

České vysoké učení technické v Praze

Fakulta stavební

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**Dodavatelské systémy mezinárodních stavebních
projektů**

**International Construction Procurement Systems
- Mitigation of Risks**

Summary

This text of lecture provides an overview of possible interrelation between the procurement systems in international construction and the international contractor's risk management toolkit. The lecture highlights problems and areas that are unique to international projects and business and that need the systematic care and effort of the all project team members.

Construction project risk is a term interrelated and connected with the international projects. International construction firms have been permanently standing up to risks and uncertainties in their home markets. Nevertheless, internationally, expansion and strengthening of risks, particularly outside the advanced markets, exists.

The scope of given lecture is oriented on the real climax of contractor participation in procurement process and the same time most risky point – preparation of bid and within it the assessment and after being awarded the job, negotiation of contract final conditions.

Other risk like technical and contract performance ones are better mitigated within the company best practice and international know-how.

Contractual risks are assessed from the point of view of their impacts and their possible retention. It is shown that in final reconciliation the cost of risk impacts are more significant than the technical risks occurring during the procurement phase. The risk potential assessment of selected procurement types is provided.

Souhrn

Text přednášky poskytuje výklad možné provázanosti dodavatelských systémů mezinárodních stavebních projektů a celé sady nástrojů pro řízení takovýchto složitých dodavatelských struktur. Přednáška osvětluje oblasti a problémy, které jsou typické pro mezinárodní stavební business a které vyžadují speciální aktivity všech členů projektového týmu.

Standardní míra rizika u běžných domácích projektů se porovnává s mezinárodními projekty. V rámci tohoto srovnání se vytypovávají oblasti, kde rizika jsou oproti domácím projektům významnější.

Zaměření přednášky je orientováno v tomto kontextu na nejvíce rizikové fáze a to zejména přípravu nabídky a po získání nabídky snahu v rámci negociace s klientem vylepšit pozici v rámci znění kontraktu, který byl předem klientem přiložen k nabídkovému balíčku.

Ostatní rizika, jako jsou technická rizika nebo rizika celkové produkční výkonnosti, jsou daleko méně nebezpečná, neboť jsou řešena v rámci standardního podnikového systému založeného na Best Practice přístupu. V rámci tohoto systému jsou používány standardní procedury, vzory a checklisty, které umožňují minimalizaci rizik.

Přednáška rozebírá především rizika kontraktu spojená se zvoleným dodavatelským systémem, která mají větší ekonomické a ostatní dopady na podnikovou situaci. V závěrech se navrhuje postupy jak tato rizika minimalizovat.

Klíčová slova:

mezinárodní stavební projekty, dodavatelské systémy, řízení rizik, omezení rizik, standardní kontrakty, finanční dopady rizik, nejlepší praxe, operační manuály řízení mezinárodních projektů, řešení sporů, veřejné soutěže

Key Words:

international construction projects, procurement systems, risk management, risk mitigation, standard contracts, risks' financial impacts, best practice, operating manuals for international project management, dispute resolution, public bidding

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Introduction

If Czech or any other contractor decides to go abroad and operate internationally then the contractor will be performing more than practicing the same business in another territory. Its company is entering the international construction market with all the competition, inventive project financing, foreign currency problems and restrictions and professional labor force supply problems. It is a field where company financial manager aside with the business people, engineers and estimators must perform the essential position in negotiating contracts and in supporting the project execution from the home country and locally.

This lecture provides an overview of possible interrelation between the procurement systems in international construction and the international contractor's risk management toolkit. The lecture highlights problems and areas that are unique to international projects and business and that need the systematic care and effort of the all project team members.

Risk is a term naturally connected with the international projects. International construction firms have been permanently standing up to risks and uncertainties in their home markets. Nevertheless, internationally, expansion and strengthening of risks, particularly outside the advanced markets, exists.

The scope of given lecture is oriented on the real climax of contractor participation in procurement process and the same time most risky point – preparation of bid and within it the assessment and after being awarded the job, negotiation of contract final conditions.

Other risk like technical and contract performance ones are better mitigated within the company best practice and international know-how.

1. General Construction Features and Characteristics with Emphasis on Procurement System of International Projects and Embedded Risks

Procurement systems in construction industry are not only different from all other industries but are diverse from within as well. The differences between, for example, heavy plant construction and residential building are evident. The same feature of this diversity is evident from comparing the business range, from the local contractor for whom thousands of euros in sales are significant, to the giant company with billions of euros in turnover. Each of them creates its own special part of the overall results.

Despite this diversity, certain characteristics are common to most of the international contractors. The performance of work under a contract with a customer is the basic thread that runs throughout the industry. Significant common characteristics of project procurement and the same time of the contract include between others (adapted from CFMA, 2005):

- The generation of sales through a bidding and estimating process.
- The estimation of costs needed to finish a project long before it has even begun.
- A risk of nonperformance or loss, especially in fixed-price contracts.
- The bonding (bank guarantees) at all stages of construction or even at pre-construction.
- The use of cost and revenue accumulation techniques by project - industry specific billing and interim financing, specific differences are embedded in new space of Project Finance (PPP/PFI procurements systems)

While analysing all these five characteristics it is evident, that they have a common denominator - **the risk embedded in all**

stages of contracting business. The Risk Management, as being applied in the management of construction projects, is a particularly needed discipline in case of international projects as the contemporary tool for recognizing and mitigating all the risks (Nielsen, 2006). Elaborateness of the procedures and efficiency of such systems are in the contemporary construction management comparable with similarly structured Total Quality Management systems (TQM) (Flanagan and Norman, 1997 and later).

All above said has the close connection how the building projects are actually initiated, procured and carried out – in other words under what procurement and/or contractual system are executed.

In addition to the written above, we can describe several other selected specifics of the construction procurement systems which are contributing to the already mentioned diversity and to the risk present in any international project/contract:

- *Uniqueness and geographical dispersity of projects as a potential hazards factor*

This feature means that elimination of possible errors and reaching production improvement is not possible through some standardization and that in every project smaller or bigger deviations from the original plans and schedules appear throughout the building process. That is why the planning must be very flexible with the possibility of fast responding, even directly at the site level. So managing every international project requires a highly decentralized system of corporate/project governance, which means that it requires creative management and decision making actually at any level (Hill, 2004).

Specifically with international projects the geographical distance can be enormous, which means it is very demanding on the project teams and everybody involved. This fact can create the substantial obstacles in staffing the international projects.

- *Risk nature of international projects - working capital requirements and duration of projects*

Every international contract/project has to be backed up by a certain quantity of working capital to overcome temporary problems in project cash-flow which are empowered by specific conditions in different markets. Another feature of the project performance is its long duration (sometimes even for several years) which is contractually defined. It leads to the risky and/or hazardous nature of a project related to transacting business in foreign currencies. Exchange risks connected with exchange rates fluctuations, inconvertibility of given country currency, problems of repatriation of profits including withholding of part of sales can create risky environment for every contractor in spite of its capital background and financial power. The economic risk category includes also inflation and sudden changes in prices. This relates to the risk of price increases during the construction phase. All these risk have an important impact on overall profitability of international projects.

- *Projects Bonding as an outstanding risk phenomenon*

Bonding is an important and crucial feature of the construction industry and of the international projects in particular related generally to job's risk. The general purpose of bonding is to ensure the client that only qualified and responsible contractors are participating in the contract. It is a three-party involvement among the contractor, the client and the bonding company (most often a bank). Providing the bonds to a client is usually defined in the bidding conditions and is part of the contract text as well. Because of a higher risk connected especially with the international projects, it is a complicated and difficult procedure for a company to acquire these necessary bonds from the bank or other surety companies (Ndekugri, 1999).

The general ability of a contractor to provide the bonds for all intended contracts is restricting its ability to bid for more projects and this limit is called *bonding capacity* (or also *surety credit line*), which is derived from the overall surety relationship to a providing surety company. The process of determination of

the bonding capacity is similar to the assesment of a company's credit line (Severson, Russell, Jaselskis, 1994). The potential calling of bonds is to be considered as the first-class latent hazard of any project followed by cashing in the bond amount while that amount can represent up to 10% of contract sum. Declaring the alleged default of contractor can be the case of the misuse of Performance Bond.

2. Procurement, Types of Contracts and Project Delivery Arrangements Used in International Contracting - Risk Threats

The way how to realize the project from the point of view of an owner can be called as procurement route. What procurement route could be optimal depends on requirements fixed for cost, time, quality and/or functionality. The future project problems are predestined in selection of procurement type (Laedre et al, 2006)

Contract awarding in private sector is reasonably more often accomplished through negotiation than in in open competitive bidding. Contract negotiation with preselected and prequalified constructor is the best way how to avoid future disputes, claims and arbitration, which happens so often in cutthroat competitive bidding with contract price as main criterion. These method are nevertheless required by law and espeacially enforced by European authorities.

The construction contract is the foundation for the procurement systems in construction process. All the forms of contracts and project arrangements described further are commonly used both in domestic and international projects. For international projects in particular the arrangements provided by the standard contracts system called FIDIC (International Federation of Consulting Engineers) are often used. Concrete correspondence between individual contract arrangements and their FIDIC counterparts is shown further in this section. A

construction company performance is always interconnected with the law that influences bonds and insurance area, implementation of contract clauses, business liabilities, public bidding etc.

Legal issues and today's complicated and risky procurement systems have become the key issue in risk retention continuum. Every project or division level manager must become more and more experienced recognizer of the risks confronting given project and company and being aware of the tools for them. Especially for the managers in company international division should be an unquestionable matter to be able :

- Identify potential risks, analyse and assess impact of broader risk costs
- Minimize those risks if it is possible to eliminate it, reduce it, and/or transfer it
- Identify if and when additional counsel is required

As I can say from my own personal practice that very often constructors, striving to get the given job, concentrate on estimating cost of labor and materials founded on review of specs and drawings. *Despite that, contractors' engineers and business people pay meager attention to essential provisions of contract, specifically the general and particular conditions and other documents incorporated by reference. These documents can contain the clauses with real commercial risks.*

The above said is referred to the parts of contract (*just the nontechnical ones*) with possible threats originating from provisions of:

- a. Coordination of works;
- b. Times limits for compliance;
- c. Inspection of works;

- d. Presumption of risks in relation to the scope of contract, like unexpected underground conditions, damages for delays, variations; and
- e. Risks referring to different problems such as safety precautions, indemnification of the owner or designer, changes, and insurance requirements – in this context and that is valid particularly in government contracts there are pitfalls clauses like notice of claim requirements, liquidated damages , exculpatory clauses and bonding requirements

For the fundamental importance of individual forms of contracts, I consider it necessary to provide a shortened overview of them. The forms define the project setting and what the project is, how the project will be built, what the time frame is and what the project should cost. The parties' specific and implied rights are set by the contract text. The proper understanding of the contract by both (all) parties is a management tool. A poorly understood construction contract inevitably leads to a project's crisis. Once approved and signed, the contract cannot be unilaterally changed.

Matter of enormous importance uses to be the *risk transfer*. The contractor should always reject the *idemnity clause*. The same way the contractor should not provide the client additional insured status (e.g. by granting additional items in Commercial General Liability policy)

According to Clough & Sears (1994) and Civitello (2000) the most common forms of international construction contracts are derived from these **pricing arrangements** types:

- *Fixed Price contracts* - covers the total amount of work on a particular project for a single agreed price.
- *Time-and-Material contracts* - contractor payments are computed as a ceiling price of costs plus a markup with

possible variations (labour only, labour and materials only, etc.).

- *Cost-Plus contracts* - contractor proves all site's costs with open books plus a markup.
- *Unit-Price contracts* - total contract price becomes the sum of the units multiplied by a fixed unit price (e.g. price for 1 km of a highway).
- *Package deals/turnkey* - A construction contract for the complex project ready to use after takeover with price fixed at the time of contract signature. The constructor company is held responsible for exceeding the budget. Thus turnkey construction contracts reduce the risk to the buyer of the construction works and services

Above described pricing arrangements can be variously applied in different contracting arrangements. As already emphasized, thorough understanding of the various forms of these **contracting arrangements** and the specified relationships among the contracting parties leads to effective management of these contracts. Appropriate creation of the balanced text of the contract and its current updating (because of the changes that occur during the realization phase) is a subject of the discipline called contract management, which is of a great importance for project profitability. There are several common forms of project delivery expressed in contract arrangements, that may be selected by a client. According to Civitello (2000) and Levy (2000) they can be classified as follows:

- Lump Sum (fixed price) General Contracting (GC),
- Agency Construction Management (ACM) or Construction Management at Risk
- Construction Management with Guaranteed Maximum Price (CM w/GMP),
- Design-Build (DB).

These most common types of international contracts can be identified in following list – see the next figure. The figure

provides look on distribution of contract risk between Employer and Contractor. Generally all types of only engineering type of works are less risky because smaller own exposure, conversely the „generic „ construction job participation including own workforce and equipment use to be more risky.

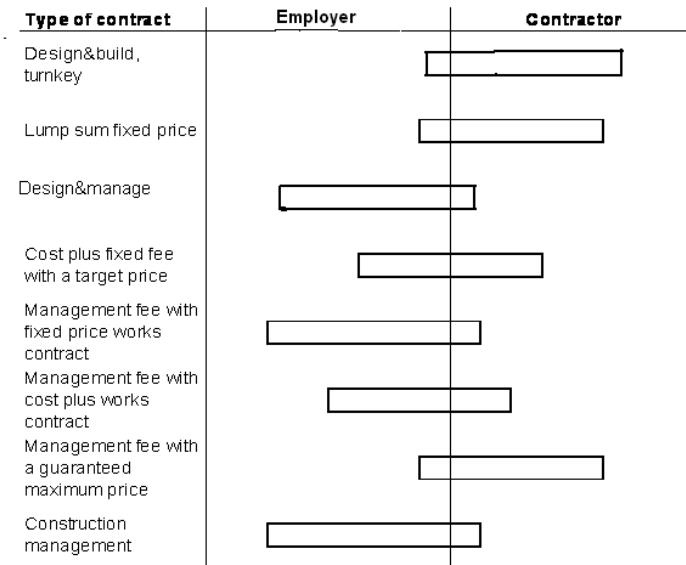


Figure 1: Contractual Risk Apportioned to selected types of contract (adapted according Edwards,1995)

3. Risk Potential of Procurement based on Lump Sum Contracts – Higher Risk

This way of arranging contracts is recognized as the "traditional" one. In the lump sum general contracting structure, the owner (client) contracts directly with the contractor. The owner also contracts directly with the architect (designer). There is no direct contractual relationship between the architect and the general contractor, there is only a communication

interaction. The architect's responsibilities beyond the design are to administer and supervise the overall performance of the contractor. Nowadays, the construction work is substantially performed by specialty contractors and subcontractors under coordination and supervision of the general contractor. By this subcontracting, the general contractor also shifts much of a legal responsibility for the performance for each part of the project directly to the individual subcontractors. Risk potential of the procurement is derived of the fact that the price is not usually subject to adjustment connected with constructor's incurred costs. This is the cause of higher than average risk embedded in this contract type. Vice versa the responsibility and risk of designer's errors are on the side of client because of the direct contract link with designer(A/E).

4. Risk Potential of Procurement based on Agency Construction Management

This arrangement is also widely known as a Construction Management for Fee. The nature of a particular job, especially one of large size and at a remote location, may move the client to hire a contractor as a construction manager. Their relation may be defined in the specific agency construction management agreement, where the functions and services of construction management are carried out on behalf of the client.

An "agent" construction manager can be thought of as an extension of the client's staff with assigned responsibility to manage the project in the name of the client. This contractual arrangement is characterised by direct contractual relations between the client and all other project participants, that is the architect/engineer, all the subcontractors, and suppliers (Levy, 2000) (Civitello, 2000). The actual project management is, however, performed by the agency construction manager only, as shown in the scheme through the communication (contact) lines. The maximum portion of risk is on the owner side of contract. The risk of contractor (here substituted by the ACM – agency construction manager) is represented by the possibility of losing part of fee, goodwill loss and conceivable professional

liability consequences. The above said hazard /risk potential enables the low required amount for construction management firms and the same time characterizes special suitability for possible export of engineering capacities abroad.

Further figure shows the scheme of ACM functioning that enables the low risk exposure of ACM firm:

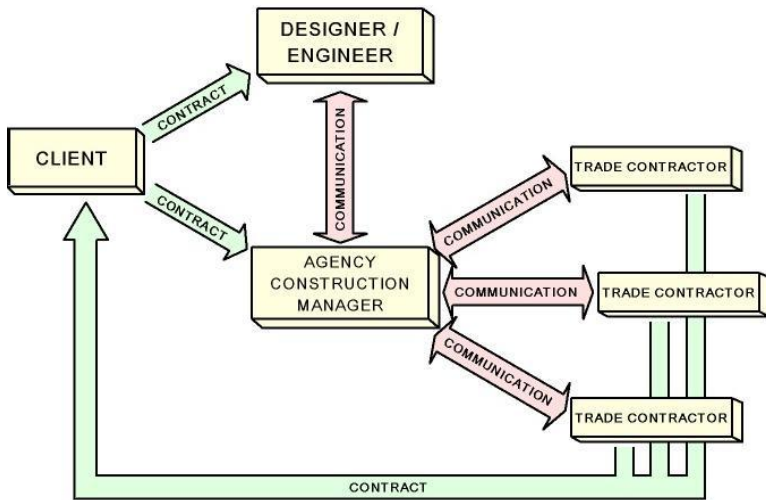


Figure 2: Agency Construction Management contracting arrangement scheme , Source: Civitello, 2000, adapted

5. Risk Potential of Procurement based on Construction Management with Guaranteed Maximum Price

There are two main characteristics for this contract arrangement. The first one is that the construction manager firm executes the role of a general contractor (is fully responsible for the project's profit or loss, which is called "construction manager at risk") and thus he has full contractual relations with all the other project participants, except the architect/engineer. The

second feature of this arrangement is that the construction manager is responsible for completing the project for the total sum, that is equal to or lesser than the guaranteed maximum price. This price is de facto a fixed one, with the incentive element consisting of the possibility of sharing the eventual savings of costs. This sharing is done by the formula (ratio) defined in the contract. Through this incentive, sharing of eventual cost savings, it is possible to sign the contract and to set the guaranteed maximum price as a "cap" even before all the plans and specifications are completed - usually at 70-80% progress done, e.g. in (Civitello, 2000) or (Clough et al, 2005). Risk potential is similar like in the case of lump sum contract i.e. higher risk. Possible risk of loss can be partially mitigated by earning from profit sharing scheme.

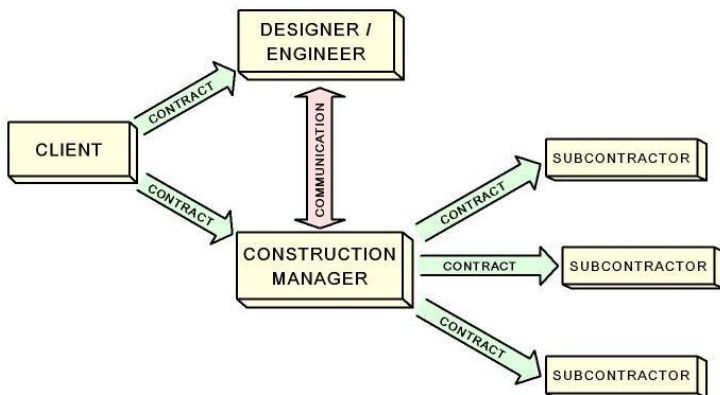


Figure 3: Construction Management with Guaranteed Maximum Price, source: Civitello, 2000, adapted

6. Design-Build Risk Potential

In this form of contract, the client contracts directly and singularly with the single "design and build" firm. It can be a general contractor with design capabilities or an association made between the design firm and construction firm for the specific contract. The principal advantage of this arrangement to the client is its simplicity - abandoning the usual triangle client-

contractor-designer. The obvious advantage is that the design-build company is completely responsible to the client for the quality, cost and schedule of final product. The design-build method can produce substantial cost savings and it also enables so called "fast-track construction", because it removes the complicated procedure of harmonizing separate design and construction schedules and legal separateness of both entities (Levy, 2000).

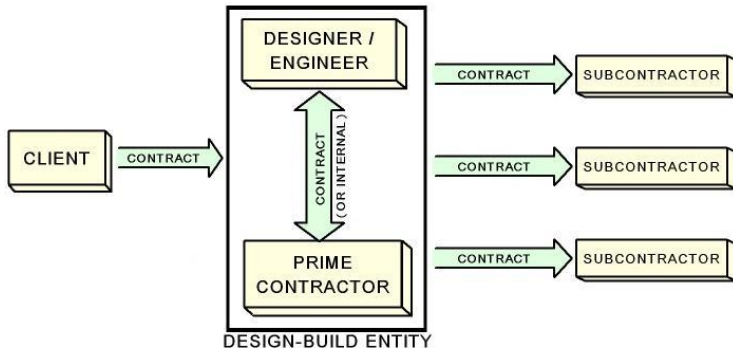


Figure 2-4: Design-Build contracting arrangement scheme, Source: Civitello, 2000, adapted

7. Risk Sharing in Procurement System Based on FIDIC Standard Contracts

As pointed out above, for international projects in particular the arrangements provided by the standard contracts system FIDIC are being used. The FIDIC 1999 Suite of Standard Conditions of Contract enables to adapt the individual "Books" for given project arrangements conditions. The main difference between the Books is coming from two distinctive criteria: who does the project design and who bears the risk for change in quantities. All the types of contract arrangement described

above correspond with the following standard FIDIC contracts, as they are defined in The FIDIC Contracts Guide (2000), (Toterdill,2008):

- *Conditions of Contract for Construction - The Construction Contract* (The New Red Book) - When a project design is supplied by a client. This type is most suitable for building and engineering works. The risk sharing is balanced for both parties. Corresponds with the Lump Sum General Contracting type of arrangement.
- *Conditions of Contract for Plant and Design-Build - The Plant and Design-Build Contract* (The New Yellow Book) - Suitable for plant, building and engineering works, designed by the contractor. The risk sharing is balanced for both parties here as well. Fully corresponds with the Design-Build contracting arrangement.
- *Conditions of Contract for EPC Turnkey Projects: The EPC/Turnkey Contract* (The Silver Book), where EPC stands for engineering, procurement, construction - Responsibility for design lies with contractor, and he carries out all engineering, sometimes design and always procurement and construction. The client's requirements are functional only, and not for the way of realization. The project must be ready for operation at the "turn of a key". Because the contractor carries the majority of risks, the client pays a higher price. This contract corresponds with the Lump Sum contracting arrangement, however, the general contractor is responsible for all the pre-realization phases too.
- *Short Form of Contract: The Short Form* (The Green Book) - Is an abbreviated and simplified Red Book. It is suitable for a short-term and limited volume of works projects. The text of contract is written in uncomplicated language and condensed into fifteen clauses only. Project design is provided by either party and is suitable for all types of construction. The contract corresponds with the simplest form of the

Lump Sum contracting arrangement and is easily adaptable for any other pricing arrangement.

8. Hierarchy of International Supply Forms and the Risk Potential of Individual levels

To make the previous description of the forms of contracts and project delivery arrangements used in international contracting complete, we should characterize the degree of contractor's involvement and the risks potential of the given procurement type. It can be from a simple generic contract to a global service providing, which, as the name explicitly expresses, provides the customer with all the services connected with all the project's life cycle stages. To illustrate this, we can describe the hierarchy of construction contracting, where the complexity of services and sophistication of possible supply forms in the international/domestic construction business (similar approach can be found in Skanska's and Hochtief's internal company manuals, 2004, 2000). It can be sorted in an ascending order as follows:

- *level 1 - Simple Generic Contract* (i.e., General Contract) it is limited only to the execution stage, without providing any other engineering and design services – risk is considered standard, predominantly o
- *level 2 – Simple form of Turnkey Contract*, it is all engineering, design, procurement and construction including all equipment for smaller projects, ready to use
- *level 3 - Design-Build or Construction Management* when the contractor supplies both the project design and the realization stage, but not always with own production capacities
- *level 4 - Project Development* when the project developer manages the designer and the general contractor or developer is at the same time the constructor, coordinates and finances all the pre-

realization and realization stages and then sells the facilities built

- *level 5 - All Stages Construction Supply plus Facility Management* pre-realization and realization stages under contract of any previously mentioned type and in the operation stage facility management of the built structures provided by the construction firm's operating unit/ subsidiary
- *level 6 - Build-Operate-Transfer (BOT) and similar types* there are many variations of Private-Public Partnership (PPP) projects, e.g., DBOT, BOOT, etc., the contractor not only completely prepares and builds the structure, but also operates it for a given time period before transferring it fully to the public owner
- *level 7 - Global Service Provider* provides the customer with all the services connected with all the project's life cycle stages: 1. project initiation, 2. solution planning, preparation and design, 3. implementation/ realization, 4. operation, 5. project closure. At this level, all the variations of levels 1 - 6 can be used.

All these above mentioned procurement forms are widely used in international/domestic construction, but the last three ones are the domain of the big international contractors only, because of the need of extensive know-how and capital resources. These big contractors cease to call themselves contractors; they justifiably see themselves as service providers. We can demonstrate this by an example of the British company Bovis Lend Lease, which is one of the important world players in this field. Bovis concentrates on offering its clientele a complete investment solution based on delivering the complete package of a long term investment project.

Assesment of risk potential and risk impact of above defined procurement levels: There is no direct correlation or interdependence between the achieved unique level of procurement characterised chiefly with the type of selected

contract and degree of overall riskiness. Nevertheless it is a matter of fact and generally accepted paradigm that with increasing measure of complexity and entropy of supply system the overall and specifically commercial risk grow enormously.

Contractual risk of given procurement level should be usually balanced by concrete markup and within it the contingency sufficient to cover the mass of risks. Comparatively the most advanced procurement system at level 7 characterised by application of FIDIC Silver Book (EPC/Turnkey) contain definitely the highest level of entropy relating to low degree of client's defined requirements and in the final assesment then also the highest degree of profit.

It is however counterbalanced by larger markup (including contingency). The fairness principle of construction contracts is based upon the balanced contract concept – it means that risk and markup/profit are two complementing variables.

Risk impact of so individual cases, that are mostly unique and not frequently occurring can be performed by *guessing* while the quantitative risk probability estimates can be inaccurate. For projects of this complexity and with data not yet accessible the use of *decision trees* can be oriented on assesment of expected outcomes and to forecast risk information about contract. Decision tree evaluation may be used for project's parameter values like work in progress percentage, cost or schedule, claim collection progress and others.

9. Conclusions and Recommendations Oriented on Risk Mitigation:

1. *Concentration on high severity risks:* The lecture deals with controllable risks as well as not controllable ones. The approach to both risk classes differ – however the root cause of risk must be always identified. Nontechnical risk sources connected with the international procurement system generally and type of contract specifically must be considered as *high severity*

risks and be classified mostly as preventable risks. From the point of view of possible financial impacts they are often of higher importance than technical and performance risks.

2. Detailed assessment of risk cost impacts ought to be performed within company Best Practice procedures. Existence of company international operations' management manual is of vital importance. It is to comprise all standard procedures, patterns and checklists, adjusted to given territory including the *contingency* plans for possible recovery of cost impacts. The very existence of the manual cannot simply be overvalued enough .
3. *Standard contract approach* : Risk of accepting contract clauses as proposed in international job's bid package is definitely higher than are the home market standard clauses covering scope of works, terms of payment, indemnity, insurance termination, dispute resolution and others. Project risk potential is reinforced by other accompanying contracts like agreement with local agent, JV partner or bank/surety. Company Best Practice based upon the previous international project should strongly support usage of proven standard contracts like FIDIC, German VOB, UK applied standard JCT 2005 or AIA Contract Documents in USA. Such conditions of contract solve all key risk events and introduce procedural rules important for balanced contract. It comprises among others - definition of time periods in Contract, risk transfer clauses, risk mitigation and as well as other risk management proactive tasks.
4. There exists sturdy practical recommendation for the contractual matters – there is no such thing as client's „standard terms and conditions“ – especially for the international jobs. It is valid that if contractor's bid is competitive there is always chance to negotiate balanced terms and conditions. The balanced terms and

conditions cannot comprise the indemnity clauses that are simply outdated and the additional insurance status as described above.

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Narozen 19.8.1948 v Přerově, absolvent VŠE Praha, obor ekonometrie a statistika (1971), CSc. – ekonomika a řízení stavebnictví ČVUT Praha (1986) – školitel Doc.Ing.V.Jelen, CSc.

2.Přehled odborné praxe

1971 – 1972 Výpočetní centrum VŠE Praha (vývoj software)

1972 – 1978 Výzkumný a vývojový ústav Stavebních závodů, vedoucí výzkumný pracovník v oblasti řízení výrobních procesů (KS L+N a VVÚ Eta) a následně vnitropodnikového ekonomického řízení, vedoucí řešitel prací z řízení výroby,dopravy a montáže KS LaN a KS VVÚ ETA

1979 – 1981 vedoucí odboru výpočetní techniky,Stavební závody Praha

1982 – 1986 vedoucí odboru účetnictví, Stavební závody Praha

1986 – 1990 vedoucí finančního odboru IPS Praha, práce na systému vnitropodnikového ekonomického řízení středisek

1990 – 1995 finanční ředitel Montované stavby a.s.,účast na zahraničních stavebních projektech

1993 – 1995 člen představenstva vývozní dceř.firmy IPS (IPS Brochier)

1996 – 2005 ekonomický poradce v oblasti řízení projektů a developmentu, developerská činnost

1996 – 1998 externí pracovník FSv - přednášky 3 - 6 hod. týdně na fakultě stavební ČVUT

2001 – 2004 zástupce vedoucího katedry ekonomiky a řízení stavebnictví Fakulta stavební, ČVUT

1998 – dosud na katedře ekonomiky a řízení FSv ČVUT - vedení předmětů

Strategické řízení, Finanční řízení stavební firmy ,

Řízení velké stavební firmy, Financování a Investování,

Construction Economics, Construction Engineering and

Management, Legislation - Construction Contracts a řady dalších

2000 – dosud školitel doktorského studia, dosud obhájil 1 doktorand

2000 – 2003 člen red.rady impaktovaného časopisu Statistika

2004 – dosud Masarykův ústav ČVUT – předmět Projektový development a řízení projektů

Od 2007 Vicepresident Sdružení ECEM (European Construction Engineering and Management), což je program spolupráce stavebních fakult z 15 zemí v oblasti řízení ve stavebnictví

Od 2008 člen hodnotitelské komise Operační program Průmysl a podnikání, program Prosperita (podnikatelské prostředí) a program

Nemovitosti (nominován rektorem ČVUT)
Od 2008/09 International School of Business and Management při VŠE
Program MBA – garance a přednášky v oboru
Corporate Construction Management