a company. With the increasing significance of the purchasing

function, purchasing decisions become critical in the profitability of a company. Materials represent a major expense in construction, so minimizing procurement costs presents important opportunities for reducing costs. According to Stukhart and Bell (1987), materials management is not just a concern during the monitoring stage in which construction is taking place. Decisions about material procurement may also be required during the initial planning and scheduling stages.

So, an effective procedure of implementing successful construction projects in trading companies must be joined with an effective procedure of procurement materials and supplier selection. These two procedures can be very helpful in avoiding cost overruns and schedule slippages in the project. Moreover, a company should have a list of specific suppliers who must be certified and checked for their reliable services and good quality of their products. Having certified suppliers means adding good value to the project and completing the project in good performance.

4.0 METHODOLOGIES AND PROCEDURES USED IN THE STUDY

In this study, effective project management is proposed in a BPR framework in order to create a clear procedure of implementing construction projects in trading companies. The following four steps were followed:

1. Study business environment of the organisations
2. Record the actual status of a trading company for implementing construction projects
3. Identify areas of concern.
4. Apply process re-engineering.

4.1 Study of business environment

Research from journal articles, books and internet resources resulted in the determination of several factors that pertain to trading companies and affect its business environment. Those environmental factors are economic, social, organizational relationships and technological problems and can have direct or indirect effect to the implementation of construction projects.

4.2 Record the actual status of a trading company for implementing construction projects and identifying areas of concern

Another key source of data is the results of interviews conducted with key persons inside the author's company. The roles and responsibilities of the sales persons were defined and the major problems occurring when a construction project was undertaken were identified.

4.3 Apply process re-engineering

Process re-engineering was carried out in order to solve the problems occurring when undertaking a construction project. The following steps were carried out:

- Identification of existing process
- Determination of the areas of improvement
- Deriving the re-engineered process

In the end of the above three steps, a complete procedure of implementing construction projects in any trading company will be made.

5.0 RESULTS

Results of this study are outlined in the following three sections. Taking into account the results of the two first sections, the final procedure of implementing construction projects is formed.

5.1 Business environmental factors' great effects to construction projects

Any trading company aspiring to globalization is required to carry out up-to-date detail study in the following:

1. Economic environmental factors such as economic instability, economic control and regulations, economic trends and structure, economic problems and prospects.
2. Political environmental factors such as regulation and control criteria of the Government, party system, political stability and party's ideology, policies and agenda.
3. Social environmental like education, culture, environmental protection and public safety
4. Organizational relationships
5. Technological problems

All the above factors must be studied from every trading company as they can have great risks to the construction project. Regulation which concerns the environmental protection movement has contributed to the uncertainty for construction because of the inability to know what will be required and how long it will take to obtain approval from the regulatory agencies. The requirements of continued re-evaluation of problems and the lack of definitive criteria which are practical have also resulted in added costs. Public safety regulations have similar effects. The situation has created constantly shifting guidelines for engineers, constructors and owners as projects move through the stages of planning to construction. These moving targets result in great uncertainty which can make it virtually impossible to schedule and complete work at budgeted cost. Economic conditions of the past decade have further reinforced the climate of uncertainty with high inflation and interest rates.

Regulatory agencies, environmental issues and financial aspects of construction can also result in great uncertainty for projects and they should be at least mitigated or ideally eliminated. Owners are greatly interested in achieving a breakthrough that will lower the costs of projects and mitigate or eliminate lengthy delays.

During periods of economic expansion, industries make major capital expenditures and therefore bid up the cost of construction. Consequently, some owners make fixed price contracts in order to control costs, so that the risks of unforeseen contingencies related to an overheated economy are passed on to contractors or to trading companies which act as constructors. However, contractors or trading companies will raise their prices to compensate for the additional risks.

The risks related to organizational relationships may be unnecessary but are quite real. Strained relationships may develop between various organizations involved in the design/construct process. When problems occur, discussions often center on responsibilities and not on solving the problems. Cooperation and communication between the parties are discouraged for fear of the effects of impending litigation. This barrier to communication results from the ill-conceived notion that uncertainties resulting from technological problems can be eliminated by appropriate contract terms. The net result has been an increase in the costs of constructed facilities.

The risks related to technological problems are familiar to the design/construct professions which have some degree of control over this category. However, rapid technology advancement presents new problems to designers and constructors so technological risk has become greater in many instances. Some design assumptions which have served the professions well in the past may become obsolete in dealing with new types of facilities which may have greater complexity or scale or both. Site conditions, particularly subsurface conditions which always present some degree of uncertainty, can create an even

greater degree of uncertainty for facilities with heretofore unknown characteristics during operation. Sometimes, construction procedures may not have been fully anticipated so the design may have to be modified after construction has begun.

Many owners have begun to understand the problems of risks and are seeking to address some of these problems. For example, some owners are turning to those organizations that offer complete capabilities in planning, design, and construction, and tend to avoid breaking the project into major components to be undertaken individually by specialty participants. This trend forces trading companies to be able to implement successful installation of their selling products.

5.2 Interview Results

The author conducted many interviews from key persons throughout the company she's working in order to record the actual status of a trading company when implementing a construction project. Employees from the Sales department, the Service department and the Procurement department were interviewed and the existing status of implementing construction projects is described below.

First of all, the customer makes a request for having a complete offer for the supply and installation of the selling products. The sales engineer studies the customer's request and makes an offer to the customer that contains the selling and installation of the products suited to the request. When the project is undertaken and the sales person gets the written approval by the customer, a contract with the customer is made. The order for the products is made and the sales person must select a subcontractor within an approved list in order to implement the installation of the selling products. A contract with the subcontractor is made too. After the initiation of the project, the sales person makes a meeting on site with the supervision engineer of the subcontractor and discusses the technical details of the installation. In most cases, the sales person doesn't visit the site again. It's the subcontractor's responsibility to

supervise and implement the installation of the products based on the technical directions given by the sales person and the Service department of the company. Any materials needed for the installation are purchased by the sales person in collaboration with the procurement department of the company.

The main error points of the above procedure are the following:

- A sales person's role and responsibility is to make an offer for the selling products. He or she usually doesn't have the appropriate skills and experience to make a cost estimation of the services and materials needed for the installation of the products. This lack of experience sometimes results in false cost estimations and therefore cost overruns in the project.
- The sales person doesn't have the time to supervise the project on site in order to avoid possible technical problems that may occur. Therefore, the risk of the project not completing in good quality is great.
- There should be a financial control of the project. This means that invoices to the customer should be made in weekly or monthly basis, depending on the scheduled duration of the project. The invoices should be made based on the completed percentage of works in the end of the week or month. In most cases, the sales person invoices the whole amount of the project after its completion which is not beneficial for the trading company as it usually results in cost slippage for the project.
- The procurement of the materials is sometimes delayed as the sales person doesn't always have a clear view of the project's progress.

Consequently, all the above areas of concern must be discussed and solutions must be given in order to avoid cost overruns, schedule slippages and bad performance in the project.

5.3 Process re-engineering

In the flow chart of Appendix F, the new procedure of implementing construction projects in trading companies is outlined. The flow chart is developed annals based on the life cycle phases of a construction project as defined in PMBOK (2000, fig. 2.3, page 15). The phases of the life cycle of a construction project are: Feasibility, Planning and Design, Construction, Turnover and Start-Up.

6.0 DISCUSSION

Based on the evaluation of the key concepts of this study, the author realised that trading companies that need to act as contractors in order to increase their sales is still a developing issue. Many trading companies are trying to keep up to new market trends which force them to become constructors in order to maintain their share market or even increase it. There were three main required efforts that resulted from this study.

1. Create a new project team with qualified staff for implementing construction projects in trading companies.
2. Re-engineer some of the key related processes of the organisation in order to incorporate project planning and execution processes.
3. Design a new and effective procedure for implementing construction projects in trading companies.

The major outcome of the above efforts is to increase customer satisfaction and the organisation's profits.

7.0 CONCLUSIONS

Reviewing the literature review of this study, some interesting issues were identified. Business process reengineering can be used in many organisations in order to deal with new market trends. From the late 1980s to mid 1990s, BPR, as a new management style, took over from the previously popular management trend of quality or continuous process improvement. Trading companies which must play the role of the "constructor" with the aim to increase the sales of their products can be greatly benefited by BPR.

As a result of the interviews made in the author's company, there is a great need for trading companies to have a clear and effective procedure of implementing construction projects through a qualified and organized project team. Sales persons mustn't be involved in any kind of construction facility. A complete project team must be formed for the implementation of the construction projects in trading companies, therefore resulting in increased sales and profitability for the company. Moreover, the new procedure of implementing construction projects will bring about high quality services and therefore increased customer satisfaction.

The customer's exceptional position in BPR is emphasized by Hammer and Champy (1993), who state that "there is no longer any such notion as the customer; there is only this customer, the one with whom a seller is dealing at the moment and who now has the capacity to indulge his or her own personal tastes." The customer has the power to trigger a business process. In response to such a triggering event, a business process – defined as a sequence of steps and decisions – is initiated to produce a specific, identifiable result or output.

Redesigning core processes is the primary aim of any BPR project. Hereby, BPR is meant to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed (Hammer and Champy, 1993, p. 32). Basically, BPR is a methodological collective term for activities that intend to achieve

organizational change by process orientation, namely, by radically reengineering an organization's existing collective and regulative knowledge.

BPR encompasses drastic actions in companies that aim to change from trading to contractors. These actions that aim to change an organization's institutions are considered organizational change actions. They are part of the tactics, which aim to achieve organizational change and to establish outcomes in terms of new institutions and new business actions.

The new procedure of implementing construction projects in trading companies formed in this study will be an effective and helpful "tool" for project managers to have in order to plan and execute their projects successfully. Furthermore, the sales team will be relieved of a great amount of work, which isn't included in their working duties, therefore resulting in increased sales for the organisation. The selling products will be greatly promoted in the market through big construction companies as well. Finally, customer satisfaction will increase as the services offered by the trading company will be wider, with better quality and value-adding to the customer.

8.0 RECOMMENDATIONS

As a result of this study, it is recommended that the projects department receives a constant training on the new selling products of the company and construction techniques. The project site supervisor as well as all the members of the project team must have great technical knowledge and skills in the products in order to be able to resolve quickly and efficiently any technical problems that may occur in the execution phase of the project.

Furthermore, a detailed procedure of evaluating and selecting new subcontractors or suppliers must be formed by the Procurement department of the company and then incorporated into the existing Projects procedure. The credibility and effectiveness of the subcontractors and suppliers of a company is an important factor for the project success as it involves great risk.

Finally, techniques and requirements during project planning, including risk assessment, cost estimation, forecasting and economic evaluation are greatly needed in construction projects. During the planning and design phase, major cost savings may be obtained from the eventual construction and operation phases. Techniques for control of time, cost and quality during the construction phase are also useful. There are numerous software programs which could be used for these purposes. Software packages for information management and project scheduling should be used by the project team in order to simplify the project's processes.

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APPENDIX A- Projects Policy and Procedure

COMPANY LOGO

COMPANY NAME	
DATE :	Number : PRO 2007

POLICY AND PROCEDURE

Procedure of Coordinating and Implementing Projects in trading companies

INITIAL APPROVAL

Preparation	(Signature & date)	Approved by	(Signature & date)	Disengagement	(Signature & date)
Project Manager		Managing Director		Quality department	
Commercial Manager		Financial Manager			

REVIEWS

Review N°	Review date	Reviewed by	Approved by	(Signature & date)	Disengagement	(Signature & date)
1		Project Manager	Managing Director Financial Manager		Quality department	
2						

HISTORY REVIEW

Review N°	Review date	Change Description	Reason of change
1			
2			

DISTRIBUTORS TABLE FOR POLICY AND PROCEDURE

PRO 2007

DEPARTMENT	✓	SIGNATURE	DATE
<u>GENERAL MANAGEMENT</u>	✓		
<u>FINANCE DEPARTMENT</u>	✓		
<u>SALES DEPARTMENT</u>	✓		
<u>MARKETING DEPARTMENT</u>			
<u>PURCHASING DEPARTMENT</u>	✓		
<u>IT DEPARTMENT</u>			
<u>SERVICE DEPARTMENT</u>	✓		
<u>HR DEPARTMENT</u>			

<u>QUALITY</u>			
<u>DEPARTMENT</u>			
<u>EH&S DEPARTMENT</u>	✓		

1.0 PURPOSE

This procedure refers to the formulation and description of the processes which must be followed when coordinating and implementing construction projects in trading companies.

The trading company undertakes the construction of projects only when:

- It is essential for the promotion of considerable Volume and Value of selling products.
- The take-over of the project from one of the company's dealers isn't accepted by the customer or doesn't secure the sales promotion of the products based on the company's goals.
- The organization doesn't compete directly other associate companies like dealers, contractors.
- They serve work that can only be executed satisfactorily by the technical staff of the company.
- A "key account" customer demands that the overall invoice and responsibility will be made by the trading company.

2.0 INFLUENCE AREAS

Departments: Service department, Sales department, Finance department, Procurement department, Project department.

3.0 DEFINITIONS

The project is defined as followed:

« Every construction activity that includes the sales of the company's products, services (company's staff and subcontractors) and materials for which the organisation has complete responsibility of delivery in smooth functioning».

Indicative services are the design, determination of technical specifications, cost estimates, installation and supervision in the project execution phase as well as the final close-out and delivery of the project to the customer.

When in this procedure, cost limits are referenced, they are subject to the company's policies.

4.0 COMPETENCIES

Qualified for the alteration and review of this procedure is the Managing Director. The competencies that coexist in this procedure involve the Project department, the Service department, the Procurement department, the responsible project supervisor and the Finance department.

5.0 DESCRIPTION

Since an activity falls into the above definition of the "Project", the overall management of all the projects is undertaken by the Project department (PD) of the company. The procedure that must be followed is:

- Every project will be discussed from the qualified sales person with the Project department and the decision whether the company will undertake the project or not will be made.
- If the project isn't undertaken by the company, the most suitable dealer will be suggested who will be responsible for the overall management of the project.
- If the project is undertaken by the company, the Project department will be responsible for the following processes :

5.1 Project design – Cost estimation

The project design and cost estimation will be made based on the following guidelines:

- Before the submission of the offer to the customer, the regulated approvals will be taken based on the current approval policy of the company.
- The project design will be made by the project supervisor responsible for the project in collaboration with the Service department. The best technical solution will be quantified in terms of offered machinery as well in terms of required technicians for the project.
- Cost estimation will be made by the Project department and it will be written in the attached form «Pro 001», which will be approved according to the following :
Overall cost estimates till 60.000 € are examined and approved by the Project Manager, overall cost estimates over 60.000 € are examined and approved by the Managing Director. The Project department approves the suggested level of the offer (cost and margin).
- The final offer is sent to the customer after it is signed by the project supervisor responsible and the Commercial Manager.
- For the origination and execution of the project, the written acceptance from the customer and the signature of a contract will be required.
- After the approval of the design and the cost estimation, credit control of the customer will be made from the Finance department and its results will be taken into account before the final offer.
- After the acceptance of the offer and if the total value of the project is over 3.000 €, the Project department will make a contract with the customer which will be given to the Finance department and then to the tax office.
- Following the above approvals, the Service secretariat opens a project order with a protocol number, which requires approved printed cost estimation form Pro 001, and

follows the directions of the Project department in order to perform the presumable invoices of the project (based on the instructions in paragraph 5.3).

- The order of the necessary materials for the project is made by the Project department in collaboration with Service department for the issuance of shipping invoices.

5.2 Subcontractors – Suppliers

If the installation of the project isn't executed by the company's staff (technicians) only, and there are subcontractors and suppliers, the below process is being followed.

The Project department prepares the scope of works and the technical specifications of the project.

- For project commissions until 300€

The Service department in collaboration with the Project department selects the most suitable subcontractor who must obey the rules of Environment, Health and Safety of the company.

- For project commissions until 20.000€ per subcontractor and installation:

- For subcontractors within approved list

The Service department in collaboration with the Project department selects the most suitable subcontractor by making a summation note in which the reasons of selecting the specific subcontractors will be mentioned. Moreover, the subcontractor's offer for the project will be taken into account for the total cost estimation of the project.

The project supervisor on behalf of the subcontractor must ensure that all the procedures of Environment, Health and Safety (EH&S) are followed.

- For subcontractors out of approved list

The Service department in collaboration with the Project department must get two (2) offers at least and forward them to the Procurement department in order to follow the procedure of introducing a new subcontractor.

- For project commissions over 20.000 € per subcontractor and installation :

The Service department in collaboration with the Project department must get two (2) offers at least and forward them to the Procurement department in order either the subcontractor to be approved if he is new or to be compared to older kindred offers for subcontractors within the approved list.

➤ For subcontracting over 3.000 € a contract will be made with the subcontractor by the Procurement department which will be given to the Finance department and then to the tax office.

After the selection of the subcontractor or supplier, the Procurement department completes the relevant processes and forwards the copies of the offers, contracts and purchase orders to the Project department for file.

For the compilation of the **list of approved subcontractors and suppliers**, the Project department will collaborate with the Procurement department on the determination of the criteria that will be applied for the selection of subcontractors and suppliers.

5.3 Project observation

A complete file will be prepared for every project which will contain all the technical and financial data as mentioned above. It will be the Project department's responsibility to keep and maintain the file of the project. The typical parts of the folder are:

➤ Part 1

Data on the technical study, cost estimation, approvals of offers to the customer and final offer. The final offer must satisfy the criteria of the company's commercial policy. In other cases, the appropriate approvals must preexist .

➤ Part 2

Acceptance of the offer, contract with the customer, customer and company's correspondence, project protocol of delivery and acceptance by the customer.

➤ Part 3

Implementation data of the project like subcontractors' and suppliers' contracts, sales orders for machinery or parts and relevant correspondence with the subcontractors and suppliers. Furthermore, the schedule, specifications, drawings, calculations and other technical data are included in this part.

➤ Part 4

Financial project data like progress cost tables, customer invoice copies, subcontractors' and suppliers' payments as well as other data that must be included in the project order that is being kept by the Service secretariat. The project's invoices will be made based on contract's conditions and the approval of the supervisor project engineer for the completion of every project phase.

The guidance of the Service secretariat for the customer invoices as well as the approvals and acceptance of the subcontractors' and suppliers' invoices will be on the Project department's responsibility. One week before the end of the month the responsible project engineers will send form Pro002 to the Service secretariat, in which the progress of works and the corresponding amount that must be invoiced, is included. Then, the Service secretariat fills in form Pro003 and sends it to the customers in order to inform them and get the final approval for the invoice of the amount. The final financial result will be written in form Pro001 along with the protocol of delivery and acceptance (Pro004) by the Service secretariat, which will mean the completion of the project.

5.4 Project supervision

The project supervision will be made by the Project department by staff that is aware of the project. The execution of the installation will be made based on the correspondent manuals of the products. Weekly audits for possible technical defects and deviations from the initial design will be made by using the available in-house checklists.

The final delivery of the project to the customer will be made with a protocol of delivery and acceptance. At the completion of the project, the Project department will send the final Pro001 to the Finance department, the Sales Management and the Service department.

If there are significant deviations from the initial bill of quantities, the causes will be detected and a lessons learned folder will be prepared for future similar projects.

After the completion of the works , the project order is characterised as Technical Completed (TECO).

5.5 Internal briefing

The Project department will make progress reports in a monthly basis in which the following data will be included:

1. Number of projects in progress
2. Percentage of completion and estimation of completion time per project
3. Number of offers given in the last month
4. Number and values of offers that resulted in contracts with customers.
5. Projects that were completed in the last month and their financial results (estimation versus actual, manhours spent, earnings).

6.0 RELATIVE SUPPORTING DOCUMENTS

1. Installation manuals of the machinery
2. Pro 001 (Cost estimation form)
3. Pro 002 (Progress observation of project works)
4. Pro 003 (Informational letter of project invoice to the customer)
5. Pro 004 (Form of Protocol of acceptance/delivery)

7.0 VALIDATION

This policy and procedure is liable to validation duty. If there is any alteration to this policy and procedure, a retained copy of the void version is kept for seven (7) years by the responsible person in the design control. After the seven years time, the sort-out and removal of the void version is allowed only with the approval of the Quality manager.

8.0 ALTERATION DUTY

Alteration duty for this policy and procedure has the issuing department with the commissioning person. The final approval will be made by the commissioning person.

9.0 DISTRIBUTION LIST

This policy and procedure must be released to all managers of the company and must definitely be kept to all departments' records that are mentioned in the influence areas (paragraph 2). Each department decides if more copies of the policy and procedure are needed. The Quality department will retain in its record all the policies and procedures of the company. Moreover, the Quality department will organize the distribution and alteration of all policies and procedures.

10.0 ATTACHED DOCUMENTS

Flow chart FC Pro 2007 (Flow chart of policy and procedure in coordinating an implementing construction projects in trading companies).

APPENDIX B- Cost estimation form PRO 001

COMPANY LOGO

Projects Department					
CLIENT:					
Project Name :					
Service order :					
% complete :					
	Est. Dry Cost	Targeted Margin	Offered Price	Actual Cost	Diff
COST ANALYSIS					
FINISHED GOODS					
PARTS & MATERIALS COSTS					
THIRD PARTY COSTS					
INTERNAL LABOUR COST					
OTHER COSTS					
TOTALS					
SELLING PRICE					
MARGIN%					
					Date
Cost estimate Approved by					
Offer Approved by					
Final closing review performed by					

APPENDIX C - Progress observation of project works form PRO 002

COMPANY LOGO

COMPANY NAME								
Services Operations								
Project Monthly Invoicing								
Month May 2007								
No	Customer	Company's Project manager	Project Location & location	Customer's Responsible	Fax	Contract date	Amount € to be invoiced	Description of works
1								
2								
3								
4								
5								
6								
7								

APPENDIX D - Informational letter of project invoice to the customer PRO 003

COMPANY LOGO

INFORMATIONAL LETTER BEFORE INVOICE

To : (customer name)

Attention : (customer's responsible)

Fax: (fax number)

Date :

Subject : Invoice of current project phase

According to our contract dated on 04/03/2007, we inform you that we will invoice the amount of 10.000 € until 04/25/2007 which relates to the works that have been completed during the current project phase. The invoiced works involve the following:

- Equipment installation
- Piping installation
- Electrical connections

If there are any objections regarding the above amount of invoice, please contact us until 04/22/2007.

Regards,

(name of the Project Manager)

APPENDIX E - Protocol of acceptance/delivery form PRO 004



PROTOCOL OF DELIVERANCE AND RECEIPT

Today on the _____ at the building of the following address: road _____, No. ____, city: _____ property of: _____, was made a complete check and the:

- final receipt temporary receipt no receipt

of the project, as it is mentioned in the contract of date: _____, and concerns:

The project was implemented by the company _____ and during the check were:

- Representative of the company: _____
- Representatives of the customer: _____

During the check was made certain that the installation and the operation of the equipment:

- is consistent with isn't consistent with

with the specifications and the agreement between the contracted of the relative contract.

Based on the above and in combination with the fact that the above equipment:

didn't perform any technical problem performed a technical problem

during the testing, that were made from : _____, until: _____,

the present form was completed in cooperation with the representative of the customer.

Notes:

For the company

For the customer

APPENDIX F- Flow chart Pro 2007

